Routledge Research in Education

DEVELOPING A DIDACTIC FRAMEWORK ACROSS AND BEYOND SCHOOL SUBJECTS

CROSS- AND TRANSCURRICULAR TEACHING

Edited by
Søren Harnow Klausen and Nina Mård

Developing a Didactic Framework Across and Beyond School Subjects

Centered around a contemporary conception of Bildung, this book effectively demonstrates how the aims of cross- and transcurricular teaching can be reconciled, resulting in a didactic framework for teaching and learning in secondary schools that can be applied internationally.

Chapters present a nuanced and unified approach to fusing theory and practice by offering accounts of some of the most promising teaching methods from leading scholars in the field of curriculum research. These methods include dialogic teaching or movement integration, transversal competences like digital or entrepreneurial thinking, and topics that call for crosscurricular approaches, like sustainability or citizenship. Addressing diverse worries and criticisms of crosscurricular teaching, the book includes international viewpoints and trends such as sustainability, citizenship, and student motivation to present a comprehensive and systematic scholarly treatment of crosscurricular didactics within the classroom. It further addresses important challenges that have been widely ignored, like how to evaluate crosscurricular work.

Ultimately, this volume makes a highly novel contribution to the field of crosscurricular didactics, and will be of interest to researchers, scholars, and academics in the fields of secondary education teaching and learning, educational science, and curriculum design. Those interested more broadly in the theory of education will also find the volume of use.

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Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First published 2024
by Routledge
4 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
605 Third Avenue, New York, NY 10158

Routledge is an imprint of the Taylor & Francis Group, an informa business

Open access funded by Åbo Akademi University

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-032-43320-2 (hbk)
ISBN: 978-1-032-43429-2 (pbk)
ISBN: 978-1-003-36726-0 (ebk)

DOI: 10.4324/9781003367260

Typeset in Galliard
by Apex CoVantage, LLC

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1 Introduction

Nina Mård and Søren Harnow Klausen

Teaching and learning across and beyond individual school subjects continues to be in high demand. Large societal challenges, such as information overload, problems of orientation and motivation, mental health challenges, democracy and climate crises, and the rise of transhumanism, call for teaching approaches that support and promote students' overall development. To meet the challenges and prepare students for future work and life in increasingly diverse societies, they must acquire competences and skills that are not adequately supported by the standard curriculum. Instead, this requires collaboration between different school subjects or the creation of new contexts of teaching and learning.

There is, however, a profound lack of theoretical foundation and didactic guidelines for cross- and transcurricular teaching. Research on interdisciplinary teaching (a different but widely used concept that indicates the need for conceptual clarification) has been to a large part focused on higher education. Studies on crosscurricular teaching in primary or secondary school are predominantly descriptive, mostly confined to reporting the outcome of individual teaching projects. Hence paradoxically, research on crosscurricular teaching and learning, which aims at achieving unity and coherence, is itself highly fragmented. This means that even when crosscurricular teaching is officially encouraged or required by educational policy, as it is in many countries, it is left to teachers to make difficult decisions about the choice of topics and methods with little systematic guidance.

This book presents not only a theoretically grounded and unified, but also a flexible and inclusive framework for cross- and transcurricular teaching and learning. It lays down the theoretical foundation by offering a systematic account of the rationale and aims of different kinds of cross- and transcurricular teaching, and shows how more specific didactic guidelines can be developed on this basis. It connects theory and educational practice by offering accounts of some of the most promising teaching methods, like dialogic teaching or movement integration, transversal competences like digital or entrepreneurial thinking, and topics that currently call for crosscurricular approaches, like sustainability or citizenship. It further addresses important challenges that

DOI: 10.4324/9781003367260-1

have been widely ignored, like how to evaluate crosscurricular work. The book breaks with the tendency to focus on narrowly cognitive aspects of crosscurricular teaching. It explores how movement and emotions can become integral parts of learning across school subjects, and recognizes a diversity of goals and outcomes, including a concern for wellbeing both as an educational goal and as a means for fostering motivation and collaboration. The book also addresses typical worries and criticism of crosscurricular teaching, such as the widespread fear that it will be less sophisticated than subject-specific teaching, that such teaching is likely to benefit certain kinds of students more than others, or that the time and resources spent on it will make it difficult to ensure that students also acquire the necessary subject-specific content and skills.

A welter of different, seemingly incommensurable, theoretical approaches characterizes educational research. Crosscurricular teaching is also understood and valued differently by various pedagogical traditions and from various normative stances. The very idea of fostering general competences or teaching to meet future challenges remains controversial. Despite a partial rapprochement in recent times, the Anglo-Saxon tradition of curriculum studies and emphasis on problem-solving is still contrasted with the Continental European tradition of Bildung and Didaktik. Without downplaying the importance of such differences, the book presents a comprehensive approach that makes it possible to accommodate insights and practices that have been associated with different traditions and theories. By offering a framework for clarifying the aims and goals of crosscurricular teaching, it will enable teachers and educational planners to make qualified decisions. It is centered on a comprehensive notion of cultivation or Bildung, which provides the basis for balancing and merging concerns for not only the background, needs, and interests of the individual student, but also the social context, the internal features of subjects and disciplines, and the larger societal goals and challenges to which contemporary education must be sensitive.

This approach helps to ensure that the framework, which allows and calls for ongoing modification and development, is adaptable to different national or sector-specific traditions, curricula, and other framework conditions. Although many of the cases and examples are taken from a Scandinavian context, mostly Finnish and Danish, the reflections and guidelines are formulated to be widely applicable. Also, while the Bildung-based approach is self-consciously normative, its emphasis on contextualization and adaptation makes it not only possible, but necessary to take into account and negotiate between different, more or less established "subject didactics."

Positioning itself in the genre of a research-based monograph, the book is to be consulted for inspiration, justification, and guidance. It addresses school teaching, with a special focus on secondary education, and is thus relevant for not only teachers and teacher students but also researchers and everyone with an interest in education. The different chapters make a framework that probes the ideas and openly discusses potentials, challenges, and possible shortcomings of crosscurricular teaching and learning. As indicated by the title, the

focus is on the ongoing development of a suitable framework. This means, first, that the chapters describe ongoing attempts to practice and improve crosscurricular teaching, and that they critically discuss and sometimes complement or correct assumptions made in other chapters. Second, it means that the framework that emerges still needs to be further developed when applied to specific school contexts. Serving as a tool for reflection, it both provides specific ideas and recommendations that are realistic and applicable in classrooms across educational settings and raises imaginative issues that can foster new and creative ways of thinking.

The book is a result of fruitful research collaboration between Åbo Akademi University (ÅAU) and University of Southern Denmark (USD). In 2021, Prof. Søren Harnow Klausen from USD was invited guest professor in crosscurricular education to support the development of crosscurricular didactics together with ÅAU's teacher education (2022–2025). Besides editing this book, the collaboration involves empirical research in schools and input to courses in teacher education programs in both countries. Special thanks go to Högskolestiftelsen of Ostrobothnia and Swedish Cultural Foundation, both located in Finland, for financially supporting the collaboration and enabling the development work, to Prof. Michaela Pörn from ÅAU, who has provided much help and support along the way, and to Furkan Mustafa Tuncer, who helped bringing the manuscript into shape. Very special thanks go to senior lecturer Mårten Björkgren from ÅAU, who has not contributed directly to the book, but initiated the research collaboration on crosscurricular education and has been a constant source of advice, support, and inspiration.

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Part I
General theory

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2 Speaking and thinking about crosscurricular teaching

Terms, concepts, and conceptions

Nina Mård and Søren Harnow Klausen

Introduction

Crosscurricular teaching is an approach traditionally characterized by terminological unclarity. A bewildering variety of terms and concepts are used, partly to express different conceptions or describe different types of teaching, partly reflecting different traditions and terminological habits. It is neither realistic nor desirable to establish a single uniform terminology. However, it is important for everyone involved in crosscurricular teaching practices to know the most widely used expressions and underlying conceptions. Thinking clearly about teaching across the curriculum requires a coherent conceptual framework, and planning and carrying out such teaching requires a language for addressing it.

Crosscurricular teaching is about work across different domains. The approach was first developed and has been most discussed in research and disciplinary fields, and accordingly, the terminologies addressing such activities are derived within disciplinary structures. This is why concepts of multi-, inter-, and transdisciplinarity have gained ground and are utilized also in domains of school teaching. In this chapter, we will problematize the use of concepts referring to academic disciplines when addressing school teaching. Although having their epistemological basis in academic disciplines, school subjects are knowledge domains with their own aims and rationales. Teaching across and beyond school subjects has other preconditions than teaching in higher education or working together in interdisciplinary scholarly teams, and hence there is a need for a specific conceptual framework for school teaching, which specifically considers the conditions of teachers and school subjects.

The conceptual framework presented in this chapter is centered on the concepts crosscurricular and transcurricular. Crosscurricular teaching refers to integrated teaching situations where subjects are visible or recognized, whereas transcurricular refers to teaching approaches of deep integration between subjects. When addressing the approach without further clarifying the intensity or depth of integration, we suggest crosscurricular teaching to be used as an overarching term. A taxonomy based on the two concepts is presented and elaborated on in the last section of the chapter. We argue for the feasibility of

DOI: 10.4324/9781003367260-3

the two concepts with respect to the existing school realities. Crosscurricular and transcurricular teaching refer to work that goes across curricular subject areas. Curricula across nations are structured around the division of subjects and therefore crosscurricular teaching, regardless of its realization, will always relate to subject areas and initiate negotiation and planning by teachers with different subject affiliations (see also Chapter 5). Hence, the terms reflect the school reality and are comprehensible for teachers and students.

Mapping the conceptual field

Crosscurricular teaching in school education has been an advocated approach for many decades. This is due to several reasons, relating to beliefs about which knowledge should be taught in school to address contemporary problems and issues in society (Lam et al., 2013; Lenoir & Hasni, 2016). Since the Western intellectual tradition has traditionally classified knowledge into specialized domains within a larger system of disciplinarity, crosscurricular approaches to knowledge exploration are generally perceived as opposites to subject-based activities (Klein, 2017). This is reflected in the terms and concepts developed for speaking about crosscurricular activities as the most popular of them, multi-, inter- and transdisciplinarity, refer to academic disciplines and the disciplinary structure of knowledge. The prefixes multi-, inter-, and trans- indicate that two or more disciplines are connected in different ways, in attempts to benefit from the collaboration of distinct disciplinary perspectives.[1]

In the literature, the approaches of multi-, inter-, and transdisciplinary teaching are distinguished by their degree of integration between subjects and/or the degree to which subjects as such are transcended or ignored. Traditionally, multidisciplinary teaching is understood as an approach with a low degree of integration, while inter- and transdisciplinary teaching refer to more integrated teaching (Klein, 2017). According to Drake and Burns (2004), *multidisciplinary approaches* focus primarily on the disciplines and imply organizing of standards from the disciplines around a common theme. Lam et al. (2013) describe multidisciplinarity as the juxtaposition of subject areas according to a theme identified in two or more subjects, with the organizing theme subordinated to established subject areas. Multidisciplinary teaching can include features of collaboration between teachers, but is often implemented either by one teacher who includes perspectives from other subjects into his or her own teaching or by several teachers who all deal with aspects of one topic or theme at the same time (Lam et al., 2013; Klausen, 2011).

Interdisciplinary approaches refer to organizing the curriculum around common themes across disciplines, with identifiable disciplines but they are assumed less important than in the multidisciplinary approach (Drake & Burns, 2004). Lam et al. (2013) define the interdisciplinary teaching content as blended, as disciplines speaking in separate voices become tools to focus closely on an organizing theme, problem, question, or idea. Within

interdisciplinary teaching, the idea of teacher collaboration becomes evident since shared planning and instruction in two or more subjects are central components. Usually, fewer subjects can be involved in interdisciplinary teaching compared to multidisciplinary teaching, due to the need of resources for common planning time and the restructuring of teachers' schedules (Klausen, 2011).

Aside from this notion of a middle degree of integration, the term interdisciplinary is perhaps the most commonly used concept, employed in a large amount of literature, to address the issue of crosscurricular teaching in general (see, e.g., Klein, 2017; Lenoir & Hasni, 2016; Wilson, 2010; Wineburg & Grossman, 2000; St Clair & Hough, 1992). In addition, terms like curriculum/subject area integration, integrated/integrative curriculum or teaching/learning, and crosscurricular teaching/learning are frequently used as general labels of teaching across and beyond different school subjects (see, e.g., Barnes, 2015; Drake & Burns, 2004; Haapaniemi, 2022; Hammond, 2017; Lam et al., 2013; Nollmeyer et al.2016; Rénnie et al., 2012; Savage, 2010).

In a *transdisciplinary approach* to integration, the teaching is organized around student questions or real-life problems, with disciplinary skills used in authentic situations without being recognized as such (Drake & Burns, 2004). Subject boundaries are blurred and connections are magnified in a new organizational framework, resulting in teaching that does not thematize subjects explicitly as subjects (Lam et al., 2013). The potential of this approach is that the schoolwork comes to exhibit coherence and the students are often given more responsibility for regulating their own learning processes (Barnes, 2015; Lenoir & Hasni, 2016). However, there is a risk of identity loss and anxiety among teachers, if they are forced to lead transdisciplinary teaching processes that include many aspects outside their subject expertise (Klausen, 2011). A common characteristic of the transdisciplinary-related concepts is that they usually are combined with the verb "learning" instead of "teaching," indicating approaches that focus on student work and in which teaching is transformed into a process of guiding students' independent learning progression (Lonka, 2018; Silander, 2015).

As already indicated, the concepts of multi-, inter-, and transdisciplinarity have come to form the terminological basis for speaking and thinking about teaching across and beyond subjects (see Klein, 2017). Although they offer a way of classifying different approaches as discussed earlier, their references to academic disciplines are problematic in a school context. While school subjects derive from academic disciplines, there are significant differences between the two. According to Deng (2012), a school subject refers to an area of learning within the school curriculum, constituting an institutionally defined field of knowledge and practice for teaching and learning. An academic discipline, again, is an area of learning affiliated with a university, formulated for the advancement of research and scholarship, and often related to a specific domain of research or specific investigating methods. An academic discipline

thus involves the concept of research, and addresses scholarly and certified knowledge, while a school subject involves the concept of teaching and education and it not only addresses academic knowledge but also involves diverse pedagogical, moral, political, cultural, and economic components (Lenoir & Hasni, 2016).

The teaching of school subjects, regardless of grade or students' maturity, is done through didactic considerations in a process where disciplinary knowledge is didactically transferred to a suitable teaching content (Klafki, 2000). According to Chevallard (1989), the didactic transposition of knowledge is realized in a process of several stages. First, the enormous amount of disciplinary knowledge, produced through scientific research, needs to be delimited and defined as educational content in curricula and policy documents. Second, the teacher transforms the curricular content into actual teaching. In this process, she reflects on appropriate aims and methods for teaching the content to the students at hand. Third, the students interpret and attribute meaning to the content based on the received teaching. Ongstad (1999) introduces the concept of didactization, which addresses the didactic reflections, transformations, and communications of a knowledge domain. Through didactization processes, a school subject's didactic form, content, and use are negotiated in ongoing processes.

In many cases, both the content and methods of school subjects differ significantly from what would seem to be the corresponding academic discipline or disciplines. Teaching languages at school aims at fostering communicative competence, something different from work in academic linguistics (see Chapter 17). There are school subjects which, depending on the national context, do or do not have a corresponding academic discipline, such as crafting (see Chapter 12). There are also school subjects that integrate several disciplines, such as ethics in German schools, which relates to, inter alia, religion, philosophy, law, psychology, and biology (Bundesministerium, 2022), and social studies in Scandinavian schools, which relates to, for example, political science, economy, law, and sociology (Löfström, 2019). It is noteworthy that neither school subjects nor academic disciplines are static domains, but constantly changing in relation to societal and cultural demands.

It is not just that school subjects are delineated differently from academic disciplines, that is, that the maps are drawn differently. The didactic transformations of the content, especially the very different aims and practical contexts of school subjects, make for an altogether different situation in terms of potentials and obstacles for working across and beyond them. For example, the fact that school subjects are not bound by specific research methods might make it easier to work with themes from other subjects. On the other hand, the obligation to provide students with a stock of basic knowledge and skills might make them less flexible than academic disciplines, which are expected to evolve and can move more quickly into new domains. Moreover, school teaching serves general aims of educating students and preparing them for

life, which may also provide rationales for teaching across domains that do not pertain to academic disciplines.

Cross- and transcurricular teaching in schools

In an attempt to acknowledge the unique nature of school subject and school teaching, Lenoir and Hasni (2016) distinguish between academic interdisciplinarity and school interdisciplinarity. We think, however, that this approach, despite its merits, does not thoroughly capture the school reality as it has too close connections to disciplinarity in a conceptual sense. We suggest that concepts of crosscurricular and transcurricular would relate better to the reality of schools and the integration of subject areas, compared to concepts with disciplinary associations. Although crosscurricular and transcurricular do not explicitly address school subjects, like terms of subject-transcending or subject area integration, they do reflect the ambitions of crossing curricular subject boundaries and serving the educational aims of doing so. Crosscurricular teaching, however, is to be understood more broadly. While subject-related concepts may address teaching across subjects more narrowly, crosscurricular teaching, in our understanding, implicates wider perspectives on teaching and educating for Bildung, including transversal competences and values (see Chapter 3).

Crosscurricular teaching is by no means a new concept. It has been used by several researchers during the years (e.g., Barnes, 2015; Rowley & Cooper, 2009; Whitty et al., 1994) and is defined by Savage (2010) as follows:

> A cross-curricular approach to teaching is characterized by sensitivity towards and a synthesis of knowledge, skills and understandings from various subject areas. These inform an enriched pedagogy that promotes an approach to learning which embraces and explores this wider sensitivity through various methods.
>
> (p. 40)

The sensitivity to both subject and student interests, and their mutual interdependence, lies at the core of crosscurricular teaching. It seeks to create robust links between subjects, links that consider the thinking processes of different subjects and relate them through the experiences of students (cf. Rowley & Cooper, 2009). Aiming at fostering Bildung, crosscurricular teaching, in our understanding, is sensitive to various approaches with different aims and topics to enhance the edification of students. While Bildung may require crossing curricular boundaries, it is quite compatible with, and may even require, teaching without such boundaries as well (see Chapter 3).

Even though we suggest using crosscurricular and transcurricular as the most appropriate terms for speaking about school teaching, we are aware of the complexities and controversies surrounding the term curricular. It has been associated with a particular Anglo-Saxon tradition of centrally controlled

education, with public agencies determining teaching contents and methods through detailed plans and standardized textbooks, and of educational research focused on such curricula (so-called curriculum studies). This has been contrasted with the German-Scandinavian tradition of Didaktik (and the related notion of Bildung), which emphasizes teacher's autonomy and sensitivity to students' interests and needs (Westbury, 2000). Since our framework is based on the latter tradition of Didaktik, we use the term curriculum in a broader and more neutral sense. We use it to refer to the totality of school subjects – for example, mathematics, history, English, foreign languages, music, arts, and social studies – in a given institutional context. Hence the terms crosscurricular and transcurricular designate different ways of teaching across or beyond the institutionalized or traditional school subjects. This is not only in line with a common usage of the term curriculum (Goodlad et al., 1979; Young, 2014), but also reflects recent developments within educational research and practice. For more than two decades, the two research traditions have been cooperating and converging (Gundem & Hopmann, 1998; Krogh et al., 2021). A convergence has taken place also on the level of educational policy and practice, as more detailed and centralized goals and plans have been introduced in schools in Germany and Scandinavia, accompanied by an emphasis on evidence-based approaches to teaching and learning. While this movement and its compatibility with the concern for Bildung has been contested, it has shaped the educational landscape in a way that makes the distinction between curriculum and Didaktik less pertinent, and we shall allow ourselves to set it mostly aside in this book.

A taxonomy for crosscurricular and transcurricular teaching

Most existing taxonomies of interdisciplinarity build on a typology adopted by the OECD for an international conference held in 1970 (Apostel et al., 1972; Jantsch, 1972). It was inspired by the political and intellectual climate of the time, being connected with cybernetics, system theory, a holistic worldview, and a belief that radical changes in society and human thinking were urgently needed. Klein (2017) gives an overview of how further typologies classifying interactions between disciplines were developed on this basis, bringing both clarity and confusion to the field. As Klein points out, typologies are neither neutral nor static. They reflect different perspectives on changing institutions and practices. In this chapter, we present a taxonomy (see Table 2.1) that reflects our aim of developing a conceptual framework for crosscurricular teaching, thus adapting earlier typological work on interactions between scientific disciplines to the field of school teaching. The taxonomy is developed with the contemporary educational preconditions in mind and reflects our intention to problematize traditional ways of talking about Bildung-centered crosscurricular teaching.

The taxonomy (Table 2.1) shows how crosscurricular and transcurricular teaching are related to the concepts of multi-, inter-, and transdisciplinarity.

Table 2.1 A Taxonomy for Crosscurricular and Transcurricular Teaching

Crosscurricular Teaching	*Transcurricular Teaching*	
Multidisciplinary	***Interdisciplinary***	***Transdisciplinary***
Intradisciplinary; hierarchical; sequenced; correlated; theme-based/ thematic; threaded; fusion	Integrated; shared; curriculum integration; fusion	Integrative; project-based; problem-based; phenomenon-based; curriculum negotiation; opportunistic; structured and unstructured core

Following the idea of depth and degree of integration, crosscurricular teaching can be juxtaposed with multidisciplinarity, while transcurricular teaching can be juxtaposed with transdisciplinarity. Interdisciplinarity includes qualities that can be related to both crosscurricular and transcurricular approaches, depending on the context and intention of schooling.

In the literature, the concepts of multi-, inter-, and transdisciplinarity are not static or uniform approaches and neither are cross- and transcurricular teaching. Every single approach includes many distinct ways of realizing teaching across and beyond school subjects, which is exemplified in the taxonomy through the list of synonymous concepts included in each category. This means that the concepts of cross- and transcurricular teaching apply to several different levels, and it is important to clarify which level that is addressed in the speaking and thinking processes. At the highest level, crosscurricular teaching serves as a meta-concept, which encompasses all the various teaching approaches that go across and beyond different school subjects. In this book, the term crosscurricular is sometimes used in this way, as a general shorthand. On a second level, crosscurricular teaching is distinguished from transcurricular teaching depending on the depth of integration between the subjects involved. On a third and still more specific level, crosscurricular and transcurricular teaching both can be divided into subcategories which refer to various teaching practices within the two main categories. The practices listed in the taxonomy should be seen as typical examples. Like other similar taxonomies, ours is not intended as static or complete. It is part of a framework for continuously developing cross- and transcurricular teaching in response to new institutional and societal conditions. This means that the list and characterization of teaching practices calls for additions and elaborations in response to new experiences and further studies. In the following, the different examples of practices are discussed through the lenses of crosscurricular and transcurricular teaching.

On the third conceptual level, crosscurricular teaching can be exemplified in practice through teaching approaches that relate to the idea of

multidisciplinarity and, in some cases, interdisciplinarity. Crosscurricular teaching as an *intradisciplinary* practice is expressed through integration of subareas within a school subject such as reading, writing, and oral communication in languages. This approach challenges the notion of school subjects as monodisciplinary units and is an important aspect of crosscurricular didactic thinking, although it is not commonly related to as such. The aim is to help students understand the connections between different subareas within a subject and their relationship to the real world (cf. Drake & Burns, 2004).

A more common context of crosscurricular teaching is the *hierarchical* approach, which means achieving progress in one primary subject by also teaching aspects of another subordinate subject. Klausen (2011) suggests using the term "auxiliary" to address this approach, in which the teaching and learning balance is not equal but strictly hierarchical between the involved subjects. The teaching topic is defined by and related to the primary subject, and students' learning of the topic is supported by using a content area or skill from the auxiliary, or subordinate, subject (cf. Barnes, 2015).

Another way of implementing crosscurricular teaching is through *sequenced* or *correlated* practices, where the topics of study are sequenced and arranged to coincide with each other so that teachers of different subjects all deal with the chosen topic at the same time (Lam et al., 2013). In primary education, where teachers teach many subjects, one and the same teacher can allow students to explore the topic through the perspectives of several subjects. This approach is closely related to *theme-based* or *thematic* practices, which share a similar core idea of exploring a theme through the lenses of various subjects. However, theme-based or thematic refers to a more intensive way of working with a common theme, and the subjects involved need to be carefully selected to essentially deepen the understanding of the theme and to itself be better understood through application to the theme (cf. Barnes, 2015; Drake & Burns, 2004).

Finally, relating to the idea of multidisciplinarity, crosscurricular teaching can be expressed as *threaded*, referring to an approach in which overarching skills of, for example, thinking skills, social skills, study skills, or technology are threaded through various school subjects (Lam et al., 2013). *Fusion* shares a similar idea of fusing general skills, knowledge, and attitudes into the regular school curriculum, for example, that the students learn respect for the environment within every subject (Drake & Burns, 2004). There is, however, an alternative understanding of the term fusion in the literature, as Lam and colleagues (2013) define it as an interdisciplinary approach in which the idea of integration is taken further by combining the content of two or more subjects into a new course with a new name. This kind of fusion refers more to a transcurricular than a crosscurricular teaching approach as the subjects are merged into a new entity. The different notions of fusion are an example of how concepts and approaches are not fixed or uniform, but there might be conflicting understandings in the literature of how they should be interpreted and realized in practice.

Depending on the context and aims of teaching, crosscurricular and transcurricular teaching both can be expressed through approaches that relate to interdisciplinarity, such as *integrated* teaching, *shared* teaching, or *curriculum integration*. The core idea of these is to study interdisciplinary topics by finding overlapping skills, concepts, and attitudes in the subjects involved. Shared planning and teaching takes place to achieve overarching goals that cannot be accomplished within a single subject (Klausen, 2011; Lam et al., 2013). According to Beane (1993), the concept of curriculum integration may also include, besides the integration of knowledge from different subject areas, integration of experiences and social integration, which refer to psychological and sociological dimensions of learning. These dimensions relate to the idea of transcurricular teaching more than crosscurricular, as they touch upon elements in students' Bildung processes that go beyond the division of subjects. Similarly, Lam and colleagues (2013) suggest integration or *integrative* as a transcurricular approach, referring to possibilities for personal and social integration through the organization of teaching around issues without regard for subject area lines.

Transcurricular teaching can also be expressed in practice through approaches of *project-based*, *problem-based*, and *phenomenon-based*. In such cases, teaching rests on the ideas of holism, authenticity, contextuality, problem-based inquiry, and open-ended learning processes. Holism refers to the need of decompartmentalizing education to help students explore phenomena from the viewpoints of multiple subject perspectives. The ideas of authenticity and contextuality accentuate the importance of exploring real-world phenomena existing within tangible time and space, rather than engaging with only theoretical or hypothetical ideas. Through problem-based inquiry, students explore the phenomena by identifying and investigating possible problems. In this process, teachers collaborate with students to create investigations that are attainable and relevant. The learning processes of students are thus not predetermined but rather open-ended, allowing students' interests in areas of the phenomenon to guide (Drake & Burns, 2004; Silander, 2015; Symeonidis & Schwarz, 2016).

Transcurricular teaching as referring to the conceptions of *curriculum negotiation* and *opportunistic* is similarly to letting students' questions form the basis for curriculum and teaching. These approaches are not easily planned but rather unpredictable. The teacher needs to be confident and capture the moments when students show special interest in their surroundings. All environments, situations, concepts, and ideas can be looked at from many viewpoints, but it requires teachers who are conversant in a range of subject areas to build upon students' responses to real experience (Barnes, 2015; Drake & Burns, 2004).

Following the idea of *structured and unstructured core*, transcurricular teaching does not always need to entail student-led practices. While the approaches are student- and society-centered, and thus closely related to the very idea of transcurricular practices in general, the teacher(s) take the lead

in teaching planning by identifying the needs, problems, and topics that are of relevance for students. Concerns, skills, and subject matter from any pertinent subject are brought to help students deal with the matters. In a structured core, teachers have the whole responsibility for designing units of study that are relevant to students, whereas in an unstructured core, teachers and students together develop the units of study (Lam et al., 2013).

Conclusions and some recommendations for terminological practice

Our ambition with this chapter has been to present a coherent conceptual framework adapted to teaching across and beyond school subjects. We have discussed the existing terminological traditions of multi-, inter-, and transdisciplinarity and problematized them in the light of the nature of school teaching. Cross- and transcurricular teaching are suggested as more suitable concepts for Bildung-centered school teaching and the didactic nature of school subjects. The term curricular refers to teaching in a broad sense, enabling practices that either fit within existing curricula or move beyond them. Based on the chapter discussion, we presented a taxonomy which clarifies the relations of cross- and transcurricular teaching to the ideas of multi-, inter-, and transdisciplinarity. In the taxonomy, different cross- and transcurricular teaching approaches and practices are specified. The taxonomy is to be seen as an open framework that needs to be further developed and adapted to different educational contexts.

The concepts of cross- and transcurricular teaching are recommended for international usage through the English language. However, we are aware of the possible challenges of translating the concepts into other national languages since the terms curricular and curriculum may simply not have direct corresponding concepts. Based on the ideas and arguments presented in this chapter, we encourage scholars around the world to continue the work of developing conceptual frameworks for crosscurricular teaching across languages.

As far as possible, we recommend using a terminology suited for school teaching. Nevertheless, it sometimes can be necessary to keep to an already established terminology, for example, established by educational policy documents or existing research literature. In that case, it is important to clarify which conceptions the terms could be taken to express. Shared conceptual understanding is the key to more coherence in crosscurricular didactic practices.

Note

1 In addition to the three concepts of multi-, inter-, and transdisciplinary, there are other concepts relating to disciplinarity, such as *monodisciplinary* (appealing to a single discipline) and *circumdisciplinary* (encompassing experiential practices and knowledge). These have not gained the same attention in literature and practice, and thus we do not elaborate on them here. For further reading, see, for example, Lenoir and Hasni (2016).

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3 Rationale and aims of crosscurricular teaching and learning

For life, knowledge, and work

Søren Harnow Klausen and Nina Mård

Introduction

Perhaps more than any other teaching activity, cross- and transcurricular teaching needs a theoretical and normative foundation. Although cross-curricular teaching appears to be widely appreciated, it is also permanently called into question at different levels, from educational policy to teacher collaboration and interaction with students in the classroom. Moreover, its basic aims and rationale can seem unclear – what is it good for and is it worth the efforts. It can also relate to a variety of goals and functions, from securing employability and meeting societal challenges, over motivating students to learn, to fostering civic skills or critical thinking. Hence, there is a need for justifying it and providing systematic criteria for selecting among and balancing different aims and concerns. This is needed not merely to fill a theoretical gap but also to strengthen educational practice, where teachers are regularly confronted with the task of making the meaning of their activities transparent to their students and themselves, and to choose the relevant themes, methods, and materials.

However, the very idea of providing a normative foundation for teaching practices is likely to attract skepticism. Strong currents within educational research assume that it is only possible to describe how such practices have evolved and how different norms and conceptions are, as a matter of fact, applied and negotiated (see, e.g., Rothgangel & Vollmer, 2020). There is, admittedly, no point in espousing an educational ideal that is not compatible with the institutional framework or does not resonate with the values and beliefs held by teachers and curriculum planners. The norms must be grounded in, and sensitive to, reality. But when confronted with questions of meaning and justification, which inevitably arise, one cannot merely point to existing habits and conventions. We need criteria for determining which parts of the existing practices deserve to be further developed or need to be strengthened. Teachers must be able to give convincing answers to doubts raised by students and colleagues or arising in their own minds. They must also be able to deal with cross-pressures. Policies, recommendations, and curriculum documents may demand actions that clash with other interests and expectations or seem

DOI: 10.4324/9781003367260-4

to go against what the teacher finds best based on her own experience. To deal with such situations, an independent foundation is needed – not in the form of a rigid set of maxims, but in the form of a normative framework that provides tools for negotiating the different demands.

A normative foundation for crosscurricular teaching is needed. It should be genuinely normative and foundational – able to give substantial answers to the questions of why, what, and how to teach. But it should also be realistic. It must be compatible with other basic norms and interests in the relevant cultures and communities. A foundation for crosscurricular teaching must be sufficiently *comprehensive* – able to address a wide variety of relevant concerns and goals of teaching. It must be *ecumenical* rather than partisan – able to accommodate a wide range of approaches to teaching and learning, and knowledge obtained by different methods. Last but not least, it must be *unifying* – not just able to cover different goals and approaches but also to show that they are interrelated, and how. We think that the classical notion of Bildung meets these requirements, even though it is also far from uncontroversial and in need of improvement.

Bildung: its promises and discontents

The notion of Bildung refers to a mode of thinking that came to the fore in Germany around 1800. It was anticipated and influenced by earlier ideas, notably the notion of *paideia* (comprehensive cultural education) in ancient Greece and the ideal of gentlemanly "politeness" espoused by the English philosopher Shaftesbury (Horlacher, 2015). Bildung refers to a process of self-cultivation, of personal and cultural maturation, in which a person continuously forms herself through her interactions with the surrounding world. This ideal was espoused in writings of Schiller, Humboldt, Goethe, and Schleiermacher (see, e.g., Bruford, 1975). In its classic form, Bildung is defined as a proportional development of all human powers, in their mutual interplay, and, at the same time, a linking of the self to the world (Humboldt, 1967, p. 22). This idea entails the following:

(i) A human being can and must develop a self that is unique, coherent, and relatively independent (autonomous).
(ii) Selfhood and autonomy have to be achieved, and this requires continuous effort, self-criticism, and self-restraint.
(iii) Achieving autonomy is also a process of socialization, as the materials for developing the self must be taken from social and cultural traditions (as well as from encounters with nature).
(iv) These materials must be individually appropriated and modified, making Bildung a process of mutual adaptation and attunement between the individual and its environment. And while they must, to some extent, be taken from the social and cultural setting in which the individual is embedded,

they should also include elements of other environments and traditions. Bildung requires effort and experiences of challenges and limitations.

(v) Bildung is driven by a concern for wellbeing (one's own and that of others), and is a process which is itself experienced as fundamentally pleasurable, rewarding, or meaningful (i.e., intrinsically valuable and motivated).

(vi) By requiring a proportional development of all human powers and a linking to the world, Bildung assumes that human abilities and the domains of human life are strongly interrelated and must be developed in concert. Hence Bildung entails a striving for unity, completeness, and connection.

This characterization of the general ideal of Bildung already indicates both why it is controversial and how the skepticism it has attracted can be answered. It is often criticized for being overly *individualistic*. The focus is on *self*-cultivation and on enabling the individual to flourish and develop according to her own interests. This might seem to clash with concerns for the welfare of the community or social cohesion.

To this, it can be replied that while Bildung does take the individual to be both the starting point and ultimate goal, it emphatically conceives of the individual as constrained and formed by the social context and societal norms. As for the suspicion that it is too closely wedded to modern Western liberal values, it is admittedly related to modernity in a broad sense. This is part of its justification: in the modern world, which is marked by changes and transformations, plurality and diversification, and where individuals do not have ready-made scripts for life, a probing attitude to life and a broad range of abilities and skills are needed. While Bildung was historically associated with a European bourgeois lifestyle, there is nothing in the notion itself that supports this. Indeed, with its emphasis on enculturation and mutual adaptation between individual and society, it is rather a corrective to radical forms of liberal individualism. Given that it entails that the individual forms itself by appropriating material and norms from its cultural and natural environment, it must be expected that the specific combination of values, knowledge, and skills which it results in will differ between cultural contexts; that Bildung will play out differently. This makes it ecumenical and flexible, and useful in a world with different cultural traditions and disagreement over specific norms.

A related criticism of Bildung has it that it is *elitist* and *exclusive*, often presented as requiring a detachment from the world (Horlacher, 2015, p. 60). It is true that some of the classical descriptions of Bildung depict it as a process requiring extraordinary cultural, material, and cognitive resources, making it *de facto* a privilege of the few. It has also been seen as requiring longer periods of contemplation and withdrawal from practical activities. But such withdrawal is understood in the Bildung tradition as a means for deepening understanding and sensitivity, with the aim of reestablishing the link to the world still more firmly. That there should be a place for reflection and creative thinking not constrained by narrow concerns for utility is almost a

commonplace and clearly compatible with promoting an engaged and practical attitude to the world. What remains valid in the criticism, however, is that Bildung, as a comprehensive and ambitious ideal, carries with it a risk of aiming too loftily, demanding too much, or expending scarce resources. And the historical manifestations of Bildung show that it can tend to privilege certain kinds of traditional elite culture and be less sensitive to broader societal concerns (Masschelein & Ricken, 2003). These tendencies are not entailed by the notion of Bildung and they have been corrected by subsequent developments of the tradition (see later). Yet they have proven sufficiently long-lived to merit sustained critical attention. Hence, it must be emphasized that Bildung is not just about development of all human capacities, but development *for* all (Sjöström & Eilks, 2020). Realizing this ideal is probably the most central challenge to contemporary Bildung-oriented teaching and a central task for crosscurricular teaching, which likewise has been criticized for benefiting students from strong backgrounds (Poulsen, 1997).

It is further common to contrast Bildung with institutionalized education. Bildung is seen as an essentially informal, free, and open process, pertaining to a person's whole life. While this is not a criticism of the notion per se, it might seem to undermine our proposal that Bildung could serve as a foundation for crosscurricular teaching. Even those who agree that Bildung is relevant to institutionalized education often ascribe to it a mostly negative significance, taking it to imply that teaching should not be closely planned and structured, and that schools should make room for personal development rather than foster specific competences (Rømer, 2015). It is indeed important to maintain that Bildung refers to a comprehensive process of cultivation and not particularly to activities at school or specific educational goals. But this does not make it incompatible with school education, nor does it mean that it has no implications for how such education should be. Teaching for Bildung means teaching primarily for life rather than for school while maintaining a view of the student as a whole human being even when teaching specialized knowledge or skills. This is not just compatible with, but seems to call for the kind of structuring and planning necessary for teaching the knowledge or skills in question. Receiving structured and planned teaching is arguably important, if not essential, to the process of self-formation. In modern societies, the process of socialization and enculturation entailed by Bildung cannot be conceived independent of school education.

Rather than criticizing the notion of Bildung directly, some might find it outdated and think that more appropriate and well-motivated theoretical foundations are at hand. Various forms of *constructivism* emphasize the active role of students in constructing new understandings and integrating new information (Steffe & Gale, 1995). A related approach known as *student-centered learning* advocates putting students' interests first and making them choose for themselves what to learn, how to learn it, and how to assess their progress (Jones, 2007). *Transformative learning theory* centers on the potential for perspective transformation in students brought about by critical reflection on

"disorienting dilemmas" (Mezirow, 2000; see also Chapter 13). Educational philosophies like *liberal education* (Nussbaum, 1997) or *democratic education* (or "progressivism": Dewey, 2011) emphasize the value of critical thinking, self-reflection, and the promotion of democratic values and habits. Recently, *non-affirmative education theory* has been put forward with the intention of bridging different traditions in educational research and combining concerns for democratic citizenship with a respect for different cultures and value systems (Uljens & Ylimaki, 2017; see also Chapter 4).

All of these approaches are sensible and useful. However, they overlap or recapitulate central elements of Bildung, while being insufficiently comprehensive or basic to be able to serve as a complete normative foundation for teaching. Hence, they should not be seen as alternatives to Bildung, but rather as ways to elaborate and emphasize different aspects of it.

For example, Bildung, constructivism, and student-centered learning all view learning as an active process driven by individual interests. They partly agree on the justification, with constructivism referring to how human cognition is supposed to work and student-centered learning adding a normative perspective, implying that students have a right to be treated as responsible and autonomous beings. All three approaches assume that personal interest and experience of agency is necessary for motivation and for appropriation of knowledge and skills. Student-centered learning and Bildung also argue from a concern for human wellbeing, both as a value in its own right and because it promotes learning and strengthens motivation (see characteristic (v)). But Bildung takes a broader perspective, balancing the recognition of students' interests and presuppositions with further concerns. It maintains that teaching should also represent general societal interests that may not yet be fully acknowledged as such by the students, and that it should foster resilience and social responsibility, even if this requires teaching in a way that does not squarely match students' immediate personal interests (Goldman, 1999, p. 250). Bildung particularly emphasizes the value of recalcitrant experiences, being challenged and forced to expand one's horizon. In this respect, it resembles transformative learning theory. This does not make teaching less student-centered, but adds an obligation to look beyond the present skills and needs. Neither does it contradict the principle that what is taught should always be *relevant* to students. However, from a Bildung-perspective, this should include matters of *potential* relevance. Such matters are no doubt taught most efficiently when they can be linked to something of more immediate relevance; but this should be seen more as a practical constraint.

The progressivist, democratic, and nonaffirmative approaches can also be said to highlight particular aspects of Bildung. Fostering autonomy, participation, and critical thinking are central goals to all strands of thought. Yet human beings are more than democratic citizens. No matter how widely one extends and conceives of democracy, there will be important aspects of human life not covered by it. And while political participation and critical activity arguably also have an affective dimension, the progressivist tradition tends

to emphasize rational reflection and discourse, as if these were the defining traits of humanity or the most important activities of all. This tendency is exemplified by non-affirmative education theory that conceives of the curriculum as a "complicated conversation" and advocates that individual, cultural, and societal interests – and existing knowledge – should be recognized and critically reflected upon, but not affirmed (Uljens & Ylimaki, 2017). Bildung entails that such meta-reflection must be supported by more direct encounters and experiences that enable students to appropriate what they are presented with, actively taking up, testing, and adapting the perspectives in question. For example, history should not merely be presented as an object of political interests and different uses and interpretations, important though this is, but also as a distinctive reality and dimension of human life (Bjerre, 2021).

It may seem that the notion of Bildung presented here is so broad and flexible as to be almost empty. How can it function as a normative foundation for crosscurricular teaching if it is compatible with so many different approaches and adaptable to different cultures, norms, and values? The answer to this is that Bildung does carry with it several non-negotiable fundamental commitments. It does rule out certain understandings and practices of teaching. Though it may be adapted to more collectivistic cultures, in which the individual is seen as more strongly dependent on her community and the wider social sphere, Bildung still requires that she is viewed and treated as an autonomous being with a potential for developing a unique self. Characteristics (ii) and (iii) may be balanced differently against characteristic (iv), depending on the context, but characteristic (i) cannot be ignored. Treating students merely as members of society, reducing them to specific social roles, or inducing them to uncritically adopt conventional norms, beliefs, and behaviors is incompatible with Bildung.

A contemporary conception of Bildung for didactics

A contemporary conception of Bildung can and should maintain all the classical defining characteristics (i)–vi), but it should be developed to meet further contemporary concerns. For it to function as a foundation for school teaching, it must be developed into a *didactic* theory. Traditionally, Bildung as an educational ambition has been and is still closely connected to the German, and Scandinavian, Didaktik tradition. As discussed earlier, Bildung is not only an aim of education but of human development in general since it refers to a lifelong process covering all spheres of life. However, according to Didaktik, school education plays a significant role in facilitating young people's processes of maturity and formation, especially through the meeting with a culture's resources presented as the teaching content (Westbury, 2000).

Wolfgang Klafki (1927–2016) developed the core ideas of contemporary Bildung-centered Didaktik. He used the classical theories of Bildung to form his own didactic theory, in which Bildung works as a double unlocking: the world opens to a student and the student opens to the world. This

understanding combines material Bildung theories, which focus on knowledge of a content canon, and formal Bildung theories, which prioritize personal development over content knowledge. This is in line with the original understanding of Bildung as an integrated and comprehensive process (see characteristics (iii) and especially (vi)). Klafki proposed a definition of Bildung as categorical, which means becoming part of an already existing society but doing so in a reflective way that enables thinking and acting critically in relation to the existing, thus overcoming the artificial dichotomy between material and formal Bildung (Klafki, 1998).

Transferred to teaching, the idea of categorical Bildung implies a dual process in which a student engages with and adopts a certain content, but always through personal reflection. Selecting content that gives students possibilities to better understand the world and interpret it critically is therefore fundamental in Bildung-centered Didaktik. The curriculum (or "Lehrplan" in German) prescribes the traditions and topics that provide the content of teaching. However, each teacher needs to understand this content as a reflection of the communal values it represents and critically examine it in relation to her own teaching context and students. Didaktik thus posits an autonomous teacher who reflects on the content in relation to the curriculum and other conditional factors, and develops her own approaches to teaching. The core of didactic teaching preparation is to analyze and interpret the curricular content, reduce its complexity, and transform it into educational matter that is meaningful and relevant for the students in the specific setting (Westbury, 2000).

The Bildung-related didactic idea of content as a fundamental principle of any teaching practice has recently been challenged by goal-oriented educational ideas, defined in terms of competences and skills that would be relevant for students to learn. In this genre of competence-based education, crosscurricular teaching is advocated as an approach that supports the development of students' transversal competences. Besides not only diminishing the question of content, competence-based education focuses on competences and skills needed for citizenship in contemporary and future society. The latter can also be said, however, to apply to Klafki's didactic theory as it is grounded in democratic theory and an idea of human existence as consisting primarily in citizenship. Klafki suggests self-determination, co-determination, and solidarity as central abilities that Bildung-centered teaching should promote (Klafki, 1998). In more recent works (see, e.g., Sjöström & Tyson, 2022), the idea of citizenship is presented as a global citizenship and Bildung as a means of taking responsibility for the planet together.

A contemporary conception of Bildung for didactics must acknowledge citizenship as one central aspect of being a human and taking part in society. Yet, it must expand the view to consider other aspects of humanity as equally important, aspects that traditionally have gained too little attention such as affect, bodily activity, and wellbeing. In this book, several chapters offer examples of crosscurricular teaching that take into consideration not only students'

cognitive development and formation as citizens, but also new modes for learning in supporting students' maturity as whole persons.

Bildung-centered Didaktik as a foundation for crosscurricular teaching

How, then, can Bildung function as a foundation for crosscurricular teaching? In which ways does it call for, or justify, such teaching? And how is it related to its more specific aims and goals? Bildung entails that teaching is fundamentally for life and not for school. It has the development of students as whole persons, of the "totality of their powers," as its ultimate aim and demands that the student be linked to, and interact with, the world. This means that she must be presented with it *as* the world; not just with topics or learning contents but also with real and interconnected things, tasks, and phenomena. Because the different human powers are likewise interconnected, they must be developed in concert. Therefore, it is necessary to look across and beyond the different school subjects.

However, Bildung does not preclude working with subject-specific topics or concentrating on fostering specific skills or the acquisition of specialized knowledge. It only requires that one does so in a particular way – with at least an implicit concern for overall development (and (i)–(vi)). Bildung emphasizes appropriation and immersion, and this is hardly possible without providing spaces for concentrated work or helping students with acquiring language and other means and media for relating to the world.

Crosscurricular teaching is usually justified with reference to putative benefits and goals. These goals are manifold and seem to differ widely, sometimes even to contradict each other, and so they have been a source of confusion and controversy. Using Bildung as a fundamental and comprehensive framework can help to integrate and provide some guidelines for balancing them. In policy documents and educational research, one typically finds the following notions of what crosscurricular teaching might be good for (see also Savage, 2010):

(A) CCT prepares for meeting grand societal challenges.
(B) CCT prepares for higher education.
(C) CCT prepares for future work and employment.
(D) CCT fosters collaborative skills and a flexible mindset.
(E) CCT strengthens motivation.
(F) CCT fosters citizenship.
(G) CTT fosters creativity.
(H) CTT fosters critical thinking.

Some of these notions imply that crosscurricular teaching is a means for tackling external situations, adapting students to societal conditions, or making them conscious of and prepared for meeting societal challenges like climate change, inequality, migration, or civic disaffection – notably (A), but also (C)

and to some extent (B) and (F). Others focus on its ability to foster more personal ("internal") and generic dispositions and skills, notably (D), (E), (G), and (H). Some relate it to material challenges and needs (notably (C)), others to normative issues (F) and (H). This has led to controversies about more or less instrumental or critical approaches to CCT (Klein, 2010, p. 22f.).

Viewed from the comprehensive perspective of Bildung, the different notions appear compatible and even interrelated. Bildung demands a joint focus on internal development and societal conditions and norms. It requires a specific matter (content, case, or task) on which to work, forging a connection between the generic personal dispositions (D), (E), (G), and (H) which cannot be acquired in abstraction from concrete tasks, and more specific themes and goals (A), (B), and (C). In this respect, crosscurricular teaching merges the ideas of content as fundamental in Bildung-centered teaching with more recent principles of competence-oriented education.

Regarding contents of teaching, crosscurricular teaching brings renewed light on the question of content selection. The crosscurricular teaching content is often, in contrast to subject-specific academic content, an undefined issue in curricula. Thus, the reflective process of teachers to select meaningful content that span across subject areas becomes highly relevant (cf. Arnold & Koch-Priewe, 2011; Mård, 2021). Bringing content back into teaching has recently become an argument among several scholars, who stress the potential of fostering students' overall edification of both knowledge and skills/competences through the meeting with different contents (Deng, 2021; Ryen & Jøsok, 2021; Willbergh, 2016). The question of content selection in crosscurricular teaching contributes to this movement of creating new understandings of the classic Bildung-oriented didactic theories. For example, Mård and Hilli (2020) developed a didactic model for crosscurricular teaching, with the aim of supporting teachers in reflecting on content and other factors related to teaching across and beyond school subjects. The model uses the ideas of not only Klafki but also Paul Heimann and Wolfgang Schulz (Berlin/Hamburg Didaktik) to develop a new didactic framework that considers contemporary challenges and ideas in education. In Chapter 5, the authors present a revised version of the didactic model for crosscurricular teaching.

Grand societal challenges are closely similar to what Klafki (1998) termed epoch-typical key problems and proposed as core contents of Bildung-centered teaching. Epoch-typical key problems are aspects of the contemporary world a person must respond to as part of her general personal development. They are, moreover, characterized by extraordinary complexity and unpredictability; they are literally *challenging*, also in the sense that they must be approached in a creative and open-minded way (connecting A with D, C, H).

Many policy documents and research publications describe crosscurricular teaching as a means for fostering specific competences, as already discussed. Most of the goals and benefits listed earlier ((A)–(H)) are thus commonly described in terms of competences, such as study competence, innovation competence, and critical thinking competence. The notion of competences is,

however, controversial; many see it as wedded to an instrumental understanding of education that conflicts with the ideal of Bildung. It has been promoted as a part of OECD and EU policies for securing competitiveness and employability (OECD, 2022). Critics of the "competence agenda" worry that it will reduce knowledge and skills to a mere means for fostering competences, and that it requires fixed goals and learning progressions that leave little room for teachers' and students' autonomy (Tanggaard & Brinkmann, 2008).

There is, however, much in the notion of competences that sits well with both Bildung and crosscurricular education. Competence-oriented teaching requires the teacher to maintain a focus on the wider relevance of the knowledge and skills being taught and make it transparent to the students. While some competences are subject-specific (like English communication competence), they are always related to real-world tasks, and most often conceived as abilities relevant to a wide section of the curriculum. The focus has been increasingly on "metacompetences" or "transversal competences" (Eronen et al., 2019), thus relating competences directly to crosscurricular teaching.

Nonetheless, this might again give rise to worries that we are concerned with qualities too general and formal, putting process before substance, and ignoring the value of studying a particular subject in depth without having to think about its particular applications or usefulness. This is indeed a genuine risk. However, it should serve to highlight the importance of the Bildung perspective and of didactic considerations, not as a reason to discard the very notion of competences. Like Bildung, competence-oriented teaching requires a constant *double focus*. The overall aim of furthering personal development or general competences must be kept in mind and used as a principle for structuring and selecting contents and tasks (in the case of Bildung, this includes creating spaces and occasions for autonomous student activity, reflection, and discovery, and allowing for unpredictability). But it should be pursued by engaging in concrete activities that are given due attention and appreciated for what they are. Reading a novel can be a means to personal development and fostering reading and perhaps also social or ethical competences; but it can only function as such if the reader becomes absorbed in it and comprehends it. Similarly, mathematical representation competences cannot be acquired independent of the acquisition of knowledge and skills related to, for example, equations and graphs, which in turn requires learning to solve and understand specific equations and working with specific functions or quantities.

Bildung as such does not embody a concern for employability or higher education ((B) and (C)). However, being able to find and manage a sufficiently rewarding job is arguably a part of mastering life in contemporary societies, and the practices and norms of higher education and research have become constituents of the world with which many students will have to come to terms, including those who will not themselves embark on higher education. These specific goals are, in any case, compatible with the overall aim of Bildung and can function as a material on which to work with the formation

of more generic social and personal qualities (see Chapter 16). Employability is very much about adaptability, creativity, self-discipline, and knowledge of one's own strengths and weaknesses. In this, it overlaps with central elements of Bildung. This is an example of how "instrumental" goals can be compatible with the more "intrinsic" goals associated with Bildung. That qualities which are pursued for their own sake can also have instrumental value has been noted by philosophers since antiquity, but tends to be ignored in polarized debates over education.

How to evaluate crosscurricular teaching in regard to students' learning has long been a challenge: neither sufficiently discussed in the literature, nor much empirically researched. According to Bildung-centered Didaktik, teaching is not a process of transmitting content or knowledge but rather a meaning-making process. Because Bildung happens within an individual, the teacher cannot fully foretell what meaning a student will create in the meeting with a certain matter. The teaching, or educational, matter of a content is therefore never the same as the educational meaning a student derives from this matter. Given the openness of how different students give meaning to specific contents, the question of evaluation of students' learning is uneasy. If autonomy is a prerequisite for teaching and students' meaning-making processes, the outcomes of learning can only be measured partly and never captured entirely (Ryen & Jøsok, 2021). However, being open-minded to the different routes students' Bildung-processes can take in the meeting with the content does not contradict that the teacher sets certain goals for what she intends with her teaching. Quite the opposite, a teacher should always make the intentions of teaching clear to both herself and her students (cf. Bengtsen & Qvortrup, 2013). In crosscurricular teaching, defining goals that relate both to subject-specific and subject-transcending curricular guidelines ensures academic progress in students' learning that can be evaluated. Nevertheless, the teaching should also be open to possible outcomes that do not only relate to students' cognitive development but also to their overall formation, as discussed earlier.

Conclusion: a framework for cross- and transcurricular teaching based on Bildung

We have argued that the classical notion of Bildung provides a strong rationale for crosscurricular teaching. It is capable of unifying and balancing a whole range of interests and approaches, as it requires not only a fundamental concern for the personal development and wellbeing of students, but also sensitivity to issues of contemporary societal relevance; and it is compatible with an interest in fostering competences. Although Bildung calls for teaching across and beyond school subjects, it maintains an important role for the teaching of particular subjects, but requires that it be done with a focus on how specific knowledge and skills contribute to personal development and a general understanding of the world.

In spite of its broad and flexible nature, the ideal of Bildung is distinctive enough to serve as a guideline for balancing different concerns and criticizing and correcting existing forms of teaching. It entails that instrumental goals or the reproduction of societal norms must never override the concern for autonomous personal development. Yet the general notion of Bildung only provides very general guidelines. It must be worked out in more detail in order to be constructively applied to school teaching. This requires both the development of a Bildung-oriented didactical theory and still more specific investigations into particular topics, methods, and approaches (though it can be known in advance that these must have relevance across and beyond the curriculum). The subsequent chapters are attempts to show how the ideal of Bildung can be implemented in actual school teaching, and to identify affordances and obstacles to such teaching in different fields and contexts. It should be noted, however, that even these more specific investigations still only provide a flexible and dynamic framework for crosscurricular teaching, and not a recipe for success or a fixed set of instructions. Bildung requires constant experimentation, adjustment, and contextualization. What precisely the concern for Bildung means, and how crosscurricular teaching is best done, in a specific educational context, is something each teacher eventually has to find out for herself, albeit not without a foundation or clear direction.

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4 Crosscurricular work and Bildung

Empowering the students

Peter Hobel

Introduction

What are the requirements for Bildung-oriented[1] and crosscurricular education and teaching? This question is discussed in this chapter, here taking the experiences from Denmark over the past 20 years as the starting point. What didactical[2] challenges do these experiences point to, and how can they be understood from a theoretical perspective? To answer these questions, this chapter first presents the intentions behind the 2005-reform of the Danish Upper Secondary School-system and the research in the case. Then, three cases, that is, three teaching examples, are presented. These three cases are analyzed and discussed based on a theoretical reflection on Bildung-oriented and crosscurricular teaching. The chapter concludes that Bildung-oriented teaching must be crosscurricular, that it must be nonaffirmative, and that it must position students as actors who construct knowledge about epochal key problems. This type of teaching will enable students to empower themselves and be authoritative citizens in a democratic society.

Chapter 2 – and the entire book – shows that the discussion on Bildung and crosscurricular teaching is not only taking place in Denmark but discussing the Danish case is relevant for two reasons: First, in Denmark, since 2005, there has been a comprehensive and ongoing reform of upper secondary school based on the issue of Bildung and crosscurricular work, and second, research has been done on this development. This will be further elaborated on below. Thus, a discussion of the Danish case can contribute to a general discussion of the didactic challenges associated with Bildung-oriented and crosscurricular education.

The Danish case: the intentions behind the curricula

To understand the Danish case and analyze it from a general perspective, we first look at the intentions behind the curricula.

The purpose clause of the Ordinance of the Law on Secondary Education emphasizes that education aims at Bildung and general study competence.[3] Bildung has been the central purpose of Danish secondary education since

DOI: 10.4324/9781003367260-5

1850 (Haue, 2008), and this was not changed by the reforms in 2005 and 2017. According to the curricula, Bildung can be achieved through the acquisition of declarative/content knowledge and procedural/methodological knowledge and the ability – competence – to apply this knowledge to the production of new knowledge (MCE, 2017a, 2017b).

The key change in 2005 was that crosscurricular work became compulsory in Danish secondary education. According to the curriculum (MCE, 2005), students had to work with "cases" – for example, climate, science and responsibility, globalization, and how to achieve knowledge – and analyze these cases from the perspective of different school subjects. They had to consider the possibilities and limitations of different school subjects and school subject methods in relation to working with the specific case. They needed to do this as part of the Bildung process – to be able to relate reflectively and responsibly to the world around them and to their own development.

The official rationale behind compulsory school subject interaction was that complexity in education should not be provided by increasing the number of school subjects and electives but by enabling school subjects to work together on "cases" in the joints or spaces between school subjects (Haue, 2008, p. 222). Crosscurricular work should take forms that enable students to reduce societal complexity and be open to and embrace societal diversity. The students should investigate complex societal problems and dilemmas and apply multi-subject perspectives to the problems. This can allow the students to process problems in a more exhaustive way than if they were to apply only one school subject's perspective. The students should formulate problems and, based on their analysis, present innovative solutions.

Another rationale behind compulsory school subject interaction was to challenge students' creative and innovative skills and critical faculties. Politicians wanted innovation to be embedded in a market discourse. Students should be educated to be innovative in the marketplace, and the school subjects in the upper secondary curriculum should be legitimized by providing the knowledge and skills students need to be innovative in the marketplace so that they can create growth and prosperity. However, the market discourse was challenged when the reform was implemented by the Ministry of Education, and it was not allowed to one-sidedly determine how innovation should be understood. Innovation became semantically and discursively linked to Mündigheit[4] (in the Kantian sense), Bildung, and citizenship (Hobel, 2009, pp. 41–47). Thus, innovation is understood not only as an instrumental process, but also as an ethical-reflective process (Christensen & Hobel, 2012, p. 57; see Chapter 16 for a similar tension between narrowly instrumental and broader understandings).

The purpose clause of the Ordinance of the Law on Secondary Education, which applies not only to crosscurricular work, but also to the upper secondary program in its entirety, can be summarized as follows:

> Education shall have a Bildung perspective, with an emphasis on the development of personal authority of the students. Therefore, students must learn to relate reflectively and responsibly to the world around

> them: their fellow human beings, nature and society and their own development. Education must also develop students' creative and innovative skills and critical faculties.
>
> (MCE, 2017a, §1, §29, and §30)

From 2005 to 2017, crosscurricular work in general upper secondary school (stx) was organized partly in the school subject "Multi-subject courses within the framework of general study preparation" (MCE, 2005) and partly in three major written assignments (one each of the three years): the Danish History Assignment, the Study Program Assignment, and the Study Program Project. The 2017 reform abolished the multi-subject courses. Instead, students have some crosscurricular courses, including the Danish History Assignment in the first year and the Study Project Assignment in the second year. According to the curriculum and the Ordinance of the Law on Secondary Education, students are required to formulate problems and work on complex issues that they have not encountered before in their school subject lessons. They should work in an investigative and problem-solving way and formulate innovative solutions. These activities should all lead toward the Study Program Project, which, as a novelty, is defended in an oral examination (MCE, 2017a, 2017b).

Lessons from the 2005 reform

To understand the Danish case and to analyze it from a general perspective, we have looked at the research that has examined the implementation of the reform.

Research has been carried out on crosscurricular work introduced in Danish upper secondary schools in 2005. Thrane (2021) included a review of 24 studies on crosscurricular work at the upper secondary level. These were mainly qualitative empirical studies analyzing student texts. However, there were even studies discussing school-based development projects or the relationship between crosscurricular work and Bildung.

The studies indicated that many teachers positioned students as actors who must reproduce knowledge on a topic from several school subjects. Thus, students were positioned as actors who must document knowledge, and several of the studies showed that students accepted this positioning and worked to reproduce the content reviewed in the classes. Hobel (2015) analyzed a case in which students were writing about the cohesion of Danish society. The discussion section of their assignment was a summary of a text given to them by their teachers. One might have expected the students' own inquiry-based discussion and not a summary of a text.

However, there were also examples of students being positioned as investigators and knowledge developers.

In a qualitative study, Krogh (2016) showed how two students in the Study Program Project worked in a knowledge-developing and problem-solving way. Both students identified themselves as investigative researchers. One of these students discussed the ethical considerations that need to be considered

when producing information materials on chlamydia for young people. She drew on bioscientific knowledge and knowledge of campaigns by public institutions. Based on disciplinary knowledge, she examined what can and should be done. Hobel (2009) stressed that an important prerequisite for this to happen is that both teachers and students should work on writing problem statements that set the stage for investigation and knowledge development. Thrane's (Thrane, 2021; Thrane and Christensen, 2022) own study showed how a crosscurricular project between chemistry and Danish on the topic of "taste" strengthened students' self-efficacy and their ability to act knowledge based. Hobel (2012) gave an example of how students developed new knowledge in a crosscurricular course. This example is analyzed in third and fifth sections of this chapter (third example). Thrane's review showed that students' independent, problem- and formation-oriented work and their capacity for academic reasoning can be strengthened in crosscurricular work if based on current social problems and on the students' own experiences (e.g., Grice, 2014; Persson, 2014). Applebee et al. (2007) showed that students working in a crosscurricular manner can be involved in conversations on new ideas and use the different disciplines as powerful tools when addressing crosscurricular themes.

In a study based on 118 interviews with ten students, Hobel (2018) explored how the students positioned themselves in relation to crosscurricular work. Here, four of the ten students positioned themselves as knowledge documenters. For them, the purpose of crosscurricular work was to reproduce content as presented by the teachers. The other six students, on the other hand, positioned themselves as students who wanted to investigate and develop knowledge. One of these was the student writing about chlamydia. Another mixed methods study (Petersen & Hobel, 2020) investigated how first-year students attributed meaning to crosscurricular work; the study showed that students following commercial and technical programs perceived crosscurricular work as preparation for acting in their future jobs. Students from the general program appeared less certain about the meaning of crosscurricular work. None of the students linked academic interaction to authority and activity in civil society. However, how the same students attributed meaning to crosscurricular work in the last year of upper secondary school has not been investigated.

Christensen et al. (2018) investigated how teachers understand crosscurricular work after the 2017 reform. The study was based on 877 questionnaires completed by teachers from 37 schools. Two cluster analyses showed that around half of the teachers believed that crosscurricular work enhanced students' learning outcomes, while a third were neutral and almost two-thirds believed that both teachers and students can benefit from crosscurricular work. However, the survey did not indicate whether teachers positioned students as knowledge documenters or knowledge developers.

Thrane's review has suggested that most students worked as knowledge documenters. However, knowledge-developing and problem-oriented work can be seen, and some students positioned themselves as knowledge-developing.

We do not know whether the students who positioned themselves as knowledge developers saw knowledge development from a Bildung perspective. We have found that most teachers believed that students benefited from crosscurricular work. However, what was meant by "benefit" is not clear. In addition, the survey did not clarify whether teachers positioned students as knowledge documenters or knowledge developers.

Bildung and crosscurricular teaching: Danish experiences

To illustrate the Danish case, I selected three examples from my own research (Hobel, 2009, 2011, 2012, 2021). These examples bring the Danish case to life: What has happened in the classroom? How do we see didactic challenges in practice?

The selection of examples was information oriented, with a focus on maximum variation (Flyvbjerg, 2006). The three cases were selected to cover a range of crosscurricular work. A closer discussion of these examples – which is shown in the last section of this chapter – makes it possible to uncover, conceptualize, and discuss the didactic challenges facing Bildung-oriented and crosscurricular work in upper secondary education. It is also possible to make a conceptual generalization. That is, to point to concepts that can be used by other researchers analyzing similar cases and discussing similar didactic problems and, thus, further elaborate on them.

In the first example, a group of students worked for a couple of weeks on the topic of "nationalism" in music, history, and social science. They were instructed to write a synopsis with one main question that had to be elucidated from all three school subjects. The group asked, "What is Danish nationalism?" and they added two sub-questions for each school subject. These were check and match questions that could be answered by referencing the knowledge presented in the school subjects. The group pointed out that the three school subjects represented different perspectives. For example, social science provides "a more contemporary perspective" than history, and music is "a feature of nationalism." The students expressed their own opinion when writing, "It is difficult to say how to define Danishness. In the end, it's up to each individual to decide."

In the second example, a student wrote a Study Program Project on the topic of "microdosing and psychedelic drugs." This was a crosscurricular work that combined biology and chemistry. The student wondered how the drugs worked and whether it was a good idea to take them. He examined how drugs functioned by doing experimental work in chemistry and presenting research articles. Finally, he discussed microdosing as a means of improving cognitive function and the risks that may be associated with it. He did this by listing the disadvantages and advantages of microdosing.

In the third example, a class had been working on the topic of "corporate social responsibility" (CSR) in the subjects of English, social science, and innovation for a couple of weeks. In English and social science, the students

worked with texts in different genres and with different senders (NGOs, investigative journalists, etc.) on labor issues in India. The project took the form of a project in which the students worked with a local company with a branch in India. The task was for the students to write a pitch to the company on how they could improve their CSR. Two groups proposed that the HR department in India should develop training courses for employees on how to make demands on the working environment and how to be a good entrepreneur. The students also worked with students from a friendship high school in India in the city where the company's Indian branch was located. Communication with the Indian students was not as extensive as planned, but some of the Indian students challenged the Danish students' proposals because "young people in India are knowledgeable."

Crosscurricular work and Bildung

Before summarizing the results of the analyses of the three examples, a theoretical discussion of the relationship between crosscurricular work and Bildung in the twenty-first century is necessary.

How should Bildung-oriented crosscurricular work be organized in the twenty-first century? From a Bildung perspective, is it limiting to work within the frames of single school subjects?

Bildung-oriented and crosscurricular teaching must address the question of what students should know and select content that can provide a knowledge-based foundation for students' work on crosscurricular problems. This concerns both declarative knowledge (knowing that) and methodological or procedural knowledge (knowing how). An essential part of procedural knowledge is the ability to wonder about and formulate problems. Therefore, crosscurricular teaching must be not only knowledge-based but also knowledge-developing and problem-solving. It must be action oriented in an ethically reflective way. It must be innovative.

I follow the Danish educational researcher Harry Haue's definition of the content of universal Bildung and its function. (I include Haue in continuation of the considerations on the concept of Bildung in Chapter 3 because I see him as being in dialogue with these considerations and because he has had a major impact on the Danish debate.):

> Universal Bildung can be developed in an education that includes the general parts of the sciences and school subjects that society needs to develop students' personal authority to reflect on their own relationship to fellow human beings, nature, and society.
>
> (2008, p. 8)

Universal Bildung is developed in the encounter between the resources of the culture (the objective) and students with their different types of experiential backgrounds (the subjective) (see characteristics of Bildung (iii) and (iv) in

Chapter 3). In this encounter, students' everyday understandings can become qualified, and they can develop authority. However, authority does not only mean to "know what." It also means to "know how" and the ability to develop new knowledge and understanding and participate in the ongoing dialogue about the values of society. Haue added that universal Bildung must be holistic in character; the range of school subjects must be broad, and all school subjects must be Bildung oriented. This is in line with the classical notion of Bildung, which entails that human abilities and the domains of human life are strongly interrelated and must be developed in concert (see characteristics of Bildung (vi) in Chapter 3).

Haue added that the universal is dynamic, and we must look for how the dynamics are expressed.

The question is as follows: How do we have to conceptualize universal Bildung in the twenty-first century? Klafki (1993, p. 45f) pointed out that, starting from the middle of the twentieth century, there was a reckoning with the decline of the concept of Bildung, that is, a reckoning with an exclusionary nature of Bildung, that was linked to possession and power. It was a showdown with a school where the children of civil servants were socialized and qualified to become civil servants. To have authority meant to be enculturated in the hegemonic ideology (Gramsci, 2011, pp. 210–214) and act independently within its framework.

This reckoning has been linked to the UN Declaration of Human Rights, which has made education a human right. At the same time, UNESCO stressed that everyone has the right to education and literacy (Holmes & McLean, 1989, pp. 1–5). In Denmark, this process was fully implemented by the primary and lower secondary school reform of 1975 and upper secondary school reform of 1972 (Haue, 2008, pp. 149–160). In the late modern epoch, which is marked by cultural liberation (Ziehe, 1982), the idea that Bildung is rational self-determination for all and the notion that this marks the abolition of all power over the individual has had a breakthrough. However, there has been national conservative resistance to this (Haue, 2008, pp. 202f, 211). As noted in the following, Bildung is now widely understood as something that makes it possible for everybody to become empowered citizens.

Bildung-oriented teaching must urge students to investigate and research the world, not simply communicate the results of the research of others. Bildung-oriented teaching must be crosscurricular because core societal problems cannot be solved within the frames of a single school subject. The societal complexity (Haue, 2008, p. 222) can be addressed by having several school subjects work on problems that lie at the joints and places between them. In this way, added epistemic value (Klausen, 2014, p. 5) can be created (Gibbons et al., 1994). This is in line with the point made in Chapter 3 that crosscurricular teaching implicates wider perspectives on teaching and education for Bildung. Working within the frames of single subjects limits the Bildung perspective.

How can crosscurricular work and universal Bildung be conceptualized within this framework?

Everybody must have the opportunity to develop authority. Klafki (1993, 1995) stated that empowered students have a "historically mediated awareness of key contemporary issues (and aim for) a readiness to contribute to the solution of these issues." Thus, Klafki emphasized the action perspective. It must be a normative goal for students to participate as active and empowered actors in civil society. In concrete terms, this can be achieved through problem-oriented work on key epochal problems (1993, pp. 56–69). Here, they must work with epistemic knowledge (how the world is), technical knowledge (what one can do in the world), and phronetic knowledge (what one ought to do in the world to have ethic strength) (Gustavsson, 1998, p. 54ff).

Interestingly, this constructivist pedagogical (Haue's term) approach to Bildung and didactics is parallel to social–cultural learning theory. Klafki's dialectic between the subjective and objective in the double opening is echoed in the Vygotskyan tradition, for example, in Engeström's (2014) expansive learning theory. See also Chapter 2, which highlights that Bildung, constructivism, and student-centered learning all view learning as an active process.

Thus, the question of Bildung is that of what the students should become. In late modern society, this must mean that students should have the opportunity to – whatever their background – become citizens who can autonomously reflect upon social problems and possible solutions and then act.

The problems that can be addressed in crosscurricular teaching can be key epochal problems or social, societally essential dilemmas (Engeström, 1987, p. 160; Klafki, 1993, pp. 56–69). Students may encounter solutions proposed by different actors and consider and discuss them. It is true for these problems that they will typically be controversial (Christensen & Grammes, 2020), that is, problems that are contested in political and civil life. It is these problems that students must relate to in school and as citizens in a democratic society. What belongs to the realms of politics is education. Problems such as climate change, social equality, migration, etc. can be addressed.

The discussion on Bildung-oriented teaching is not only about the content of teaching, but also about the form of teaching. Teaching must be seen as communication (Englund, 2015, 2022), in which both students and teachers are legitimate participants. Work on key epochal problems must be organized as a deliberation in which the validity claims of the conversation (Habermas, 1986, pp. 94–101) are respected.[5] Deliberation ensures students' self-determination and requires them to empower others' self-determination and be in solidarity with them (Klafki, 1993, p. 52).[6] This is true both when, for example, investigating facts about climate change (episteme), what one can do (techné), and what one ought to do (ethics). These questions must be asked and answered in class. Didactics is normative (Krogh et al., 2022) in the sense that it is committed to addressing the problems that students as citizens must deal with, but it is nonaffirmative (Uljens, 2021; Uljens & Kullenberg, 2021) in the sense that the solutions to the problems are not given in advance

but must be the result of deliberation. This can, of course, lead to both innovation and free adoption of and adaptation to conventions.

Thus, from the teachers' point of view, nonaffirmative didactics and pedagogy are forms of leadership. The teacher leads students to self-activity and authority.

Thus, crosscurricular didactics are innovative, aiming at rethinking and improving existing practices and ways of thinking in the world in an ethically sound way, together with all relevant actors and based on relevant knowledge (Hobel & Christensen, 2012, p. 57). In a Bildung-oriented school, innovation cannot be particulate and limited to instrumental and strategic actions in the market, but it must be ethically reflected, based on general criteria, and address all societal domains and not only the market.

If the school is to be genuinely inclusive, all students must be legitimate participants. Their voices and points of view must be heard in terms of epistemic, technical, and phronetic knowledge. Otherwise, they will be excluded and may resist learning (Illeris, 2004), that is, reject the teaching because it contradicts their values or accept it anyway for strategic reasons but without identifying with it. On the other hand, it is the school's task to challenge students' experience-based approaches to key problems by not only involving, but also discussing, academic knowledge and academic methods.

Thus, Bildung-oriented teaching must be empowering. It must be so through its content – addressing key epochal problems – and through its form – students working on the ephocal problems in a problem-oriented and independently investigative way. It must also be deliberative and nonaffirmative, involving all as legitimate participants with their respective backgrounds. The work aims at solving epistemic, technical, and ethical problems, and participants and places outside the school can be usefully involved. In this way, a Bildung-oriented school aims to involve everyone in the work of analyzing and solving complex, interdisciplinary, epochal problems in a disciplinary grounded way, and acting upon them.

Examples discussed

In this section, I revisit the three examples reviewed earlier. Based on the conceptualization of crosscurricular work and Bildung in the previous section, I discuss the problems and potentials of the three examples. The intention is to contribute to a general discussion of the didactic challenges associated with Bildung-oriented and crosscurricular education.

Research has shown that many students are positioned and position themselves as people who need to document knowledge. The analysis of first example shows the limitations of this teaching. In the second and third examples, students work to construct knowledge, and the teaching must be assumed to be nonaffirmative. Students must find their own solutions. However, the analyses show that there are still didactic challenges. In both examples, these challenges are linked to the development of ethical knowledge and competence

to act and, in the last one, to a confrontation with students' biases. There is a need for a heightened theoretical awareness of Bildung and crosscurricular work among teachers. Teachers need to position students, and students need to position themselves in new ways.

In the first example, the students only worked to document knowledge. They seemed to understand learning as the transmission of knowledge. They did not work to develop a knowledge base for active action in civil society. They were not Bildung-oriented. They *did* express their own opinions about nationhood and identity, and there may also be some evidence that they had opinions about how they must act. However, their opinions were based solely on their experiences – which seems to not have been challenged by the teachers. The theme – Danishness, national feeling, and identity – can be seen as a key epochal problem, but the students did not work with it in a crosscurricular way. Simply put, they gave an account of the knowledge transmitted to them by the three teachers. Nor did they work in a problem-oriented way. Their problem statement prepared the grounds for retelling the textbook material, and as mentioned, they did not engage in dialogue with this material to develop new knowledge based on which they could find out to act in civil society. One must ask: Can a course that proposes to retell the textbooks be nonaffirmative?

In the second example, the student worked on his study program project to construct and develop knowledge. He investigated, based on two school subjects, what microdosing is and what can be done with microdosing. He positioned himself as a researcher who must investigate and construct new knowledge about whether microdosing is a "miracle drug," which was done by addressing both epistemic and technical problems. However, when it came to ethical problems, he did not elaborate on an academic basis but started from everyday considerations of a utilitarian nature about pros and cons. On this point, he did not challenge his everyday understanding, even though the teacher's task formulation suggested that he should. The student was working on a key epochal problem: drugs to promote wellbeing and performance, and he was doing so in a crosscurricular manner. He highlighted the epistemic and technical levels from the perspective of biology and chemistry and discussed what the two school subjects contributed. However, as already mentioned, he did not have an academic foundation for the ethical discussion. The student worked in a problem-oriented and crosscurricular way, and in dialogue with the school subjects, he developed knowledge about what microdosing is and can do. His learning was expansive. As a researcher, he gave himself authority – an authority he could bring to the debate in civil society, even if he did not have a school subject–based basis for participating in the debate on what we ought to do.

In the third example, a class worked with corporate social responsibility (CSR). They did this together with representatives from a Danish company with a subsidiary in India and with students from their friendship high school in India. They had to advise the company on CSR, and drawing on knowledge from three school subjects, they were qualified to advise the company. They

positioned themselves as knowledge developers in schools and civil society. Despite their extensive work, however, there was some evidence that their everyday understanding of Indian issues was not being challenged. They were othering their Indian schoolmates. The class was working on a key epochal problem – social inequality in a global context – and they were doing so in a crosscurricular way. They explored both what the conditions were, what can be done, and what we ought to do. They worked in a problem-oriented way, examining the situation in India, and in this way, they acquired a disciplinary foundation that enabled them to make ethical reflections and make suggestions about what needed to be done. The course was crosscurricular, Bildung-oriented, and empowering. The students developed the authority to act on a key epochal issue – but neither the Danish students' everyday understanding, nor that of the Indian students was challenged.

Thus, in late modern society, Bildung-oriented teaching must be crosscurricular. This is a prerequisite for addressing the complex problems with which students must work. Teachers must position themselves as actors who organize nonaffirmative teaching that gives students the opportunity to be empowered. That is, to be able to reflect on the subject based on epochal key problems with an epistemic, technical, and ethical perspective, be able to engage in deliberation about the problems, and point to possible courses of action.

Notes

1 "Bildung-oriented education" could be translated into "General education." In Danish, it is "*almendannende uddannelse*" and in German "*allgemeine Bildung*."
2 In this article, didactic is to be understood as it is used in the German and Nordic traditions, covering the questions of the content to present and processes to teach, the reasons for these choices, and reflection on this.
3 In Denmark, there are four upper secondary education programs, the first three of which are three-year programs: the Higher General Examination Program, the Higher Commercial Examination Program, and the Higher Technical Examination Program. These programs give access to Master Education. The fourth – The Higher Preparatory Examination – is a two-year program and gives access to Professional Bachelor Education. The examples in this chapter are from the general upper secondary school.
4 "*Mündigheit*" is translated into "authority" in this chapter. People who have authority are referred to as empowered.
5 Habermas' deliberative conception of democracy is discussed and criticized for being exclusive in Chapter 15.
6 Klafki (1993, p. 65) added that Bildung does not only make cognitive demands. Emotional experience and empathy are also central.

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5 Crosscurricular teacher collaboration actualizing teacher professionalism

Revising a didactic model

Nina Mård and Charlotta Hilli

Introduction

This chapter examines crosscurricular teacher collaboration, meaning that teachers with different subject affiliations develop the curriculum and teach together. Recent trends suggest that many international and national policy documents expect crosscurricular teacher collaboration but leave it to the schools and teachers to organize the efforts (Horn et al., 2017; McPhail, 2018). Policymakers and school leaders sometimes set overly optimistic goals for crosscurricular teacher collaboration and expect it to enhance a range of matters, such as teachers' professional and school development, student learning, and professional learning communities (Admiraal et al., 2016; Lysberg, 2022).

Crosscurricular teaching is considered an approach to linking distinctive components of two or more subjects (for conceptual clarifications, see Chapter 2). Crosscurricular teaching and teacher collaboration have traditionally been under-theorized (Mård, 2021). The research is often descriptive, and there are few didactic theories to support teachers in jointly planning and implementing crosscurricular activities in school. To meet this need, we developed a didactic model for crosscurricular teaching (Mård & Hilli, 2020). The model provides a framework by highlighting decisional (subjects, competences, values and aims of education, student needs and interests, contemporary issues, and methods) and conditional (curriculum, collaboration, and school culture) factors (for an extended explanation of the model, see Mård & Hilli, 2020). In the first version, we did not further examine collaboration as it was one of many important factors raised in the empirical cases analyzed. In this chapter, we will revise the didactic model while considering crosscurricular teacher collaboration, its potential and pitfalls. Hence, other forms of crosscurricular collaboration are excluded, such as student collaboration, teacher–student collaboration, and collaboration with the surrounding community.

We suggest that crosscurricular teacher collaboration creates new didactic tensions as teachers negotiate which subjects to include and the scope of the collaboration, depending on the available resources (Haapaniemi et al., 2020). Several interpersonal, individual, and organizational factors affect

DOI: 10.4324/9781003367260-6

collaboration, including the support of the educational leader, available resources, and teachers' attitudes (Toikka & Tarnanen, 2022). Adding to the complexity is the lack of guidelines for collaboration, as it has been realized in multiple ways, from sharing materials and ideas to planning joint teaching. The collaborative interventions can be short- or long-term and may, to various degrees, support teacher autonomy and constructive group discussions and activities (Hargreaves, 2019; Vangrieken et al., 2015).

Working together in shared practices may enable teachers to develop professionally by gaining new insights into their teaching and student learning, potentially increasing the effectiveness of education and teachers' professional wellbeing (de Jong et al., 2019). However, teachers may question and mistrust collaborative initiatives for different reasons. The goals may be ill-defined or unrelated to teachers' professional practices, the conditions may be unfavorable, or collaboration may challenge the individualistic culture teachers are accustomed to. Even productive collaboration may add to teachers' workload with increased risks for exhaustion and burnout (Little, 2007). Hence, crosscurricular teacher collaboration must be critically examined to avoid common mistakes.

In the following sections, we discuss relevant studies on crosscurricular teacher collaboration and elaborate on Mård and Hilli's didactic model (2020). Since studies have shown that conflicts and negotiations often relate to teachers' didactical positions and worldviews (Frederiksen & Beck, 2013), we argue that teacher professionalism frames crosscurricular teacher collaboration. Our inquiry led us to revise the didactic model and include teacher professionalism as a conditional factor for crosscurricular teaching, besides collaboration, the curriculum, and school culture (see Figure 5.1). Before entering the literature review and discussion, we will define teacher collaboration in general and in relation to Bildung-didactic theories, which make the theoretical framework of the model (cf. Mård & Hilli, 2020).

Teacher collaboration and professionalism

Teacher collaboration is not a uniform or static concept but rather an umbrella term for different types of collaboration with varying depths. Vangrieken et al. (2015) define collaboration as a joint group interaction concerning all the activities needed to perform a shared task. The authors distinguish mainly between collaboration and cooperation, the latter referring to partners splitting their work and combining the partial results for the outcome. The idea of collaboration is instead that shared activities characterize the process. Different types of teacher collaboration have been identified to describe the degree of team entitativity (Vangrieken et al., 2015). The depth and focus of collaboration range from whether it pertains to practical arrangements, such as sharing ideas and materials (i.e., decisional levels), or whether there is room for deeper didactic discussions on classroom practice, such as underlying teacher-related beliefs and values (i.e., conditional levels).

Similarly, Havnes (2009) suggests four levels of collaboration: preserving individualism, coordination, cooperation, and sharing. When *preserving individualism*, the focus is on individual teacher responsibility and autonomy. The second level of collaboration refers to *coordinating* duties and tasks without discussing the substance of teaching. *Cooperation* alludes to establishing a common ground for the joint enterprise by focusing on the content and process of classroom activity. *Sharing* entails clarification of pedagogical motives that direct how the teaching and learning are structured. In teacher collaboration, individual freedom is generally negotiated while developing shared ideas and responsibilities.

However, questions remain regarding the quality of teacher collaboration and how it impacts teachers' professional development. Teacher collaboration can be not only ambitious and rewarding but also tension-ridden and filled with conflicts. The collaboration may challenge the teacher's professional attitudes toward content, knowledge, assessment, and a school culture of individualism (Hargreaves, 2019; Little, 2007). The quality of teacher collaboration relies on opportunities to express different and possibly contradicting views rather than to favor consensus or avoid conflicts during interventions (Hargreaves, 2019). Collaboration may also become challenging because of teaching conditions, such as classrooms, schedules, and curricula. Overly controlling school leaders that want to manage when, where, and how teacher collaboration happens have also restricted or hampered the efforts (ibid.).

To develop schools and teaching practices, teacher collaboration can be initiated either on the district and government level or the school and teacher level (Hargreaves, 2019). The school leader's navigation, coordination, support, and encouragement are needed to establish collaborative cultures (Hargreaves, 2019; Kim & Lee, 2020). Equally essential is trusting and empowering teachers to address and change problems in their teaching and schools. Teacher collaboration benefits from teachers identifying problems they want to solve as a professional community rather than individuals (Little, 2007).

Teacher collaboration thus seems to need professional freedom and trust, as well as organizational and emotional support, for it to become effective for the school's results and meaningful to the professional development of teachers. The discussion so far has paved the way for the next section on Bildung-oriented Didaktik as a multilevel framework that trusts and respects the professionalism of autonomous teachers but lacks concepts for collaborative school cultures.

Bildung-oriented Didaktik as a framework for crosscurricular teacher collaboration?

The didactic model revised in this chapter builds on theories of Bildung-oriented Didaktik. The Nordic and German Didaktik traditions are based on pedagogical and philosophical assumptions of teacher autonomy and abilities

to reflect critically on teaching. According to Didaktik, teaching is related to teachers' instructional practices and study practices and consequently learning of students (Uljens & Ylimaki, 2017). Didaktik aims at open-ended and Bildung-oriented processes for a better society by offering students possibilities to become more knowledgeable and capable of participating in society. However, in this chapter, we turn the attention to the teachers and their professional processes of Bildung as they collaborate. Didaktik points to the complexity of teaching because it is determined by many interpersonal factors (i.e., teacher–student relationships) and the cultural and political contexts that influence and regulate the aims, contents, and methods (i.e., the curriculum). Rather than providing definitive answers, Didaktik leaves it to the teacher to reflect on the content and context of teaching (for an extended discussion on Didaktik and Bildung, please see Chapter 3). In crosscurricular teacher collaboration, these reflective processes are extended to the faculty members and the aim becomes to change teaching individually and in groups.

Didactic models can reduce teaching complexity by identifying relevant teaching factors, for example, aims, contents, and methods (Jank & Meyer, 2006). According to Sjöström (2021), didactic models bridge theories and practices. A good didactic model can help teachers to face complex teaching situations by operationalizing didactic theories and making them more concrete.

Numerous didactic models exist, most addressing teaching at the classroom level. The model we discuss here similarly considers concepts related to instruction and conditional factors that determine and frame crosscurricular instruction (see Figure 5.1). Inspired by the so-called Berlin Didaktik (Jank & Meyer, 2006; Keiding, 2013), the two-level model contains decisional factors (e.g., subjects, aims, methods), which need to be selected by teachers for every teaching activity, and conditional factors (school culture, curriculum, collaboration), which regulate crosscurricular teaching activities and affect the decisional factors.

Didactic models may also include political and economic reasonings behind teaching, for example, the values imbued in curricula documents and steering mechanisms (e.g., funding) in education (Uljens & Ylimaki, 2017). Crosscurricular teacher collaboration is often initiated on policy levels. In recent years, policymakers in many countries have decided to include principles for crosscurricular teaching in national curricula. Teachers are encouraged or forced to collaborate across subjects to provide students with holistic and meaningful learning experiences (Frederiksen & Beck, 2013; Haapaniemi et al., 2020; McPhail, 2018). Enhancing student learning and promoting teachers' professional learning and schools as learning communities are among the main ambitions of crosscurricular teacher collaboration (Adams & Mann, 2020; Admiraal et al., 2016; Lysberg, 2022).

In many cases, schools and teachers are free to implement policy guidelines and decide how to realize teacher collaboration in their schools (Lysberg, 2022; Lähdemäki, 2018). Crosscurricular teacher teams may be established

temporarily to work with short-term projects (cf. Haapaniemi et al., 2020) or long-term projects to restructure the whole school organization (cf. Lysberg, 2022). No matter the approach, teachers may welcome or doubt collaborative efforts (Adams & Mann, 2020; Frederiksen & Beck, 2013; Toikka & Tarnanen, 2022).

The increased policies for crosscurricular teacher collaboration call for critical reviews of Didaktik as a teaching framework. The individualist culture, typical for Didaktik traditions, which signifies individual teacher's planning and realizing teaching within one classroom with a group of students (cf. Hopmann, 2007), is challenged by the collaborative or community-based school culture that crosscurricular teaching implies (cf. Hargreaves, 2019; Kim & Lee, 2020). For didactic theories and models to be timely, there is a need to address aspects of teaching where teachers collaborate and what kind of professional Bildung-processes this may enhance.

Crosscurricular teacher collaboration: navigating teacher professionalism

This section discusses previous studies on crosscurricular teacher collaboration. In the literature, we identified two central factors: *organizational factors* and *factors related to teachers' didactical positions.* After discussing the literature and the two factors, we will present a revised version of the model that includes a conditional factor of teacher professionalism (see Figure 5.1) and elaborate on its premises for crosscurricular teaching. Our discussion will suggest that teacher professionalism informs all factors of crosscurricular teacher collaboration on both conditional and decisional levels.

Organizational factors for crosscurricular teacher collaboration

Crosscurricular teacher collaboration requires teacher teams to negotiate curricula-related decisions when combining contents and aims of different subjects. In subject-structured systems, schedules, physical spaces, teaching employment, and other resources are related to different subjects. In crosscurricular teacher collaboration, these *organizational factors* can be reconsidered and rearranged (cf. Trent, 2010). Depending on the context and aims of crosscurricular teaching, the number of teachers and subjects included can be many or few. Studies suggest that fewer teachers and subjects involved may reduce the complexity and ease the planning and implementation processes (Braskén et al., 2020; Haapaniemi et al., 2020).

No matter the number of teachers involved, crosscurricular collaboration requires time. To avoid the risk of teachers considering it time-consuming or an additional workload, researchers suggest that school leaders should plan joint time for collaboration within teachers' ordinary work hours (Adams & Mann, 2020; Admiraal et al., 2016; Haapaniemi et al., 2020). In Pöntinen's study (2019), many participating student teachers did not see crosscurricular

collaboration as an integral part of a teacher's work, but rather as a voluntary work outside regular working hours. Thus, crosscurricular teaching and collaboration must be part of the schoolwork to gain teachers' credibility. Otherwise, there is a risk that it becomes an ideal positively viewed by teachers but rarely implemented in teaching practices due to organizational obstacles (cf. Toikka & Tarnanen, 2022).

Organizational factors such as time allocation are often regulated by laws, work agreements, and national curricula (cf. Little, 2007; Lysberg, 2022). In the United States, there are significant differences in how teachers in elementary and secondary schools can allocate time for collaboration, due to the number of employed teachers and state agreements on planning time (Little, 2007). The national curriculum and work agreements in Norway allow school leaders to organize joint time for teacher collaboration (Lysberg, 2022). In Finland, the national curricula require crosscurricular teaching in primary and secondary schools. However, teachers may need to organize it within their regular work, which can be challenging because of teachers' different schedules (Pöntinen, 2019).

The outcomes of crosscurricular teacher collaboration are thus related to conditional factors at the school level (schedules, teaching resources) and political decisions on national or regional level (curriculum, work agreements). As already stated, the school leaders should plan for joint time for teacher collaboration to ease the teachers' workload and support the initiative (cf. Hargreaves, 2019). With little time for mutual planning, the collaborative efforts will likely stay on a coordinative basis (cf. Havnes, 2009) since the available time is spent on teachers agreeing on organizational issues. Deeper forms of collaboration, such as cooperating and sharing (cf. Havnes, 2009), require time for teachers to discuss and negotiate their didactic positions.

Factors related to teachers' didactical positions

The aforementioned organizational factors relate to the most influential variable for crosscurricular collaboration: teachers' professional attitudes or didactical positions (Frederiksen & Beck, 2013). *Didactical positions* are indicators of teachers' professional inclinations (e.g., views on teaching, the learners, and socialization). In a study of Danish secondary teachers, Frederiksen and Beck (2013) found that didactical positions were not related to specific variables of gender, seniority, or teaching subject. Variations in positions and attitudes did not have the same distribution pattern at all schools, but different perceptions existed. Therefore, it is essential to consider what happens in a heterogeneous teacher group when implementing crosscurricular reforms.

Teachers have different attitudes to crosscurricular teaching and collaborating with their colleagues (Toikka & Tarnanen, 2022). For example, studies revealed that teachers with different subject affiliations had contrasting views on the aims of students learning the content in crosscurricular projects. Content teachers identified strongly with their discipline and were more

inclined to follow the syllabus, while language teachers negotiated the meaning of the content with their students and viewed knowledge as less sure than the content teachers (Arkoudis, 2007; Creese, 2010; Davison, 2006; Trent, 2010). The studies suggested that the teachers needed to negotiate and challenge their epistemic beliefs to reach a shared understanding that supported teacher collaboration. Thus, rather than highlighting the differences between subjects, crosscurricular teaching benefits from finding common ground among teachers and perhaps even a collective identity for the whole school (cf. Trent, 2010).

Similarly, Finnish home economics and mathematics teachers had mixed feelings about the effectiveness of crosscurricular teacher collaboration (Haapaniemi et al., 2020). Some teachers in the study felt that the amount of time spent on the crosscurricular lessons resulted in quite a low efficiency when considering the objectives met in the subjects involved. They suggested that fewer subjects and teachers should be involved in a crosscurricular collaboration to reach the different subjects' objectives (cf. Braskén et al., 2020).

In contrast, Lysberg (2022) reported on Norwegian teachers gaining respect for their colleagues' knowledge and work through crosscurricular teacher teams. Content teachers benefitted from language teachers' knowledge of reading strategies and gained new insights into teaching strategies in their subjects. Teachers having students with challenges in their subjects could find out that the same student was managing well in other subjects. The collaboration thereby increased the teachers' motivation to find new supportive teaching methods for those students. Hence, shared knowledge in crosscurricular teacher teams can enrich teaching in different subjects if teachers recognize and value their colleagues' subjects and work (cf. Pöntinen, 2019).

In profound forms of collaboration, such as cooperation and sharing (Havnes, 2009), teachers need to negotiate their didactical positions. Deep engagement is required for successful collaboration, implying a change of attitudes and inspiring others (de Jong et al., 2019; Toikka & Tarnanen, 2022). It might be relevant for teachers to explore the concept initially and aims of collaboration collectively since realizing it can take many forms (cf. Vangrieken et al., 2015). If teachers have not decided on didactic aims for their collaboration, the negotiations may focus on solving practical problems or organizational issues rather than planning joint lessons or projects (cf. Horn & Little, 2010).

In successful crosscurricular teacher collaboration, the outcomes for teachers' professional development are promising. Several studies report on teachers' increased motivation as they get new ideas (Haapaniemi et al., 2020; Horn et al., 2017; Lysberg, 2022). Positive effects such as teachers' professional development, increased wellbeing, and reduced workloads have been identified when teachers collaborate toward a mutual goal (e.g., joint lesson planning) and everyone feels included and valued. Teachers' openness to differences of opinion and willingness to learn together and from each other may benefit professional development, as they develop new perspectives and

strategies for teaching (de Jong et al., 2019). This may, perhaps surprisingly, increase the sense of teacher autonomy in collaborative practices (Haapaniemi et al., 2020).

Crosscurricular teacher collaboration relates to conditional factors such as resources, professional inclinations, and the quality of collaboration. If teachers have the autonomy and time to plan crosscurricular activities and develop a shared focus to engage in meaningful discussions with their colleagues, the collaboration can become professionally meaningful and engaging. Developing new ways of teaching together means identifying possible conflicting views, organizational issues (e.g., number of teachers, subjects), and shared problems to address. The reviewed studies confirm that collaborative cultures indeed build on teachers respecting and trusting their colleagues' professionalism (cf. Hargreaves, 2019; Little, 2007). Establishing professional communication open to different views on decisional factors (e.g., aims, methods, themes) may be challenging but necessary as teachers mediate between the curriculum, their didactical positions, and collaboration with their colleagues.

A revised didactic model for crosscurricular teaching: adding the factor of teacher professionalism

Crosscurricular teacher collaboration actualizes professional negotiations and possible conflicts on decisional and conditional levels grounded in the teachers' ontological and epistemic standpoints (see also Chapter 15). Teacher professionalism covers the didactical positions of individual teachers, which form the teacher's identity and agency. The professionalism of involved teachers will most likely be (re)negotiated when developing crosscurricular collaboration. In this process, teachers' conflicting views and understandings need to be addressed for two reasons; they help focus the collaboration and challenge a deeper and more meaningful collaboration. Crosscurricular teacher collaboration brings didactical tensions between the individual and the collective to the fore and calls for critical examinations of existing practices, structures, and forces influencing teachers' work. Similar tensions can be explained as Bildung-oriented processes where teachers reflect on their didactical position while they adapt to the collaboration with other faculty members. Successful collaboration suggests that teachers communicate respectfully and purposefully to realize the possible positive effects, such as professional development and school improvement, increased autonomy and wellbeing, and reduced workloads (cf. Chapter 3).

In the previous model version (Mård & Hilli, 2020), we did not highlight the individual teacher's attitudes to and views of crosscurricular collaboration or teaching. Accordingly, we added teacher professionalism to the conditions for crosscurricular teaching in the revised didactic model. The theories of Didaktik, which inspired the model, also include aspects of teacher professionalism to encourage, for example, teacher students, teachers, and researchers to analyze how a teacher's background and inclinations frame and affect teaching

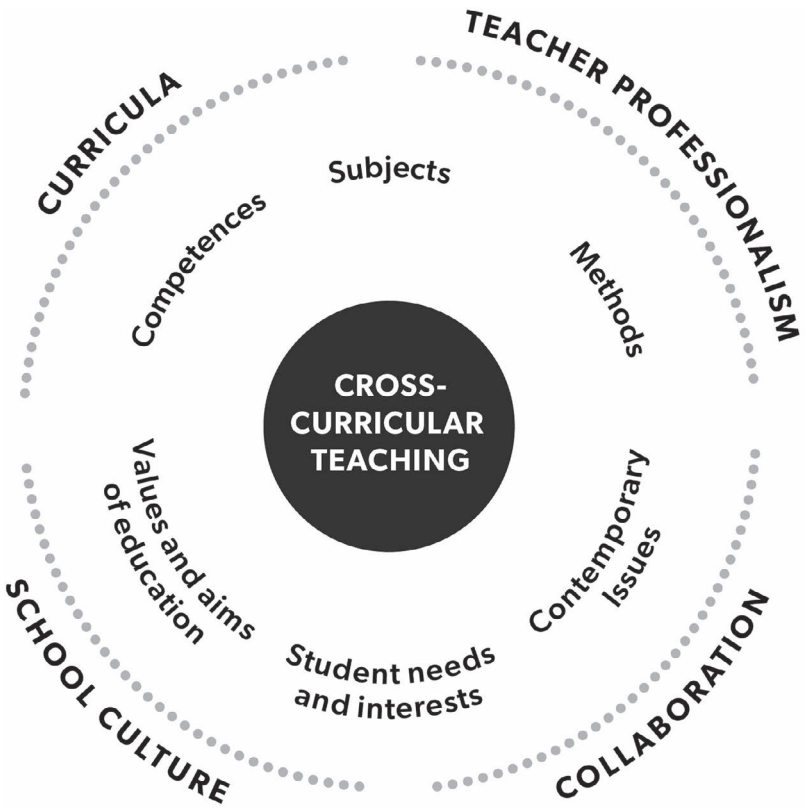

Figure 5.1 A revised didactic model for crosscurricular teaching.

(Jank & Meyer, 2006; Keiding, 2013). The revised model is presented in Figure 5.1.

In the revised model, teacher professionalism, curricula, school culture, and collaboration offer a conditional framework for crosscurricular teaching. One could argue that teacher professionalism is an overarching meta-factor that should be placed on a third factor level since it influences all teachers' choices and actions. Related to the model, teacher professionalism influences teachers' decisional choices of considering different subjects, competences, values and aims of education, student needs and interests, contemporary issues, and methods in crosscurricular teaching. Teacher professionalism also influences how teachers interpret curricula and contributes to developing the school culture and collaboration with colleagues. However, in our understanding, the model's conditional factors make the framework for crosscurricular teaching within which teachers are expected to act.

Despite the various conditions of teachers worldwide, the conditional factors of teacher professionalism, curricula, school culture, and collaboration will

inevitably frame crosscurricular teaching. The model can provide a framework to analyze relevant conditional factors for crosscurricular teacher collaboration since the factors may hinder or support crosscurricular initiatives in schools. Further, due to the hermeneutic nature of the model, the conditional factors are nonhierarchical and have different interconnections depending on the contexts of crosscurricular teaching (cf. Mård, 2021). Previous research suggests that similar issues occur despite contextual and cultural differences. Therefore, the model is a flexible framework that may support teachers in various contexts and school systems to reflect on, develop, and adopt it according to their practices.

Crosscurricular teacher collaboration is often initiated and framed by policies and curricula. Teaching resources or work agreements are rarely something teachers or even school leaders can control. However, organizing joint planning time has been shown to ease the teacher's workload and support the collaboration. The model encourages school leaders and teacher teams to assess the quality of collaboration related to teachers' didactical positions and team communication. Ideally, crosscurricular teacher collaboration challenges teachers to reconsider their didactical positions as they get new insights into teaching and learning. Learning from and with their colleagues can support teachers' Bildung processes as they develop collaborative skills and get new perspectives on their teaching (see Chapter 3).

Finally, we want to make some terminological clarifications. Following the standards of this handbook (see Chapter 2), we have changed the concept of multidisciplinary to crosscurricular in the model core (see Figure 5.1). The original version used multidisciplinary teaching as a concept contextually related to Finnish education and curricula (Mård & Hilli, 2020). By replacing the core concept, we want to further emphasize the model as an international didactic framework for school teaching compatible with different cultural and curricular contexts.

Concluding remarks

This chapter has revised a didactic model for crosscurricular teaching. Decisional factors relate to instructional matters such as *subjects*, *competences*, *values and aims of education*, *student needs and interests*, *contemporary issues*, and *methods*. The revised model added *teacher professionalism* to the original conditional factors of *curricula*, *school culture*, and *collaboration*. We suggest that the conditional factors can hinder or support crosscurricular teacher collaboration; therefore, they are all important to consider. Crosscurricular teacher collaboration suggests that teachers negotiate the decisional factors to develop new teaching practices, often challenging their professional identity, attitudes, values, or didactical positions.

Crosscurricular teacher collaboration is supported by a school culture which respects teachers' professionalism, provides resources to transform the curriculum, and supports the development of new shared teaching practices. Successful collaboration is worth considering as it can lead to several positive

effects, such as reducing teachers' workload; increasing their professional well-being, motivation, and engagement; supporting their professional development; and improving education. For these reasons, the chapter and the revised model suggest that crosscurricular teacher collaboration can be understood as Bildung-oriented collective processes.

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Part II

Crosscurricular teaching, thinking, and competences

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6 Dialogic teaching

Caroline Schaffalitzky

Dialogic teaching across the curriculum

Dialogic teaching has been researched and promoted for decades across school contexts and research traditions. It has become a vast field both theoretically and practically, and it spans the traditional gap between empirical educational research (e.g., Cazden, 2001; Dysthe, 1996; Nystrand & Gamoran, 1991; Mercer et al., 1999) and educational philosophers such as Dewey, Peirce, Vygotsky, and Bakhtin (see, e.g., Gregory, 2022; Lyle, 2008). The growth of the field has also brought many ways to define, describe, justify, study, and realize dialogic teaching. Some see dialogue as an epistemologically valuable path to constructing new knowledge as exemplified in Plato's Socratic dialogues; some see dialogue as a socially valuable way to include voices or advance social empowerment (e.g., Mayer et al., 2020; Shor & Freire, 1987); and some see dialogue as part of development selfhood (e.g., Alexander, 2008, pp. 48–49; Mercer, Wegerif et al., 2019, pp. 595–686). The aims can be divided into instrumental and noninstrumental approaches (Matusov, 2018), but this should not lead one to think that there are clear-cut ways to identify and sort dialogic approaches. Here, the many aims seen in dialogic teaching are most likely a reflection of the fact that education in general can be seen as having many aims (see Warwick & Cook, 2020, pp. 121–122 for a similar point). In this chapter, I offer a description of dialogic teaching that does not rely on a dichotomy between instrumental and noninstrumental values (see the Bildung approach presented in Chapter 3).

Despite the various traditions and approaches, some aspects recur in the descriptions of the aims of dialogic teaching: namely, the focus on the importance of engaging in the process and on the cognitive, social, and personal skills and competences the activities that help develop rather than a focus on subject knowledge or arriving at specific conclusions. Dialogic teaching is also often described as a collective, engaging, and supportive learning environment that strengthens transferrable skills and competences such as collaboration, communication, argumentation, self-reflection, and thinking more broadly (e.g., Alexander, 2018a, pp. 1–6, 11–13). The idea is not to dismiss and replace classical teaching concerned with content knowledge but to use the dialogical

DOI: 10.4324/9781003367260-8

approach to support collaborative inquiry, cultivate abstract thinking skills, and strengthen personal engagement – all of which support further and more complex crosscurricular competences such as action competency. However, dialogic teaching not only supports crosscurricular competences, but it can also be used to address crosscurricular content. I provide an example of an activity in the following, but first, we turn to what dialogic teaching is and how it can be conducted.

Characteristics of dialogic teaching

Dialogic teaching can take many forms (see, e.g., Alexander, 2018a, pp. 562–563; Nystrand et al., 2003, pp. 138–139 for overviews). In the following, I focus on a dialogic classroom discourse in the form of a community of inquiry to illustrate how the Bildung ideals of, for instance, personal engagement and self-reflection come together with the importance of a community in dialogic teaching.

For teaching to be dialogic, it is not enough for there to be classroom talk with teacher–student interaction. In nondialogical forms of classroom talk, the teacher retains authority over knowledge and relevance, and interchanges usually fit the so-called IRE model of discourse in which teaching sequences are initiated (I) by the teacher asking a question, which is followed by a student response that the teacher then evaluates explicitly (e.g., by saying "Correct!") or implicitly (e.g., by saying "Does anyone have a better answer?"). The IRE model of classroom discourse has been found in teaching across countries and curricula (see, e.g., Alexander, 2018a, p. 2; Lyle, 2008, pp. 225–227). It can be regarded as a monologic talk in disguise because it is aligned with an authoritative point of view (e.g., Tan & Tang, 2019, p. 550). In contrast, the dialogic classroom talk is explorative and positions the students as collaborating producers of knowledge.

An influential, succinct description has characterized dialogic teaching as collective, reciprocal, supportive, cumulative, and purposeful (Alexander, 2018b, p. 28). These aspects relate to procedure, collaboration, and quality of content, and combined, they support a learning environment that does not revolve around individual students providing the correct answer to the teacher's question but instead providing a community of inquiry in which students are engaged in exploring ideas and forming opinions. The teacher acts as a facilitator and uses a repertoire of tools and strategies to enable the dialogue, include everyone, and keep an eye on quality and the intended learning goals.

How to promote a dialogic classroom

The aforementioned description of the characteristics and benefits of dialogic teaching can be instantiated in many ways. Strategies and tools have been developed for diverse fields, such as language arts (e.g., Mercer, Wegerif et al., 2019, pp. 287–385; Wilkinson et al., 2017), science subjects (e.g., Burgh & Nichols, 2012; Dunlop et al., 2015; Mercer, Wegerif et al., 2019, pp. 525–592), and

citizenship education (e.g., Alexander, 2019; Cassidy, 2016) and have been practiced across traditions and cultural contexts such as Japanese Saitou pedagogy (e.g., Miyazaki, 2020), the British 2014–2017 Education Endowment Foundation dialogic teaching project (e.g., Alexander, 2018a), and philosophy with children (see, e.g., Naji & Hashim, 2017, pp. 141–204 for descriptions of the traditions worldwide).

Philosophy with children has developed as a field alongside, and largely independent of, the research into and development of dialogic teaching in educational studies, but recently, philosophy with children designs and activities have been used in educational research as an example of a highly dialogic form of teaching because the core ideals align (e.g., Alexander, 2020, pp. 60–62; Smith, 2017). First, the teacher must avoid the classical teacher role of authority and traditional recall questions, instead assuming the role of a facilitator who provides a space for students' ideas and conversation (see, e.g., Lipman et al., 1980, pp. 82–101; Reznitskaya, 2012, p. 447; Worley, 2015, 2016). Second, the facilitator should support student reasoning by asking for examples and justifications in follow-up questions and by inviting all students to participate in the thinking (see, e.g., Lipman et al., 1980, pp. 102–124; Reznitskaya, 2012, p. 447; Worley, 2011, pp. 29–45). Third, the facilitator should support peer interaction and the community by, for instance, connecting ideas (Lipman et al., 1980, pp. 124–128; Reznitskaya, 2012, p. 447; Worley, 2011, pp. 25–28). The strategies and tools in Text Box 6.1 are designed to support ideals such as these in practice, exemplifying what some practitioners and researchers in philosophy with children recommend for dialogue facilitation (e.g., Schaffalitzky, 2021; Worley, 2015, 2016).

Text Box 6.1 Examples of advice on how to promote dialogue

Some facilitation tools and strategies regarding learning space, questioning, and activity design. All facilitation moves are aimed at making it easy for students to participate and share thoughts freely while still promoting the quality of thinking, interaction, and community.

Physical learning space and interactions:

- Place participants on chairs or on the floor in an open (semi)circle or similar setup that allows all students to see and hear each other.
- Use an object such as a "talking ball" or similar to signify the right to speak (do not let participants determine speaking order until you are sure that they have become accustomed to including all their peers).
- Always provide the participants with the opportunity to briefly discuss ideas with the person(s) next to them before inviting them to share their views in the circle.

- If possible, place objects (such as pictures, writing on pieces of paper, toys, and other props) in the middle of the circle to establish a tangible, shared center of attention.
- If possible, let the participants take turns manipulating the props as part of the exchange of ideas in the dialogue.
- Invite participants to help each other substantiate ideas and help answer each other's questions.

Activity design:

- It is often a good idea to begin the activity with a brief thinking game or reflection task to focus the attention of the group before the actual dialogue (see Fisher, 2011 for examples).
- Open the dialogue with a prepared *stimulus* (a story, a picture, a dilemma, or similar) – you can also prepare the first question to get the dialogue going, or you can let the participants decide the first question.
- End the dialogue when the time is up (or when participants become tired – whichever comes first). A dialogue can take anywhere between 10 minutes and 1 hour, depending on age, experience, and interest, but it is best to stop while engagement is still intact.

Questioning:

- Questions should be open in the sense that they allow for answers that are interesting and conflicting at the same time (e.g., philosophical questions such as "Can you know that you are not dreaming?" or "Whose fault was it – the frog's or the scorpion's?").
- Questions should be stated in as simple a language as possible (especially at the beginning of the dialogue).
- At the beginning of the dialogue, questions that can be answered with a simple answer (such as "Yes" or "It was the frog's fault") are recommended.
- Always ask a closely connected follow-up question (such as "Why?" or "Can you provide an example?"), especially if the participant does not offer a justification or explanation for their view.
- Never ask a follow-up question about additional topics (even if related) (e.g., "Can you also know that you are not part of someone else's dream?").
- Welcome all ideas (as long as the participants are willing to substantiate them to the best of their abilities).
- Be careful not to revert to a classical teacher's role with recall questions and an evaluation of answers.

The abstract principles in Text Box 6.1 can also help design dialogic inquiries, especially regarding question design and the overall organization of activities. Text Box 6.2 is an example of a teacher's guide for a dialogic activity designed with the philosophy with children approach (translated into English by the author).

Text Box 6.2 Example of a crosscurricular dialogic teaching activity

Open-ended questions concerning a complex problem combining environmental, technological, social, and other concerns.

From: EMU (the Danish Ministry of Education's portal for learning materials)

The plastic bottle dilemma

Instruction for teachers:

- Present the stimulus to the participants in the community of inquiry.
- Ask participants the first question and let them discuss it in pairs or small groups for a minute or two.
- Facilitate a plenary dialogue about the question.
- When the first question has been exhausted, move on to the second question (first in pairs, then in plenary), and so forth.
- New themes and questions are likely to arise along the way. Assume a facilitating role: remain neutral, ask clarifying questions, support peer interaction, and pick up new themes and questions.

Stimulus story for the dialogue:

Aisha and Morten, who are researchers at a Danish university, are offered $10 million to join a large project. The project will develop technology that can collect plastic in the sea off the coast of an African country and recycle it. Before deciding whether to join, they researched the project. In their research, Morten argued that the project is very promising and will help empty the sea of plastic and have huge environmental benefits. However, Aisha is aware that a large part of the population on the coast currently makes a living from collecting the plastic, recycling it, and selling it. They will lose their livelihoods if the project is implemented.

Questions for the dialogue:

- Should Aisha and Morten join the project? (Why/why not?)
- What is more important: research into a better environment or the local population's livelihood? (Why?)
- Do Morten and Aisha need more knowledge before they say yes to the project? (Why not/about what?)

When *not* to use a dialogic teaching approach

The fact that dialogic teaching is considered to have beneficial effects across the curriculum does not entail, however, that it is suited for all educational purposes. Sometimes, the aim of teaching can be that the students arrive at specific conclusions in a particular field of learning, can learn to master the methods of an academic field, or understand non-negotiable rules concerning school conduct. The dialogic approach cannot in and of itself secure such learning outcomes and may, in fact, be at odds with them. For instance, if students must learn to follow specific rules on how to behave at school, the classroom discourse cannot be initiated on the premise that there can be various good (and potentially conflicting) answers. Similarly, it is difficult to see how there can be an open dialogue about factual matters, such as the distance from New York to Berlin, because the students will be aware that this is very far from an open question.

However, these reservations concerning content do not mean that dialogic teaching can never be relevant for teaching topics from, for instance, the STEM fields, which can have definite answers to questions. First, it is possible to combine open questions with fact-oriented teaching aimed at specific learning content. STEM subjects also include open questions (e.g., Socratic questions such as "What is time?" or "What are numbers?," disputed questions such as "Are viruses a life form?" or "Could the constants of nature be different?," and ethical questions such as "Is it okay to clone people?" or "Do humans have obligations toward nature?"). Second, a dialogue can be used to motivate students by involving them in dialogic exploration before turning to a more traditional teaching strategy. Third, some practitioners have experienced that questions need not be genuinely open if they are sufficiently interesting for the students, the answer requires some thinking (as opposed to, for example, looking it up in an atlas), and the questions are appropriate given the knowledge the students already have.

Therefore, there is no prima facie reason for not using a dialogic teaching approach in crosscurricular activities involving the natural sciences, the social sciences, and/or the humanities. However, it remains the teacher's responsibility to ensure that there is a fit between the teaching goals and the dialogic approach. If part of the purpose of the activity is subject knowledge (such as

understanding the definition of a chemical reaction or the environmental footprint of beef production), a dialogic element can help support the students' motivation, exercise abstract thinking, or support peer listening, but it must be integrated with other teaching activities as well. It is also important not to pretend that a question concerning values or ideas is open if the teacher is, in fact, looking for a specific answer. In some cases, such deception could even amount to unethical teaching practice.

Dialogic teaching and evaluation

The idea of evaluating students who participate in dialogic teaching can, at first glance, appear to clash against the ideal of a safe learning environment because evaluation is associated with high-stakes learning situations where students are evaluated based on their responses, ideas, and other contributions (see, e.g., Alexander, 2018a, pp. 30–31). Knowing that one will be evaluated (as is the case in teaching characterized by IRE structures) can hamper the incentive to act in the way needed for dialogic teaching to realize its ideals and meet its aims. However, there are ways to combine dialogic teaching and evaluation if the evaluative element is not (distinctly) integrated into the activity itself.

The evaluation of student performance should mirror the purpose of the teaching activities. Because dialogic teaching can be employed to support various learning goals and skills, an evaluation used in dialogic teaching can also take many forms. If the aim is to promote abstract thinking and cognitive skills, one can measure progress using the tools made specifically for this. Within philosophy with children, for instance, there has been a growing body of research into the cognitive effects of philosophical dialogues (e.g., Fair et al., 2015; Topping & Trickey, 2007; Worley & Worley, 2019), while others have evaluated the dialogues' impact on personal and social skills (e.g., Siddiqui et al., 2017; Trickey & Topping, 2006). Although research-based evaluations of such effects can hardly be incorporated into normal teaching practices, they are the same in principle.

Other characteristics and goals are less straightforward when it comes to evaluation, especially those related not to specific outcomes in terms of skills but that are concerned with the process of dialogue itself. These goals and characteristics include such diverse and distinct elements as listening to peers, thinking, articulating ideas, being active, being engaged, contributing to a supportive environment, community building, and so forth. Phenomena such as these are difficult to operationalize and can hardly be expected to be measured in tests. Nevertheless, there are still signs that a teacher (or researcher) could look for in an evaluation of the dialogue as an activity. Various evaluation criteria and quality standards have been proposed in research and practice (e.g., Fisher, 2003, pp. 263–266; Mercer et al., 1999, p. 99; Wilkinson et al., 2017, p. 73). Text Box 6.3 lists examples of criteria that are fairly simple to observe (at least for a person not involved in running the dialogue) and can also be kept track of over time.

Text Box 6.3 Examples of markers of dialogue

Observable elements that can be seen as indicative of dialogue quality.

Engagement:

- How many students participate (in the pair discussions and in the main dialogue)?
- Do they seem eager?
- Do they look forward to the activity? Do they ask for more?

Content:

- Do the students put forward ideas? How many ideas?
- Do they provide reasons for their ideas?
- Do they include specific examples and abstract principles?
- Do they use thinking moves (e.g., counter arguments, definitions, and comparisons)?
- Are the ideas connected? (or are they more like popcorn popping?)
- Is there progression in the dialogue? (or does it run in circles or get stuck?)
- Do the participants change their minds? Can they explain why?

Community:

- Are the participants respectful of each other (so that they, for example, do not make fun of other people's ideas)?
- Do they look at the person who is talking?
- Do they listen to each other? Refer to each other? Build on each other's ideas?
- Do they look at the person to whom they are responding (or do they look at the teacher)?

An evaluation of dialogic teaching activities can also include asking students how they experience the activities. Surprisingly, little research on dialogic teaching has been concerned with the perspectives of students (however, see, e.g., Reznitskaya & Glina, 2013; Schaffalitzky et al., 2021), which is ironic given that dialogic teaching is often seen as motivated by empowering children and making space for their voices. Not only would it be natural for dialogic teaching to also provide students with the opportunity to share their ideas on the dialogic teaching itself, there is also relevant information about the dialogues that the students have privileged access to (e.g., whether they are, in fact, thinking, on task and interested).

Another aspect of dialogic teaching and evaluation worth mentioning concerns the possibility of using dialogue as a language evaluation tool. Language skills can be difficult to test in situations that are very different from the social practices of natural language. When students are confronted with a classical test situation, they can feel inhibited or become self-conscious, hence reacting in ways that make it difficult to assess, for instance, their actual conversation competences. Therefore, a dialogic setting that provides a learning environment that feels safer and is more engaging can allow teachers to observe students in a situation that better illustrates their competences. The dialogic approach can be used in the assessment of general language skills but can also inform the evaluation of the students' grasp of specific linguistic elements such as conjugation, the use of prepositions, or rules for compound words (e.g., Kjærbæk & Schaffalitzky de Muckadell, 2019).

Challenges in dialogic teaching and overcoming them

Although dialogic teaching has been recommended, practiced, and researched, it is also known among teachers and researchers that dialogic teaching is not as easy to realize as it may sound. It can even be the case that a teacher believes that they are providing a dialogic learning environment while, in fact, they are not. Olga Dysthe, who was among the first to introduce dialogic teaching in Scandinavian research, relates an experience from her observational classroom research where a teacher engaged in what she perceived as a dialogue with the student but that, from a student perspective, was more similar to a teacher monologue with small inserted gaps where students could provide answers to the teacher's questions (Dysthe, 1997, pp. 15–16, see also Dysthe, 1996).

That teachers can struggle to meet dialogic ideals has been well described in research, and several possible explanations have been put forward (see, e.g., Šeďová et al., 2020 for an overview); it is quite possible that a combination of these factors can be at play when teachers experience difficulties. Some researchers have pointed to teachers' abilities, beliefs, habits, and convictions (e.g., Alexander, 2018b; Mercer, Hennessy et al., 2019; Resnick et al., 2018; Wilkinson et al., 2017), while others have pointed to systemic factors such as school culture, time pressure, or institutional support (e.g., Lyle & Thomas-Williams, 2012; Šeďová et al., 2020, pp. 28–30).

A recent study of teachers transitioning from the traditional to a dialogic teacher role reported a case where teachers initially failed to meet dialogic ideals, even though they had sufficient knowledge, motivation, confidence, time, and institutional support (Schaffalitzky, 2021). After supervised training, they all succeeded in mastering dialogic teaching, but many experienced that it was very difficult to let go of the usual control and authority associated with the classical teacher role – even when they wished to do so. This may help explain why teacher's talk continues to take up the larger part of the traditional classroom discourse and why IRE teaching strategies are a prevalent feature of learning environments across school cultures. It also points to the need for

systematic attention to classroom culture, student and teacher agency, and mindset, as well as the teacher's repertoire of tools and strategies to promote dialogic teaching across the curriculum.

These caveats should not, however, discourage efforts to promote dialogic teaching across the curriculum. The aforementioned case study also showed that the teachers did succeed in learning to master the techniques, even if it required supervised training and feedback (Schaffalitzky, 2021). The interviews with teachers (some of whom had been part of the case study) also reported that observing and facilitating dialogic enquiries deeply impacted the way they perceived their students and their own roles as teachers (e.g., Jensen, 2021). Hence, the transition may be challenging, but it was also worth the effort. Dialogic teaching can help create a learning environment that can promote thinking, collaborating, and several other crosscurricular competences associated with Bildung. Philosophy with children and other traditions have already developed tools and resources to help practitioners realize these aims.

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7 Integrating movement and physical education into subject teaching

Learning by moving

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Introduction

Most children and adolescents fail to meet the international guidelines for 60 minutes of physical activity (PA) per day (WHO, 2020). The widely advocated international Comprehensive School Physical Activity Program (CSPAP) offers a comprehensive school-based approach to encourage active living before, during, and after the school day through five components: (1) physical education; (2) PA during school (beyond physical education); (3) PA before and after school; (4) staff involvement; and (5) family and community involvement (Webster, 2022). Although the components are essentially interrelated, there is mixed evidence regarding whether they can collectively or independently produce a sustainable increase in PA levels over time (Daly-Smith et al., 2018; Webster, 2020). This chapter mainly focuses on the second component of the CSPAP (i.e., PA during school).

Physical education classes and recess between academic lessons arguably provide the most natural opportunities for students to accrue PA time during the school day. Bridging the gaps in existing approaches, we aim to provide a viable alternative to promote student health, developmental outcomes, and crosscurricular learning (i.e., Bildung or competence-based approach) through a multifaceted concept that is called movement integration (MI; Moon & Webster, 2019). Grasping the full prospect of MI requires a comprehensive understanding of relatively simple strategies that enable promoting not only daily PA opportunities in teaching beyond PE lessons (Weaver et al., 2022), but also more complex crosscurricular teaching strategies and methods to integrate movement or content in physical education with other subjects. In this chapter, we present a solid theoretical foundation, discuss the barriers and facilitators, and provide examples of successful MI projects and learning modules in teacher education and professional development. The rationale behind this lies in the fact that, as end users, preservice and in-service teachers will eventually come up with informed decisions on what to teach and how to implement MI in their classrooms.

DOI: 10.4324/9781003367260-9

Introducing the concept of movement integration

The incorporation of a research-supported strategy known as movement integration (MI) focuses on merging activities that are intentionally physical at any level of intensity into content-specific academic lessons (Moon et al., 2022; Webster et al., 2015). The very foundation of MI aligns with the idea of supporting holistic student development (i.e., Bildung, see Chapter 3), wellbeing, and life skills (see Chapter 8), emphasizing that health and learning outcomes are interrelated and should be developed in concert. It is noteworthy that MI is not a solitary method; rather, it encompasses a broad range of different strategies, including infusing PA breaks and enabling transitions (e.g., between and during lessons) to increase movement opportunities that do not have a direct connection to content or goals in teaching. Incorporating MI strategies within regularly scheduled classroom time can also have educational value by serving multiple academic goals and broader academic priorities of schools beyond increasing PA (Mavilidi et al., 2018). This approach entails the partial or full integration of content or goals in physical education with one or several other subjects (Weaver et al., 2022; Webster et al., 2015). Thus, physical education can provide a transcurricular environment for developing students' knowledge, skills, and competence in school and life (Webster, 2022).

A wide range of MI interventions has been reported over the past decade, and the accumulation of data through systematic reviews and meta-analyses of integrating movement into academic classrooms has increased (Bedard et al., 2019; Martin & Murtagh, 2017). The joint evidence of these studies points to a positive effect on PA during lesson time and a minimal general increase in daily PA. Thus, classroom-based movement interventions provide a low-cost, practical, and time-sensitive way to increase PA throughout the school day. Moreover, MI can also positively contribute to a range of behavioral (e.g., improved on-task classroom behaviors), cognition, and academic performance (Daly-Smith et al., 2018). However, it can be difficult to draw conclusive inferences regarding the outcomes of interventions because of substantial variations in their design, content, duration, and intensity. Within the scope of classroom-based interventions, most of which have been in primary school settings, teachers have applied a mosaic of different MI strategies in their teaching (Moon et al., 2022). The diversity of these strategies calls for a uniform approach to a comprehensive understanding of integrating movement and physical education into other subjects as a whole.

The MI framework as a foundation for crosscurricular teaching

Moon and Webster (2019) have gathered different MI strategies into a progression framework (i.e., MI wheelhouse), including four nested and progressive levels. A visualization with strategies, practical examples, and available resources for each level is presented in Table 7.1. Teachers need to gradually discover and learn to apply a multitude of MI strategies throughout their

Table 7.1 MI Framework: Levels, Strategies, Practical Examples, and Resources for Teachers

Level	*Strategies*	*Practical Examples*	*Resources*
I: Beginning strategies	Technology-directed opportunities	Using online videos, apps, music	www.youtube.com https://classtools.net/
	Teacher-directed transitions	Changing seats by moving in different ways (e.g., jumping, galloping) between academic activities	NA
	Environmental opportunities	Stand-biased desks, stability balls, wall-mounted pull-up bars	https://gophersport.com
	Student-directed transitions	Fetching materials (e.g., pencils, workbooks) during class	NA
II: Transitional strategies	Reward	Using technology-directed or environmental opportunities as an incentive	www.gonoodle.com
	Opening activity	Initiate lesson with movement activities	www.activeschoolsus.org/
	Nonacademic movement breaks	Brain breaks between lessons, PE games in recess	www.brainpop.com
III: Academic integration	Academic integration	Using body to create letters, words, and/or sentences *or* sections of the parachute to illustrate parts of a whole	www.take10.net https://mathandmovement.com
IV: Crosscurricular integration (three teaching models)	Connected model	Enhancing learning in PE by including content from another subject (e.g., put numbers and operation symbols on the ground as targets for students to practice throwing while solving math problems)	Interdisciplinary Elementary Physical Education (Cone et al., 2009)
	Shared model	Linking two subjects through a similar topic, concept, or skill (e.g., complete an activity and stop to take heart rate. Tap on the ground to find the beat: music and biology)	Interdisciplinary Elementary Physical Education
	Partnership model	Full unification of content from two or more subjects (e.g., teachers plan a unit on sports origins: lessons on history, culture, rules, manufacturing equipment)	Interdisciplinary Elementary Physical Education

Source: Adapted from Moon and Webster (2019).
NA: not applicable.

working careers (Moon et al., 2022). To incorporate MI into teaching practice in a sustainable way, it is recommended that teachers with limited or no experience start by applying relatively simple strategies at levels 1 and 2 rather than moving directly into using more demanding strategies at levels 3 and 4 (Johnson et al., 2017; Weaver et al., 2022). Infusing classroom-based movement is a reflective teaching practice; thus, the activities have to make sense for the content of subjects, students, and individual teachers (Knudsen et al., 2021). The four levels within the MI framework provide teachers with flexible and unique resources to enrich student wellbeing and crosscurricular teaching.

The first level of the framework consists of four beginning MI strategies: the infusion of technology-directed opportunities into the classroom, enabling teacher-directed transitions within and outside of the classroom, creating environmental opportunities for movement, and student-directed transitions, allowing students the freedom to move without explicit teacher directives (Webster et al., 2015). The second level of the framework encompasses three transitional strategies: using MI as a reward, opening activity, and providing nonacademic movement breaks. Incorporating level 2 strategies requires more purposive planning from teachers compared with level 1 strategies. The characteristic for teachers applying strategies at level 2 is an increased appreciation and strategies for enhancing students' health and wellbeing through the use of MI (Moon & Webster, 2019). However, the strategies at the first two levels that partially overlap are easy to adapt and enable infusing PA opportunities separate from academic instruction or content.

The third level of the framework denotes integrating movement with academic subjects (i.e., academic integration), here with the goal of combining movement opportunities with academic instruction or content without forfeiting either PA time or academic learning (Moon & Webster, 2019). The time teachers need to devote to learning how to plan and implement this strategy is far greater compared with learning strategies at levels 1 and 2. Academic integration can be executed in multiple ways, so teachers normally need to become accustomed to this level by mixing simpler strategies that overlap with levels 1 and 2 before teaching academic content through movement (Johnson et al., 2017).

The most advanced layer in the framework, level 4, consists of one MI strategy. A characteristic of this strategy, which is labeled crosscurricular integration, is to integrate movement in such a manner that it can support or reinforce learning outcomes across two or more subjects simultaneously (Johnson et al., 2017; Moon & Webster, 2019). A requisite for level 4 and a clear distinction from level 3 is that crosscurricular integration involves merging content, topics, concepts, or skills in PE with one or several subjects (Cone et al., 2009). In particular, three teaching models (i.e., connected, shared, and partnership) extend the pedagogical strategies available to a teacher for a partial or full unification of subjects. Crosscurricular integration can alter students' sensory–motor, affective, and intersubjective experiences, thus shaping their cognitive learning processes to achieve goals concomitantly in physical education, and,

for instance, in math, languages, or science (Johnson et al., 2017; Mullender-Wijnsma et al., 2016).

Challenges and opportunities for implementing MI in teaching

Despite the obvious benefits of MI, schools and teachers need to negotiate varying challenges when adopting and successfully implementing MI strategies in their teaching. Recent reviews (Michael et al., 2019; Mulhearn et al., 2020) have recognized that teacher beliefs, motivation, knowledge, and skills are factors repeatedly reported to be impeding policy implementation. A lack of time and space, lack of supportive school climate, insufficient authentic training, contextual appropriateness, and the availability or quality of resources are structural barriers to MI at the school level. Teachers' have been slow to adopt MI (Moon et al., 2022); thus, building a sustainable foundation for embedding MI into teaching seems to require identifying efficient strategies to reduce teachers' personal barriers and overcome sociocultural and physical infrastructural barriers.

The MI progression framework introduced by Moon and Webster (2019) provides a starting point for reducing teachers' perceived barriers because it offers a variety of MI options, several of which require no additional time investment, resources, or space, no need to change presently used class management strategies, and with the ability to be adapted with limited training. Learning to understand the specific challenges for strategies at the underlying levels is usually necessary for a successful implementation of MI strategies at the overarching levels. The demands on teacher knowledge, time, and need for support increase for each level of the framework. Goh et al. (2017) recognized that gaining knowledge during training and developing competences through experience were important factors for novice teachers, while scheduling MI into weekly routines, children's requests for the program, and collaboration among teachers were important factors for program continuance. Importantly, teachers need to feel comfortable with, approve the concept, and understand the benefits of MI at different levels if they are to implement it effectively in their teaching (Martin et al., 2022).

For teachers who are just familiarizing themselves with the idea of MI, acquiring ideas for easily organized lessons that are compatible with their current teaching practices, having access to effective training prior to delivery, and a steady flow of support can reduce the barriers to implementation (Moon et al., 2022; Webster et al., 2020). The shared experiences of other classroom or subject teachers who have successfully applied MI along with support from physical education teachers is essential when learning to integrate beginning and transitional MI strategies (i.e., levels 1 and 2) into lessons that have been taught through traditional seatwork (Moon & Webster, 2019). Although the strategies at levels 1 and 2 do not strictly comply with crosscurricular teaching, they enable teachers to stick with MI practices and gradually learn and

acquire experience, collect ideas, and become accustomed to the idea of MI implementation (Webster et al., 2015).

Academic integration (level 3) and crosscurricular integration (level 4) require a significant increase in teacher content and pedagogical content knowledge, more time needed for planning and professional development, and strengthening collaboration between teachers to reach goals and foster learning in each integrated subject concomitantly (Moon & Webster, 2019). An eminent challenge relates to embodying crucial knowledge in academic subjects and linking movement activities to facilitate students' learning of the subject matter efficiently (Madsen et al., 2020). Adequate knowledge of critical movement skills and principles of movement enable efficient MI across different subjects (Webster, 2022). Thus, physical education teachers and teacher educators are central stakeholders, having the responsibility of providing professional development opportunities for preservice and in-service teachers to acquire an understanding of the didactical skills and pedagogical tools for successful academic and crosscurricular integration by removing barriers that make the use of MI challenging.

An important aspect is that students' perceptions of MI affect teachers' attitudes and motivation (Dyrstad et al., 2018; Goh et al., 2017). Students report that they find the use of MI exciting and fun (Bedard et al., 2019; Dyrstad et al., 2018; McMullen et al., 2019), even to the extent that they tend to enjoy the MI lessons more than the sedentary versions of the same lessons (van den Berg et al., 2019). Students perceive that infusing movement opportunities can facilitate learning by helping them feel more alert and focused and concentrate better after the exercise than before it (Martin & Murtagh, 2017; Romar et al., 2023; see also Chapter 8). In addition, students recognize its potential health benefits (Dyrstad et al., 2018; McMullen et al., 2019) and opportunities for social and reciprocal learning through increased teacher–student and student–student interactions (Lerum et al., 2019). However, teachers feel that MI implementation has to fit students' current moods and their dynamic need for a break from the academic material (Knudsen et al., 2021).

Examples of successful MI in practice

MI can serve as a prominent way to reinforce learning across subjects, but it is inevitably inefficient without deliberately considering the factors underpinning successful strategies and practical ways to incorporate it in teaching. Because MI compresses a multitude of strategies and options at different levels, the focus on teacher training and professional development should be on accommodating the individual needs of each teacher, suggesting that teachers' interest and ability is a necessity for sustainable MI support program planning and implementation (Moon & Webster, 2019). The subsequent sections outline examples of actions with the aim of expanding MI strategies in Spain and Finland.

Getting students out of their chairs: MI projects in Spain

This section describes two MI development projects, the first in teacher education and the second in professional development, carried out in schools of Castilla-La Mancha, a region located in the center of Spain.

The INMAA project (acronym in Spanish: integration of movement in classroom subjects) was developed at the Faculty of Education of the University of Castilla-La Mancha (UCLM) in Ciudad Real (Spain). This project is grounded in the aforementioned research-based assumption that it is more likely that teachers will implement MI when they have satisfactory prior experiences as learners and when they identify and understand the benefits of MI at different levels. The INMAA project intended to be living the curriculum approach (Oslin et al., 2001), that is, while the student teachers learn the content knowledge of specific subject didactics (i.e., English, Spanish, mathematics, and arts), they experience the benefits of MI. The main aims were for students to enhance pedagogical content knowledge that includes the use of MI strategies, in addition to developing the willingness to use MI strategies in their future work as teachers. As a secondary objective, the INMAA project pursued crosscurricular education, establishing the movement as a mediator of learning as a meeting point between classroom subjects and physical education.

The following phases were included in the development of the project: (1) A series of MI professional development workshops for teachers of specific subject didactics, psychology, and pedagogy. The physical education department teachers introduced the MI framework in the first workshop. The second workshop focused on scientific evidence from each area. The following workshops focused on sharing nonsitting activities that had already been carried out in the different subjects of the teacher training program, for example, the use of natural and urban spaces during lessons or methods that included movement as a total physical response method in teaching English. The last workshop dealt with the design and proposal of MI actions to be developed for the different subjects involved in the project. (2) The students experienced MI strategies (levels 1, 2, and 3) while learning content knowledge in specific subject didactics, psychology, and pedagogy. (3) The students learned the benefits and rationale of MI strategies for each specific subject didactic, including crosscurricular proposals (levels 3 and 4). (4) The students applied MI strategies in their field practices.

To ease the outlined objectives, the physical facilities were modified so that the space and furniture facilitated and inspired the use of MI strategies. Of special importance was the design of the INMAA classroom. It aimed to be the main space to apply all levels of strategy and serve as inspiration for the transformation of schools. The INMAA classroom was a gym that enabled the teaching of any subject. It promoted MI (levels 1 and 2) through movable and varied furniture and, by placing drawable surfaces on all the walls, enabled standing work in small groups. The standing work strategy was inspired by the thinking classroom concept (Liljedahl, 2021). This working area also

facilitated levels 3 and 4 by being located in the space where student teachers received their physical education subjects.

The second experience was about teacher training and expansion of PA breaks with and without integrated content (MI levels 2 and 3) through CSPAP programs. The Healthy School Projects included PA breaks as one of the ten programs that were integrated into this CSPAP developed in Castilla-La Mancha since 2016. As far as we know, before the start of this program, the use of PA breaks in this region was anecdotal. In the 2021–2022 academic year, more than 300 schools have been progressively incorporated into the Healthy School Projects, which implies that their teachers have had specific professional development and included PA breaks in their didactic program.

The following steps have been followed in the development of the program: (1) Agreement between the Department of Physical Education, Arts Education and Music of the UCLM and the regional government to promote PA breaks in schools. The rest of the actions were carried out within the framework of this agreement. (2) Agreement between the UCLM and ILSI[1] to translate and adapt Take10 materials (PA breaks with the integration of academic content, i.e., level 3) to the Spanish curriculum; (3) An evaluation of the adapted Take10 materials, including teachers' perceptions, and study of barriers and facilitators for their implementation at schools. (4) Publication of a didactical guide for teachers (Sánchez et al., 2017). (5) Inclusion of PA breaks within the Healthy School Projects, which implied that the coordinator of the school's PA breaks program had to attend a workshop, followed by the application of PA breaks in various school groups, designing some PA breaks on their own, and reporting them on a website. (6) A compilation of the proposals designed and tested by teachers in all schools in the region (Sánchez López et al., 2020).

"At first you have to, and then you want to": Learning by Moving, Finland

The Learning by Moving (LbM) program was designed for the expansion of MI strategies in schools in Ostrobothnia, a region located on the west coast of Finland. LbM included MI in various forms, from PA breaks (levels 1 and 2) to content integration (level 3), and it also included level 4 through the use of tutor support. The LbM program, which was designed as a part of a compulsory course in subject teacher education at Åbo Akademi University in Ostrobothnia, Vaasa (Finland), is described in the following.

The LbM program aimed at preparing preservice subject teachers (PSTs) to effectively implement MI as actual PA breaks from academic tasks and as an integrated part of academic activities during teaching in secondary classrooms. The LbM program included three components: university studies, tutor support, and student teaching. The 17-week (semester-long) program included studies of pedagogical and didactic content at the university. The program

also included teaching in secondary classrooms at the university's laboratory school.

The first university-based component comprised a half-day workshop intended to provide background to the PSTs so that they could change their attitudes and behaviors toward the use of MI in teaching at the secondary level. In the first portion of the workshop, the benefits of PA were addressed, as well as the typical characteristics of whole-school PA promotion, the most appropriate MI practices, and the need for lesson planning. The session started with a short introduction of the study and continued with guest speakers with significant experience in the use of MI in their schools and from the national School on the Move program. The session ended with a period for group work and collaboration, which was intended to create student interactions and discussions on how to come up with MI activities.

To reinforce communication, networking, and support from other PSTs in the implementation of MI, there was a tutor-support component included in the LbM program. All tutors were provided three sessions prior to the workshop. During these 1.5-hour sessions, the peer tutors received training in the form of readings and discussions about the benefits of PA in general and MI in particular.

The tutors met twice with a randomly assigned crosscurricular group (in general, six or seven PSTs representing different subjects). During the first meeting, which was scheduled for the day after the initial workshop, the tutors were supposed to discuss the workshop experience with the PSTs and provide them with handouts to help them plan and implement MI sessions in their teaching. The second group meeting occurred after the PSTs completed their first five weeks of student teaching; in this outside-of-class meeting, the PSTs could share their experiences, and the tutors and PSTs could discuss the challenges that they faced during their own student teaching. The tutors could also provide feedback for the PSTs to use in their next teaching sequence. In addition, the tutors could provide individual help to group members when needed and supervise at least one group member's application of MI. The tutor's role proved to be important for the PSTs when planning their lessons. In interviews with the PSTs (data were collected during spring semester 2020, in connection with the LbM program), it emerged that they appreciated the tutor's presence and knowledge for combining academic content in the classroom with PA. Fanny said, "The tutor has had an important role for me. . . . She gave me practical cues and advice that I was able to try during my lesson with the pupils." Likewise, Carolina said, "I appreciated having the tutor as a discussion partner when planning my lessons."

As a requirement of the course, each PST, with the help of the peer tutors, had to implement at least two lessons (of 12–15 lessons) with MI in their secondary classrooms during the student-teaching component. However, it was common for the PSTs to use MI in more than two lessons. Their reasons for using MI as a part of their lessons were influenced by the general knowledge

attained from attending the compulsory course in the subject of teacher education, especially regarding the positive impact MI has on the students. Anna said, "I definitely incorporated significantly more movement into my teaching than if I hadn't received the knowledge I received via the subject teacher training." Fanny mentioned, "I chose during the first five weeks of teaching to include MI in several lessons of my teaching, because it has a positive impact on the students."

Finally, the last university-based component involved a 2-hour workshop. During the first part of this workshop, the PST groups met to share and discuss their experiences and plan their presentation to the whole class. A general discussion about the LbM program took place after the presentations. Daniel summarized the discussion about the LbM program and thoughts on future use of MI by saying, "At first you have to [use MI], and then, you want to [use MI]."

Conclusions and recommendations for practice

This chapter focused on introducing the concept of MI and a related theoretical framework with a multitude of strategies at four nested and progressive layers. We gave practical examples and presented the resources for each strategy, critically discussing the challenges and opportunities for implementing different strategies at each of the four levels. A low threshold approach that enables inexperienced teachers to begin with simple MI strategies (i.e., levels 1 and 2) that are easily organized and compatible with their current teaching practices is efficient for overcoming initial barriers and gradually becoming accustomed to the idea of applying strategies at more advanced levels (i.e., levels 3 and 4). Strategies involving academic integration and teaching across and beyond subjects call for advanced content and pedagogical content knowledge in physical education and the other subjects involved, along with a need for guidance and resources to facilitate learning in each integrated subject concomitantly. Strategies at different levels can facilitate student learning and wellbeing not only independently, but also jointly (the latter in accordance with the notion of Bildung, see Chapter 3).

This chapter also discussed the varying ways and extent of implementing MI in teacher education and professional development. To overcome challenges and strengthen resources at the individual and environmental levels, we recommend three areas of action (i.e., awareness, expansion implementation, and teacher training) that we consider necessary for an adequate expansion of MI policy and anchoring it as a sustainable daily practice in classrooms. Here, awareness relates to making the educational community aware of the benefits of MI by creating school-based scientific evidence. Especially important is the evidence from a perspective that shows the positive synergy (banishing false dichotomies) between student wellbeing and academic performance. Expansion implementation denotes ensuring that MI is a strong point within

the CSPAPs. One way is to create the MI promoter/coordinator within each school, as described in programs such as Take10. The teacher who develops this role is in charge of attending the training courses, serving as an example through the application of MI in their lessons and as an advisor to their fellow teachers. Finally, including MI in teacher training is probably the action with the greatest potential for long-term effects, and the approach of living the curriculum may be the most appropriate. Teachers are more likely to implement MI strategies if they have previous satisfactory experiences as students and can identify and understand the benefits of MI at different levels (Martin & Murtagh, 2017). We also propose carrying out professional development actions among teacher educators, by using methodologies that include MI such as the building thinking classrooms method for mathematics (Liljedahl, 2021), the total physical response method for teaching a foreign language, experiential learning, or crosscurricular project-based learning that include the physical education area.

Note

1 https://ilsi.org/

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8 Fostering wellbeing competence through crosscurricular teaching

Wellbeing and skills for life

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Introduction

Student wellbeing has become an increasingly growing concern, in both educational practice and research (Hossain et al., 2023; European Commission, 2023). But it is still treated mostly as a separate aspect of school life (Konu & Rimpelä, 2002). This is so, even though wellbeing is often related to "whole-person" and "whole-school"-approaches (European Commission, 2021). The Council of Europe notes that the promotion of wellbeing requires "the development of a 'culture' of wellbeing throughout the whole school and the active involvement of the whole staff, teaching and non-teaching," but adds that this makes it a particularly difficult task (Council of Europe, 2022). Though there is also a growing acknowledgment that school teaching should prepare students for handling both their own wellbeing and that of others, the topic is often relegated to "health education" or even more specialized and limited initiatives and teaching areas.

On the level of educational theory, there has been a profound lack of interest in wellbeing. Despite a widespread concern for inclusive education, the currently dominant theories fall short of taking seriously the emotional, bodily, and hedonic aspects of learning and personal development. This also holds for contemporary theories of Bildung, which emphasize reflection, deliberation, responsibility, and autonomy (see Chapter 3), effectively maintaining a view of human beings as being defined by their rationality and capacity for verbal expression and political participation. In this chapter, we argue that the promotion of wellbeing should be recognized as a central and ubiquitous educational goal, which must inform teaching across the curriculum and requires fostering competences and skills beyond those that have been traditionally covered by particular school subjects.

Student wellbeing became a pressing topic during the COVID-19 pandemic, as adolescents and young adults proved to be a particularly vulnerable group (cf. Alt et al., 2021; Clemens et al., 2020; Guessoum et al., 2020; Hollenstein et al., 2021). In recent years, mental illness among children and young people has generally increased, as well as inequities in health between

DOI: 10.4324/9781003367260-10

different groups of children and youth (Lagercrantz, 2017; Dahlman et al., 2021). For example, in Finland, a decrease in wellbeing among Swedish-speaking Finnish youths has recently been observed (Markelin, 2022). The pandemic caused a strong restriction of social contacts for young people in the Nordic countries, not least in view of the closure of schools and the transition to distance learning (Reimers & Opertti, 2021). The rapid transition to distance learning in an emergency has been called *emergency online learning* (Loepp, 2020; Shim & Lee, 2020). Social contact decreased (Branquinho et al., 2020) and activities such as hobbies where students could meet their peers also declined. All these changes have had a particular impact on social and educational interaction, which in turn has affected young people's wellbeing and learning (Reimers, 2022, p. 28).

The lockdown during the pandemic caused several negative effects on young people such as increased anxiety, stress, depression, as well as isolation and loneliness (Alt et al., 2021; Branquinho et al., 2020; Branje & Morris, 2021, 2021; Groarke et al., 2020; Hemberg et al., 2021, 2022b; Hollenstein et al., 2021; Janssens et al., 2021; Jones et al., 2021; Orgilés et al., 2020). The corona lockdowns and distance learning has put a special strain on young people who have had mental health or life management challenges also before the pandemic (Hicks et al., 2021; Liang et al., 2020; van Loon et al., 2021). Research further shows that study motivation has been weakened by distance learning or slowed down studies (Gonzalez-Ramirez et al., 2021; Hicks et al., 2021; Lavonen & Salmela-Aro, 2021; Lessard & Puhl, 2021; Niemi & Kousa, 2020), while there is also evidence of the opposite effect, as distance learning seems to influence students' wellbeing and performance also in a positive direction (Hemberg et al., 2022a, 2022b, 2023), in terms of stress relief, a slower pace of life, improved time management, or strengthening of family relationships (Bruining et al., 2021; Shim & Lee, 2020). Some studies indicate that distance learning and coronavirus closures have had no impact on wellbeing (Janssens et al., 2021; Koenig et al., 2021). According to most studies, however, coronavirus closures and distance learning have caused mostly negative effects on wellbeing and learning, though time spent with family and personal and pleasant development activities also increased which had a positive impact for adolescents' wellbeing (Branquinho et al., 2020). The experience of belonging to the study community even during distance learning has served as a factor in promoting learning and motivation to study (Holzer et al., 2021; Kim et al., 2021; Marler et al., 2021).

These findings related to the pandemic have general significance for the attempt to promote wellbeing in school. The surprisingly positive effects found in some studies highlight the importance of a stress-free environment, close social relationships, and the possibilities for not only pleasant, but also educationally significant development activities outside the traditional school context – and the importance of being able to manage time and life, which for some students seem to have become easier due to changes caused by the

lockdowns. Moreover, the negative effects found in most studies indicate that regularly participating in an organized learning community and being in immediate contact with teachers and peers in a school environment are important factors for maintaining students' wellbeing. This supports the notion that teaching *for* wellbeing, in an inclusive, multifaceted way, is more important than "teaching wellbeing" in a narrow sense – which again makes it a crosscurricular teaching objective.

What is wellbeing?

Wellbeing is a contested and complex concept. Studies of wellbeing in school contexts often reflect this either by containing lengthy discussions of different definitions and approaches or by being committed to very specific theories (see, e.g., Hascher, 2004, 2010). However, for the purpose of demonstrating the relevance of wellbeing to crosscurricular teaching, a broad and unspecific understanding of wellbeing should do. It must be acknowledged that the word "wellbeing" is used with different meanings in different policy and practical contexts (Ereaut & Whiting, 2008; Alexandrova, 2017). On an abstract level, however, it can be said that wellbeing denotes what is ultimately good for a person (Crisp, 2017). A complementary, more instructive definition says that wellbeing is what someone cares for when she cares for a person for his or her own sake (Darwall, 2002). More substantially, we focus mainly (though not exclusively) on *subjective* wellbeing, especially wellbeing as something that is reflected in a person's subjective experience (Lindström et al., 2018). From a caring science perspective, Eriksson (2018) describes wellbeing as a state in which a person can experience her own health positively, although she may be weakened by an illness or a disability. Wellbeing has also been defined as a dynamic existential phenomenon, a particular way of "being-in-the-world" that comprises both a sense of belonging and a flow-like movement toward future possibilities (Todres & Galvin, 2010). It has been argued, however, that especially the wellbeing of children should be understood as included factors beyond their present experience. Raghavan and Alexandrova (2014) suggest that assessments of children's wellbeing should consider a child's stage-appropriate capacities that equip her for successful adulthood, given her environment, as well as possibilities for an engagement with the world in child-appropriate ways. OECD (2017) similarly conceptualizes student wellbeing in terms of a combination of experiential and more objective factors. Indeed, some such factors, like health or social relationships, may be so important to wellbeing that they can be treated as reliable indicators or even constituents of wellbeing, though it must be acknowledged that their effect can be mediated strongly by subjective attitudes and experiences.

There is good reason, however, to assume that wellbeing almost invariably requires a favorable balance of positive over negative emotional states (Haybron, 2008). Cognitive attitudes, like judging one's life or situation to

be satisfactory overall, may also play a role, but are likely to be correlated with a person's emotional state to such a degree that they can function as a reliable indicator for wellbeing, anyhow. Even though emotions can distort one's attention, it is today widely recognized by psychologists and philosophers of emotion that emotions can facilitate awareness of what is valuable and, in this sense, be "rational" (Haidt, 2001; De Sousa, 1987; Engelsen, 2018, 2022b; Klausen et al., 2021). Sometimes, emotions help inform intellectual attitudes about wellbeing. For instance, an excitement about having solved a math problem together in a group may reveal to a student the falsity of her prior belief that she did not like math or group work. The excitement is itself pleasurable and thus constitutive of wellbeing, but it is also a possible source of information about what more specifically matters to the person. Tying wellbeing closely to positive emotions does not equate wellbeing with simple pleasures, and one cannot determine a person's wellbeing simply by knowing their feelings at any given time (as argued by Rahgavan and Alexandrova, 2014). This may be especially pertinent to children and adolescents, whose capacities for development also matter crucially. Without neglecting that fleeting feelings influence a person's wellbeing, we understand wellbeing-relevant emotions to be complex states over time. A student may have momentary feelings of happiness while depressed, stressed, or alienated. Conversely, a student may feel momentary pain while having peace of mind. "Deeper" emotions, such as serenity, togetherness, or feeling safe, gratitude, adequate, and loved, arguably have decisive positive impacts on wellbeing. In contrast, stress, uncertainty, anxiety, and irritability exemplify emotions that impact wellbeing negatively (Haybron, 2008). Long-lasting emotional states have greater significance for a person's wellbeing, partly because they dispose to feel, think, and act in ways that both constitute and cause wellbeing.

Wellbeing and Bildung

The concept of Bildung is often contrasted with pragmatic and "utilitarian" approaches to life and education. It is true that Bildung entails that human life is about more than short-term pleasure or enjoyment. But it should be kept in mind that it originated as a critical response to the one-sidedly rationalist and puritan philosophy of Kant, who separated duty and inclination rigorously and viewed the sensuous aspects of human beings as inferior. The founders of the Bildung tradition, like Humboldt and Schiller, objected that it is both possible and preferable to do good things while feeling good about them and to do them also in part because they feel good. For them, the goal was to make otherwise exacting tasks feel easy by cultivating one's personality (Schiller, 2005, pp. 149, 152). They assumed that it would only be possible to turn doing the right thing into a lasting habit if it could also be experienced as enjoyable and aesthetically satisfying (Schiller, 2005, p. 150; compare Moland, 2021). Wilhelm von Humboldt maintained that the development and exercise of all

human powers, which he took to be the essence of Bildung (see Chapter 3), was also the source of the most profound happiness:

> It is in the pursuit of a single goal, and in achieving it through the use of all his moral and physical energies to its achievement, that the true happiness of a sprightly, powerful person consists . . . Pleasure is greatest in those moments in which man feels his individuality and creative energy at their highest pitch.
>
> (Humboldt, 1967, pp. 14, 48) (author's translation)

Hence the classic theories take Bildung to be intimately connected to wellbeing, to the extent that the one is hardly possible without the other. Characteristically, they also view wellbeing as both having value in itself *and* as having great instrumental value, since it is necessary for motivation and the formation and maintenance of good habits. Schiller and Humboldt's ideas closely anticipate contemporary notions of the importance of intrinsic motivation (Amabile, 1993, 1996) and the state of flow (Csíkszentmihályi, 1996) for learning and personal development. The ambition to cultivate and integrate the practical ability to do well with being well also closely resembles recent theoretical developments of the concept of wellbeing competence (Engelsen, 2022a; Klausen et al., 2021). Wellbeing competence is the practical ability to promote the wellbeing of specific others and oneself and, like the Bildung tradition, this does not merely highlight the promotion of the good as an abstract goal but also emphasizes the temporal processes involved. Cultivating students' wellbeing competence can thus be seen as a crucial part of contemporary Bildung (see also Reimer et al., 2023).

Wellbeing-competent persons or groups know how to continuously adjust, orient, and reorient themselves toward the factors that constitute, prevent, and cause wellbeing in a given social context. As with any competence, one should not equate wellbeing competence with an abstract ideal of expertise, nor with the ability to judge correctly. It is the capacity to live well and help others live well to a sufficiently qualified degree in non-ideal, real-world situations where one must manage dilemmas, conflicting interests, differing values, expectations, emotions, and preferences under conditions of epistemic uncertainty and constantly changing circumstances.

We can highlight four human dispositions that, when working together, significantly contribute to making a person or group wellbeing-competent: (1) *Metacognition* is, broadly understood, the ability to be aware of and regulate one's own "cognitions," including one's thoughts, knowledge, feelings, abilities, and behavioral tendencies (Proust, 2014). For example, metacognition can help students regulate tendencies to be narrow-minded or to regulate certain feelings prudently in specific contexts. (2) *Empathy* is the fundamental ability to apprehend the experiences of others (Husserl, 1973; Stein, 1989). It enables an understanding of what really matters to others as seen from their

perspective, an understanding that can often "see through" superficial and stereotypical beliefs about others. For example, a school class predisposed to forming empathic perspectives can see through stereotypes and form a shared understanding of what matters to the persons involved, including how people's emotional lives are crucial to their wellbeing. In addition, empathy is essential for relationship-building and establishing trust between people and holds potential for self-development since empathy enables you to see yourself through the perspective of others. (3) *Emotional awareness* is the disposition to use emotions to inform, dwell on, and pay extra attention to what we experience as valuable to ourselves or others. They are vital supplements to intellectual reflections about wellbeing (Engelsen, 2018, 2022b; Scheler, 1973; Goldie, 2002). (4) A *flexible perspective* enables wellbeing-competent persons to change their perspectives and attitudes when appropriate – to see things in a new light and recontextualize when new circumstances arise; to focus when concentration, contemplation, or mindful presence is required; and to include long-term perspectives and the perspectives of others when the situation demands it (Engelsen, 2022a; Tiberius, 2008). The flexible perspective avoids fixating on imprudent principles and perfectionist ideals and expands and narrows the horizon of possibilities as circumstances change. Thus, it becomes possible to include many different values and reasons for action in the management of wellbeing and to continuously take both short- and long-term goals into account, given the ever-changing real-world constraints.

The interaction of these components is crucial since the dominance of one component can sometimes lead to wellbeing incompetence. For instance, empathy and emotional awareness predispose to biases that metacognition and a flexible perspective can help remedy. Conversely, people without empathy and emotional awareness but with strong metacognitive abilities may lack essential information. Similarly, a person's perspective is not flexible without attention to the perspectives that emotions and empathy can add to the picture of how to promote wellbeing.

Wellbeing in school: dimensions and findings

There is strong evidence that students' wellbeing significantly influences their ability to learn (Woolf & Digby, 2021; see Holzer et al., 2022 for a nuanced assessment). Wellbeing impacts teaching and learning in several mutually supportive ways (see Text Box 8.1). Many aspects of students' school performance have been shown to depend on both their level of life satisfaction and emotional state (Gutman & Vorhaus, 2012; Widlund et al., 2018) and more objective factors like their health condition (Shaw et al., 2015). The relationship may seem to be, and obviously is in some respects, straightforward. Feeling well and safe makes it easier for students to concentrate on learning tasks and to work sustainedly and energetically. Positive affect is generally known to be a main source of human strength (Isen, 2003). However, wellbeing also supports learning and learning ability in less direct, but still important ways: feeling well strengthens self-efficacy, self-confidence,

and positive attitudes toward learning (Salami, 2010). Stress, on the other hand, has been found to impair self-control and executive functioning (Wolff et al., 2021). Positive emotions and other elements in subjective wellbeing support cognitive flexibility and creativity (Fanchini et al., 2019). Moreover, sufficient wellbeing is known to make social interactions easier. Students who display a good mood are more easily included in the classroom community. Cultivating tolerance and an inclusive atmosphere can compensate for, but not completely make up for, a lack of wellbeing among some of the students in a class. Student wellbeing is essential to collective learning, and also for developing students' competence to collaborate. Finally, the teacher's own wellbeing is also important for her ability to teach efficiently and to be perceived positively by her students (Van Petegem et al., 2007, Glazzard & Rose, 2019, Carroll et al., 2021).

Text Box 8.1 Potential benefits for teaching and learning of fostering student's wellbeing

Direct effects

Maintaining *basic strength*, *energy*, and *resilience*

Intermediate effects

Strengthening *self-confidence, self-efficacy*, and *positive attitudes toward learning and school*
Developing personal and cognitive *flexibility* and *creativity*

Indirect effects

Strengthening *social integration in the classroom* and *collaborative engagement*
Mutual *enhancement of student and teacher wellbeing* (which matters for teaching quality)

Notably, there is also evidence that *teaching* wellbeing improves student performance (Adler, 2016; Ashdown & Bernard, 2012). Although we think that the focus should be on fostering wellbeing more broadly, teaching it more or less explicitly – that is, making students conscious of factors that are conducive or detrimental to mental health and a good life more generally – can surely be advantageous as well.

The evidence for a positive impact of wellbeing on various aspects of student performance is both strong and comprehensive. Yet some expected positive

relationships have proven difficult to confirm empirically, for example, that subjective wellbeing mitigates test anxiety (Steinmayr et al., 2016). Moreover, many mediating factors have been identified, such as parental involvement and gender (Fanchini et al., 2019). Boys are, for example, known to self-evaluate more positively than their female classmates (Hue et al., 2009). That parental involvement and other features of students' close social environment are consistent mediating factors supports our suggestion that improving and maintaining wellbeing should be seen as a *collective* competence (Klausen, 2018; Engelsen, 2021).

Teaching for wellbeing across the curriculum

As a teaching objective, supporting wellbeing is obviously related to cross-curricular teaching. It is a concern that should be given attention in all teaching activities, notably in subject teaching, where it is at risk of being ignored in favor of more specific, content-related and intellectual, teaching goals. Woolf and Digby (2021) conclude from an analysis of a large body of evidence that wellbeing should be integrated across all disciplines; wellbeing interventions yield most successful outcomes when they are integrated into daily practice and school culture (see also Chapter 7). A teacher should also be concerned with the prerequisites of successful teaching in terms of students' basic constitution, situation, and the general classroom and school culture. The relationship between teaching styles, and especially cross-and transcurricular teaching and student wellbeing, currently remains underexplored. But it is widely assumed that at least some forms of cross- and transcurricular teaching are conducive to wellbeing, due to, for example, their propensity for fostering creativity, exploration, variation, collaboration, and alleviating stress expectations.

Although there is abundant reason to care for students' wellbeing in teaching, and thus for making it a central aim of cross- and transcurricular teaching, there are some important qualifications. For it is part of the idea of Bildung (see Chapter 3) that learning must also be difficult and challenging. Negative experiences of tasks as strenuous and not immediately gratifying are central to personal development, as are experiences of phenomena and learning as curious, strange, and puzzling. Bildung is very much about expanding one's comfort zone by continuously transcending it.

This means, first, that the concern for wellbeing should not lead to making the classroom an overly safe space. Exposure to different views, opinions, and ways of life is important to cultivating tolerance and resilience (Haidt & Lukianoff, 2019), and the (eventually) positive experience of being able to deal with tensions and uncertainties and "contain multitudes" is an important part of long-term wellbeing. Hence the teacher must strike a balance between caring for students' sensibilities and feeling of safety and allowing them to feel temporarily frustrated or uncomfortable. However, a sufficient overall

("baseline") level of wellbeing in a class makes it easier and less risky to work with challenging students and temporarily alienating them, as this will take place within a basically safe and familiar environment.

Second, in her didactic planning, the teacher must aim at presenting students with tasks and questions that enable them to experience the pleasure of overcoming adversity, meeting challenges, and coming to terms with unfamiliar things and situations. Cross- and transcurricular teaching may be particularly suited for this (which is itself a crosscurricular goal), as it can provide students with experiences of unfamiliar learning contexts and subjects, which they have to integrate with their existing knowledge. It may also enable them to experience subject content, which otherwise seems challenging or less meaningful, as both useful and accessible, for example, by using mathematical methods or linguistic skills for the solution of real-world tasks.

Recognizing the developmental power of negative experiences – and seeing that genuine wellbeing is markedly different from, and more complex than, simple "smiley-faced happiness" (Haybron, 2008) – should also lead to a more nuanced view of what it means to care for students' wellbeing. While it is both a teacher and collective (classmate) responsibility, caring for wellbeing also entails respecting personal preferences and characteristics, and allowing each student to find and develop her role and path within the classroom community relatively freely. Hence, the teacher should not intervene too strongly to support a student's wellbeing. A classroom culture that one-sidedly privileges positive thinking is not conducive to genuine wellbeing or personal development. Students should be allowed to maintain somewhat introverted attitudes. Again, there is reason to see the ability to maintain wellbeing as a collective competence, also in the sense that different students may play different roles, and use different skills, in contributing to the overall wellbeing of a school class.

A further qualification is that teaching for wellbeing should include teaching what wellbeing is *not*. Arguably, a significant factor behind the recent increase in mental health issues and misthriving among adolescents is their tendency to aim for, or compare their lives with, unrealistic or outright harmful or unhealthy standards of happiness and wellbeing. Making students aware that perfect happiness is not a realistic human goal (nor remotely necessary for sufficient wellbeing or success in life), and that wellbeing is not strongly dependent on peak experiences, consumer goods, or superficial forms of social recognition, is thus also an important learning goal. On the positive side, the fact that adolescents are currently interested in – sometimes seemingly preoccupied with – questions of how to achieve a sufficiently good life means that wellbeing is a crosscurricular topic with a strong potential for motivating and engaging students; it can be used to stimulate interest in, and highlight relationships between, subject content from, for example, social science, religion, literature, philosophy, and media studies.

Teaching for wellbeing directly and indirectly, and the benefits of teaching life skills

Teaching wellbeing may involve elements of explicit teaching or "instruction," treating the nature of, and methods for achieving, wellbeing as a specific kind of crosscurricular content. As mentioned earlier, there is some evidence that this can improve student wellbeing. This should also be expected, mainly because of the tendency to otherwise pursue more problematic ideals of a satisfactory life. However, improving students' wellbeing capacity requires *learning by doing and experiencing* just as much, or more, than formal instruction. It is important that the concern for wellbeing pervades all school activities, not least subject teaching. Even though there is a strong advocacy for "whole school wellbeing" approaches, there is also a tendency to focus mostly on *transcurricular* activities, that is, what can be done to support wellbeing *besides* teaching the usual school subjects, how teaching can be embedded in a wellbeing supportive environment, etc. (see, e.g., Evans et al., 2022; also Chapter 7). Not only because curricular activities – subject teaching and learning – take up the bulk of school hours, but also because learning experiences are a crucial source of wellbeing (or, in case they are negative, of feeling less well), teaching for wellbeing across the curriculum should have priority.

Teaching *life skills* has been propagated widely, and life skills education school has been shown to improve, for example, self-regulation, making informed decisions, and building social relationships (Kirchhoff & Keller, 2021), all of which are central to both wellbeing and attainment of learning objectives. However, it remains somewhat controversial in practice, as teaching children and young people how to manage everyday affairs can seem either trivial or at least not a main responsibility of schoolteachers, but rather of parents. It is also often thought about as something that should not take too much time from teaching core subject content (Work-Ready, 2019). From a Bildung perspective, however, teaching life skills is obviously an important educational task, though it has to be done in a way that recognizes the central role of the student's own experiential and developmental process. Moreover, life skills are doubly important to student wellbeing: they have an obvious instrumental importance, as they contribute to maintaining the health and social and economic (etc.) security of the student and help her realize her life goals. But they also have a more intrinsic value, since the experience of coming to terms with life and developing one's power is a fundamental source of pleasure, as emphasized by the Bildung tradition as well as contemporary psychological research.

Practical suggestions

Focusing on establishing healthy social environments, for example, in classroom settings, is vital to promoting students' wellbeing. It is crucial for most students, as for most people, to feel that they are an accepted part of the

group with which they identify. Belonging and togetherness can be crucial to wellbeing (Roffey, 2013), and relationships of recognition are instrumental to students' identity formation and self-images (Sartre, 1943; Honneth, 2010). Creating an inclusive environment where the students feel psychologically safe to express themselves and reflect on what they consider significant to their lives in a collaborative way is beneficial. Students' fear of expressing themselves can lead to overly reticent attitudes that can make it difficult to foster flexible perspectives in the classroom. One way to cultivate flexible perspectives is to establish a culture of fallibility and perspective-taking, where being curious, willing to make mistakes, and seeing things from different angles is the norm. One can create an atmosphere in the classroom where there is not only room for mistakes, curious questions, and new perspectives, but where the significance and learning potential of such attitudes are emphasized. The teacher can personify the flexible perspective and act as a role model by not hiding her own doubts and oversights but instead highlighting how doubt and reflection on shortcomings can contribute to new perspectives. In addition, the teacher can take it upon herself to continuously articulate new perspectives on a given issue – without diminishing the importance of the perspectives that students bring to the table, but, in contrast, emphasizing these perspectives as contributions to the collective flexible perspective. This effort can demonstrate that learning – for teachers and students alike – is a process that involves perspective flexibility.

Another practical focus could be to make space for emotions and empathy in the classroom. Such a focus can come in reflections on one's own emotions or the emotions of others. This focus includes reflections on the experiences of things that seem to matter, and to which the emotions are responses, but also on the perspectives that could be lost when certain emotions dominate. One can also facilitate emotional awareness in processes where students handle and "work with" emotional expressions in concrete (e.g., creative) projects and by establishing a dialogical form of teaching where emotionally expressing oneself is not frowned upon. The point is not to elevate arbitrary feelings and unfounded opinions in the classroom but to make room for actively and collaboratively dealing with emotional experiences, their meaning, and consequences. Emotions and moods are also significant for learning experiences by virtue of their motivating nature. Cultivating an openness to emotions such as curiosity, enthusiasm, and compassion can foster and make one attentive to meaning-making experiences, flow experiences, and intrinsic motivation in the context of, for example, educational immersion. Dealing with the negative experiences, which can nevertheless have a formative function (e.g., frustration at finding something difficult to understand), can be done by fostering parallel positive emotional experiences in the learning process. For instance, when space is made for a student to experience a complex subject matter as manageable (Engelsen, 2017, p. 44; Fiedler & Beier, 2014, pp. 43–44), it can come to be perceived as very rewarding and eye-opening.

These are still quite general guidelines, and the question is how to do it in actual teaching practice. This brings us back to crosscurricular teaching. For it turns out that all or most of the methods and topics related to such teaching are also particularly well suited for fostering wellbeing and wellbeing competence: supporting creativity and flow, using dialogic teaching (see Chapter 6), letting students work in ways that lead to tangible results and give them opportunities for self-expression (see Chapter 10 on arts-integrated teaching, Chapter 11 on learning by drawing, and Chapter 12 on craft) are also ways of supporting wellbeing. Entrepreneurship (see Chapter 16) also strengthens students' ability to manage their own life. Last but not least, stimulating physical movement and integrating it into all parts of the curriculum (see Chapter 7) is an extremely powerful way of creating the intimate link between learning and feeling and being well prescribed by the ideal of Bildung.

Conclusion

Though there is impressive evidence for the benefits of supporting students' wellbeing, it may still be thought that is not a task that teachers, many of whom are already overloaded with teaching and administrative duties, can be expected to shoulder. Although the task of promoting wellbeing partly falls on school management, school-and-community workers, etc., it is something that teachers also need to address and incorporate into their own didactical considerations. Bildung entails that learning should be mostly pleasurable and intrinsically motivated; and school is such a central part of students' lifeworld that what happens in school cannot but strongly impact their present and future quality of life. On the negative side, it should be noted that the current increase in mental health challenges and emotional vulnerability among young people is not likely to disappear soon. Hence this is something that any teacher will have to deal with and should be able to handle competently.

Caring for students' wellbeing should not be seen as an additional task, but as an integral part of all teaching activities. Although the ability to promote wellbeing should be recognized as a distinctive competence, we have pointed out that it can be fostered by doing other things, most of which are also cross- or transcurricular activities, and support other aims of Bildung and crosscurricular teaching. This does not necessarily make it easier for the teacher. But it does mean that wellbeing is not a topic that must be squeezed into an already crowded curriculum or given attention after other duties are done. There is also evidence that a teaching focus on wellbeing and life skills as such can help increase wellbeing and thereby also improve students' learning ability. Yet teaching *for* wellbeing, keeping it in mind as an implicit and often indirect, but pervasive goal of all teaching activities, should be given priority.

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9 Mathematics beyond and across the curriculum

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Introduction

Mathematics has a privileged status in education as a subject that is taught universally and to all ages in schools. This status partly reflects the practical utility of the tools and concepts of mathematics, as they are applied to everything from school tasks found in mathematics textbooks to realistic situations like daily business transactions and the statistics of the latest news story. There is also an assumption that participation in school mathematics is the best way for pupils and students to learn how to think abstractly (Schoenfeld, 2017).

The topic of crosscurricular teaching has a long history and has also become an issue within the community of researchers in mathematics education (e.g., Doig et al., 2019; Ward-Penny, 2011). The advocates of crosscurricular teaching and learning speak of the advantages in helping students develop a deeper understanding of concepts through authentic activities and help them encounter the *Big Ideas* of mathematics (Charles, 2005; Toh & Yeo, 2019; Ward-Penny, 2011). While helping students forge meaningful connections across ideas that are central to the learning of mathematics, a pivotal goal is to also make the curriculum more relevant and motivating to students (Czerniak & Johnson, 2014; Ward-Penny, 2011). However, moving from educational ideas as expressed in the curricula toward the successful implementation of those same ideas in the classroom is not without its challenges. Meier et al. (1998) list barriers to the successful integration of any given set of school subjects, ranging from the lack of common assessment guidelines to rigid teacher beliefs.

In this chapter, we will argue that there are also challenges unique to how mathematics is taught and learned within a cross- and transcurricular setting. These challenges are linked to how mathematics is viewed and perceived as a school subject. It is common to view mathematics as having a strict hierarchical structure and to perceive learning in mathematics as acquiring a set of techniques that can be applied outside of mathematics. We will suggest that this view, which we call *instrumental*, makes mathematics difficult to integrate with other subjects. That this indeed is the case is exemplified with an historical overview of the Finnish curriculum where the friction between viewpoints

DOI: 10.4324/9781003367260-11

is made explicit. Finally, it is argued that another view on mathematics teaching and learning, which we call *relational*, allows us to see the value of integration differently.

Mathematics from an educational viewpoint

From an educational viewpoint, mathematics can be seen both as a collection of facts, rules, and procedures to be learnt and as a science of patterns and systems in which we investigate problems and hypotheses, reason and discuss, specialize and generalize, conjecture and convince – in short, as a science where we develop abstract mathematical thinking. The word abstract here has a twofold meaning. The first is connected to how a real situation is simplified to construct an abstract mathematical model that contains only the essential features of a problem or situation (see, e.g., Cheng, 2019). The second meaning is closer to how a working mathematician thinks about the power of abstraction. Here we leave the close connections with the physical world and enter the realm of mathematical abstractions, where surprising and deep connections between seemingly different areas of mathematics may emerge. A historical example of this is how the theory of complex numbers unified what was previously thought of as unrelated areas of mathematics, spawning a rich set of new insights and applications. From research we know much about why mathematical thinking is important for both students and teachers, what it takes to learn mathematical thinking, and how to build thinking classrooms (e.g., Liljedahl, 2021; Schoenfeld, 2017). Besides knowing mathematical facts, rules, and procedures as well as when and how to apply these when solving traditional types of mathematical tasks, the students and teachers on all levels of schooling also need to know how to approach and develop more cognitively demanding and inquiry-based mathematical problems or applications (Liljedahl, 2021). This broadens the perspective on mathematics education and shows how mathematics contributes to the Bildung of the student (see Chapter 3).

In the following, we bring up issues that further illuminate mathematics and its learning and help us discuss the role of mathematics in crosscurricular and transcurricular educational settings. We will distinguish between, on the one hand, an instrumental view on mathematics and its learning, and, on the other hand, a relational view. The distinction is remotely related to the one discussed by Skemp (1978) but does not coincide with it. Skemp's focus is on the concept of understanding, while ours is a distinction between two ways of approaching mathematics from an educational viewpoint. Our take on the instrumental view does not exclude a relational understanding, as we regard the two views as complementary. Furthermore, the relational view described here goes beyond Skemp's relational understanding since it includes the relational *qua* social dimensions of learning mathematics.

When seen from the instrumental perspective, the value of mathematics and learning mathematics is taken to lie in the applications to which mathematical

facts, rules, and procedures can successfully be put by the user. This view may reveal itself in statements indicating that students know a rule or procedure and can use it for approaching mathematical challenges appearing in the mathematics curriculum or in the curricula of other school subjects. From this perspective, learning mathematics becomes a matter of acquiring a set of techniques, rules, propositions, and the ability to apply them in different situations.

The instrumental view can be seen to join hands with the emphasis on the importance, usefulness, and intrinsic value of possessing mathematical competences that has become commonplace in wake of the Danish KOM project (Niss & Jensen, 2002). A common question asked in this discussion is whether there is a mathematical competence or a plethora of competences that a student needs before entering crosscurricular and transcurricular settings in and outside school. The value of mathematics and learning mathematics is here taken to lie mainly in mathematical sub-competences of a cognitive nature that are considered pertinent for someone in school, everyday life, society, and the labor market. Mathematical competence is broader than knowing how to apply a set of mathematical methods. Following Niss and Højgaard, a student's mathematical competence is constituted by his or her insightful readiness to act, meaning the student acts appropriately in response to all kinds of mathematical challenges pertaining to given situations; situations that need not be mathematical in and of themselves, as long as they (may) generate mathematical challenges (Niss & Højgaard, 2019, p. 12; see also similar notions of "action competence" in Chapters 4 and 13). According to Niss and Højgaard, to act appropriately involves being able to pose and answer questions within and by means of mathematics as well as the ability to handle the language, constructs, and tools of mathematics (Niss & Højgaard, 2019). What remains in the background of, or is totally excluded from the discussion on mathematical competences, are the dispositions of the students, including the capacity of being critical toward the impact of mathematics in society (see Chapter 4). Other aspects that remain in the background are students' emotions, attitudes, and volitionality, as well as the reflexivity between students' school mathematical identity work – including the development of dispositions – and school mathematical traditions (Cobb et al., 2009; Skovsmose & Valero, 2001; Röj-Lindberg, 2017).

Adopting a relational view on mathematics means accounting for the intra-mathematical relations and mathematical competences as well as for the relations between people within and outside school and between these people and mathematics. Besides teachers and students, these people can include parents, peers, etc. By intra-mathematical relations, we intend to convey the intricate connections that exist between mathematical ideas and domains, for example, between arithmetic and algebra. These intra-mathematical relations may appear already on a very elementary level of mathematics studies within such school mathematical traditions that are not governed by restrictive assumptions about what students are capable of learning and in which order. For

instance, research has shown that algebraic thinking and the use of algebraic tools is possible as early as in the first grades and beneficial to both the learning of arithmetic and the learning of algebra (e.g., Schliemann et al., 2006). Another aspect, highly important within crosscurricular approaches, is how the relation between informal and formal mathematical languages in use, that is, between discourses, is understood. Within a relational view on mathematics, it is understood as the expansion of repertoires of ways of talking about problems and phenomena. A relation is constructed between less and more formal ways of expressing one's mathematical thinking. Less formal and more formal discourses are not in opposition but work together and in relation to other forms of discourse, including languages in use in other subjects, school discourses, home discourses, and so on (Barwell, 2016). By zooming out from the intra-mathematical relations to the social dimensions of mathematical activity, the relational view allows us to account for learning mathematics as participation as well as to see meaning, thinking, and reasoning as products of social activity (e.g., Lerman, 2000). Thus, the relational view leads up to a Bildung perspective on mathematics education, by also incorporating a focus on the interrelations between the student and the environment (see the discussion in Chapter 3).

Different views on mathematics have direct implications on the role mathematics is assigned in crosscurricular settings. If one views mathematics first and foremost instrumentally, the role of mathematics is easily reduced to one of providing the quantitative toolbox for taking part in a cross-disciplinary project or theme. From a relational perspective, learning mathematics within crosscurricular settings emerges not only in the applications of mathematical facts, rules, and procedures, but also in the sense-making processes where various forms of discourse become treated as mathematical by the participants. For example, a newspaper article might be discussed as an informative text in literature education and become the starting point for inquiries into how mathematical facts are represented and used in the local society. From this perspective, mathematics is learned both *for* and *through* taking part in crosscurricular settings.

Mathematics within crosscurricular settings: cases and problems

While there are many examples of crosscurricular projects involving subjects other than mathematics or where mathematics is hardly visible (see examples in, e.g., McPhail, 2018; Rowley & Cooper, 2009), the examples where mathematics is integrated are not as readily found in the literature. The most common kind of example consists in the integration of the so-called STEM subjects, that is, science, technology, engineering, and mathematics.

Among the expected positive outcomes of STEM integration are increased student motivation and a flexible mindset. Crosscurricular teaching is also expected to prepare the students for grappling with grand societal challenges, sometimes called wicked problems. These assumed positive outcomes and

other putative benefits and goals of crosscurricular work are summarized in Chapter 3. In the following, we will refer to some international examples where these positive outcomes are visible. At the same time, these examples indicate what aspects of mathematical practices need to be considered within crosscurricular settings.

Tytler et al. (2019) report on positive effects of crosscurricular STEM projects involving students aged 12–15 in Australia. These projects were based on large-scale initiatives each involving several schools. In three cases studied more closely, the most clearly perceived benefit of crosscurricular work was that student engagement improved. In one of the cases, "the usefulness of mathematics became more evident and [the students] were able to 'transfer' knowledge more readily between their STEM subjects" (Tytler et al., 2019, p. 65). During the initiatives, the teachers' attitudes to the crosscurricular STEM projects changed only gradually in a more positive direction. Tytler and his colleagues associate this shift in attitude with changes in the teachers' pedagogy and to the increased student engagement that followed their work on real-life problems. The authors conclude that the success of STEM integration depends on the use of open-ended tasks that allow for problem-solving and the creative use of mathematics in understanding the problems. The authors expressly advocate against using previously known mathematics as a tool unless this can provide important insights into the problems.

A conclusion drawn from the literature review by Honey et al. (2014) is, likewise, that integration of mathematics and science can be fruitfully furthered if the students are involved in the mathematical modeling process of the natural systems studied. Like Tytler and his colleagues (2019), Honey, Pearson, and Schweingruber suggest that the positive effects of curriculum integration can be more clearly discerned in the students' increased motivation and interest than in outcomes on standardized achievement tests. In a similar vein, Ward-Penny (2011, p. 6) argues that "[c]arefully constructed problem situations might even motivate the learner further, by giving them room to devise their own strategies, carry out their own methods and develop a genuine sense of ownership regarding their work." He warns that a compartmentalized curriculum makes the students search for solutions to problems too narrowly among mathematical skills and competences that are typically learnt during mathematics lessons.

However, as Doig and Jobling (2019) point out, it remains to be seen whether these motivational factors also have positive effects on students' conceptual understanding. In a study from the Netherlands, where students took part in a STEM course in upper secondary school, some students complained that only low-level mathematics was required and that they did not use mathematics skills learnt in the mathematics classroom (den Braber et al., 2019).

If we consider the aforementioned cases from the perspective of the distinction between relational and instrumental views on mathematics education, it seems that the success of crosscurricular learning can be hampered by a one-sided instrumental view. Such a view can even prevent the participants

from discerning positive aspects of crosscurricular work. If the contribution of mathematics is taken to consist in a set of quantitative tools that are learnt beforehand and then applied in a crosscurricular setting, there is little room for expanding the toolbox in crosscurricular learning. Mathematics is reduced to a handmaiden to the other subjects and, moreover, one that must be learnt separately. From a relational view, student motivation and engagement are not seen as external to learning mathematics. Furthermore, we argue that the relational view encompasses precisely what Ward-Penny stresses in the aforementioned quote: that students are allowed "to devise their own strategies, carry out their own methods and develop a genuine sense of ownership regarding their work."

Williams and Roth (2019) maintain that the value of crosscurricular approaches that include mathematics lies partly in that mathematics provides necessary tools for quantitative problem-solving and partly in that the crosscurricular setting provides mathematics teaching with a rich context – "the added value of a wider world." In addition, they also stress that students should become aware of the nature of different disciplines and school subjects. A value of crosscurricular projects lies in the fact that they give insights into when a certain subject can add something and when it cannot.

These examples, thus, contain possible ingredients for fruitful crosscurricular teaching. It is worth noting, however, that the cases discussed by Tytler et al. (2019) were part of two large-scale initiatives to further STEM integration. The teachers involved received intensive support from collaborating universities and other stakeholders. Moreover, even with this level of support for subject integration, "a large portion of the mathematics curriculum" was taught independent of the STEM projects in order to meet the requirements of the syllabus. Similar observations concerning the need for external support for the teachers have been noticed by others (e.g., Röj-Lindberg et al., 2022).

Regarding the *assessment* of crosscurricular teaching, there are problems facing researchers and teachers. Honey et al. (2014) point out that if the instruments for measuring learning are devised within a subject-based setting, they will fail to detect at least some of the benefits of the crosscurricular activity. Another problem concerns the outcome of crosscurricular activities with respect to the learning of subject knowledge. As a response to these problems, Hobbs et al. (2019) mention that one of the schools taking part in the Australian initiatives discussed earlier handled the problems of assessment by emphasizing both the students' competence to apply mathematics to real-world problems and their mathematical skills and conceptual knowledge. A recent review (White & Delaney, 2021) of articles that focus on the benefits of crosscurricular STEM and STEAM (STEM and arts) teaching indicates that broadening the focus in assessment can capture a wider array of benefits, including both academic success and motivation. We propose that it could be worthwhile to study the challenges of assessment through the lenses of instrumental and relational views. However, this lies beyond the scope of our chapter.

The evolution of crosscurricular approaches in the Finnish curricula: the case of mathematics

There is a long tradition of public schooling in Finland, and the Finnish educational system has always, to a greater or lesser degree, put emphasis on crosscurricular teaching and learning. Based on a content analysis, this section lays out a brief sketch of crosscurricular approaches, and the position of mathematics within them, in Finnish curricular documents from postwar Finland onward. The section provides an in-depth example, which can be read as an illustration of the negotiation between the interests of contrasting views on mathematics education.

The Finnish Basic Education Act of 1968 stated that all children from the age of 7 should attend a comprehensive basic school, a *grundskola*, for their first nine years of education. Before the 1970s, the Finnish curricula tracked students to "academic" streams or "vocational" streams and there was practically no possibility to move between these streams once students had decided which pathway to follow. The change in postwar Finland during 1945–1970 was from an agricultural nation, where the needs for mathematics in everyday life were foregrounded, to an industrialized society. At this time, mathematics was clearly seen as having an instrumental value in relation to other school subjects and the role of mathematics in any crosscurricular or transcurricular situations was subordinated to the needs of these other subjects. An extreme example is "counting within trade" (*handelsräkning*) which is described as belonging to the "practical subjects" (Kommittébetänkande, 1954: 12, p. 198). However, there are also some indications that a skill in abstract mathematical thinking was seen as a valuable gain on its own, especially when educating students for technical vocations (Kommittébetänkande, 1954: 12, p. 114).

Pedagogical ideas aiming at social gains and more holistic interpersonal development were known in Finland as early as the 1930s, but school education was not greatly influenced by them. This includes the idea of grouping the content of education into thematic, crosscurricular areas – an idea that became a model for the Comprehensive School Curriculum Committee (*Grundskolans läroplanskommitté*). The groundwork for basic schooling for all Finnish pupils, the *grundskola*, was laid by this committee whose visions were published in 1970 in a National Core Curriculum (Kommittébetänkande, 1970: A4), and subject syllabi (Kommittébetänkande, 1970: A5). The overarching curricular vision of the committee was based on the ideas of Bildung, promoting a harmonious development of the individual. The vision further included *vertical integration* within a subject, that is, the internal order of subareas in mathematics within and between grades, as well as *horizontal integration* of the learning content, that is, crosscurricular approaches. The most radical among the suggestions for horizontal integration made by the committee was "to erase boundaries between subjects and gather the subject matter around central problems for students or society" (Kommittébetänkande, 1970: A4, p. 64). The committee's research-based vision for teaching in the

new *grundskola* was clearly to implement both crosscurricular and transcurricular approaches: to integrate two or more school subjects, to fuse related subjects, or to merge subjects into new entities or themes. Yet, referring to lack of time and the resistance due to disciplinary interests of stakeholders – "subject experts can hardly free themselves from their subject-centred view" (Kommittébetänkande, 1970: A5, p. 387) – the committee felt compelled to nevertheless build its work on a subject-based curriculum.

Acknowledging the weaknesses of a subject-based curriculum, the committee pointed to the role and responsibility of subject teachers to collaborate and to support students in integrating knowledge and skills holistically and in being initiators in the learning process (Kommittébetänkande, 1970: A5, p. 68). The subject syllabi (Kommittébetänkande, 1970: A5) discusses each subject in terms of cooperation or integration with other school subjects. However, the subject of mathematics is explicitly referred to only in two other subjects: in visual arts and in home economics. Statements in the mathematics syllabus – about individual work, the scarcity of group work, and self-instructional mathematical workbooks – add up to the following conclusion: despite the vision of the Comprehensive School Curriculum Committee for the new *grundskola* concerning Bildung and horizontal integration, mathematical practice was conceived instrumentally, as an individual endeavor, and as a stand-alone subject.

With the National Core Curriculum reform in 1985, under the slogan "a school for all," came the requirement on mathematics teachers to adapt their planning to the same curriculum and syllabus for all students. The visions from 1970 of a more integrated curriculum were however still set as long-term goals for all subjects, including mathematics: "in the planning one should strive to consider the integration of mathematics and other subjects" (Skolstyrelsen, 1985, p. 11). However, the subject-specific content for each grade and the goals for mathematics teaching outlined in the National Core Curriculum were not to be compromised through "collective teaching or interdisciplinary thematic studies" (Skolstyrelsen, 1985, p. 25).

In 1994, it was time for the following curriculum reform of the *grundskola* in Finland (Utbildningsstyrelsen, 1994). One important aim was to reform traditional classroom practices by moving to a more student-centered curriculum, learning how to learn and think, and to increase the possibilities of the schools and teachers to innovate. The 1994 National Core Curriculum was characterized by a remarkable openness, flexibility, and support of creativity and freedom on the school level to use resources, as well as to implement a variation of methods of teaching, a diversity of perspectives on current issues that cross subject boundaries, and a multitude of ways of working cooperatively. There were no division of subject matter between the grades, no set amount of teaching hours per grade, no demand on evidence-based approaches to teaching and learning. It was up to the schools and municipalities to decide to what extent the local curricula would contain instructions on merging subjects into new entities or themes. Hence, in sum, the possibilities in schools to

be sensitive to both mathematical subject matter, student interests, and their mutuality were obvious. With requirements to develop mathematical thinking through problem-solving and putting mathematics to use in other subjects came the hope of "making mathematics more fascinating, exciting and surprising" (Utbildningsstyrelsen, 1994, p. 79). Hence, the syllabus of mathematics in the 1994 core curriculum did not deviate from the vision from 1970 of schools working across subject boundaries with the aim of Bildung. However, international evaluators (Norris et al., 1996) were critical of how the 1994 curriculum reform was implemented in practice. In their report, Norris and his colleagues refer to evidence of much traditional whole-class teaching, and the lack of evidence of, "for example, student-centred learning or independent learning," which were two main aims of the reform (Norris et al., 1996, p. 85).

The following National Core Curricula, in 2004 and 2014 (Utbildningsstyrelsen, 2004, 2014), both tried to narrow down differences in local implementations of the national guidelines that was an effect of the 1994 curriculum. The original idea stated by the 1970 Comprehensive School Curriculum Committee of grouping the content of education into thematic, crosscurricular areas reappears in both the 2004 and the 2014 core curricula; in 2004, as a list of seven themes to be integrated into *many* subjects (Utbildningsstyrelsen, 2004). Yet, in the 2004 mathematics syllabus, there are no explicit references to these themes or to other school subjects, and there is hardly any reference to mathematics in the syllabi of other subjects either. In 2014, the idea of crosscurricular and transcurricular approaches reappears as a list of seven interdisciplinary competences to be built up in each subject by applying the content and methods that are typical of that subject (Utbildningsstyrelsen, 2014). The strengthening of Bildung, including the competence to apply mathematics in other school subjects and outside school, is set as the general goal for mathematics teaching. The 2014 mathematics curriculum, hence, latches onto the vision set in the beginning of the 1970s, but mathematics is more clearly than before seen as a vehicle for Bildung purposes. Mathematics teachers are expected to plan for crosscurricular activities while at the same time adhering to the assessment criteria communicated in the syllabus of mathematics. Moreover, this general goal must be juxtaposed with the view of mathematics as a hierarchical subject (one idea leading to another, abstraction building on abstraction) conveyed in statements like "mathematics is a cumulative subject, the teaching of mathematics must therefore proceed systematically" (Utbildningsstyrelsen, 2014, p. 375).

Our conclusion is that the content analysis of the Finnish National Core Curricula and the international cases presented earlier reveal tensions that the mathematics teacher must acknowledge and tackle. In their local implementation of the core curriculum, teachers have to balance the requirements of crosscurricular activities, the integrity of the subject of mathematics, as well as the need to incorporate a broader view on mathematical competence and on assessment. As Drake (2019, p. 88) remarks, "it is very difficult indeed

to organize interdisciplinary activities in educational institutions whose very raison d'être is the achievement of pre-determined and specified outcomes." Tytler et al. (2019, p. 77), make an even stronger point: "Historically, an integrated curriculum advocacy has never prevailed against disciplinary interests." However, from the cases studied earlier, we see that there are hints of possible solutions.

Discussion

Considering the tradition of conceiving mathematical practice from an instrumental viewpoint, it comes as no surprise that teachers might relate to the tensions identified earlier by letting the disciplinary interests of mathematics take precedence over the organization of crosscurricular projects. From a Finnish point of view, there are no indications that the school system would be leaving the strong subject-centered curriculum and assessment (Uljens & Rajakaltio, 2017).

Crosscurricular work within schools is not easy for individual teachers regardless of subject affiliation because of the constraints that work against the establishment of a school culture necessary for dealing with such complexity. For example, the organization of school schedules, predetermined curricular structures, high-stake assessments, as well as the daily pressures on teachers' work all impact on the implementation of crosscurricular and transcurricular approaches (Röj-Lindberg et al., 2022). There are also challenges connected to defining the learning goals of the crosscurricular activities – which need not be mathematical in and of themselves – in relation to the learning goals concerning each of the collaborating subjects (Braskén et al., 2019). A successful collaboration between subjects, each bringing viewpoints on the objects of study as well as the methodologies, requires attention to the specific features and complexities of each subject and also to the criteria for evaluating the outcomes of the results of the crosscurricular activities. In the absence of clear assessment criteria, the result is likely to be evaluated in terms of weakly classified generic, or meta-skills criteria such as "learning to learn" (McPhail, 2018). McPhail further points to a danger of allowing curriculum design to be shaped by generic skills and general problems, issues, or projects. He argues that such aspects need to act as pedagogical tools for engagement, but they cannot provide the source for the deeper content itself. The content must instead come from the disciplines if cognitive advancement is to move beyond common sense or the acquisition of generic skills (McPhail, 2018, p. 63). Otherwise, there is a risk that subject-specific knowledge may be used only instrumentally and in isolation, divorced from the wider systems of meaning of which it is a part. This echoes discussions in the Bildung tradition, which has likewise warned against a fragmentation of knowledge and argued for the importance of engaging deeply with specific contents. Concerning mathematics, the question is whether the mathematical concepts applied in the crosscurricular activities are already known or learnt during the activities.

We conclude that if one views mathematics education first and foremost instrumentally, the role of mathematics teaching easily reduces to one of merely providing the quantitative toolbox within a crosscurricular project or theme. If one by contrast views mathematics education relationally – as an activity, as a way of approaching different situations in everyday life, at work, or while doing science and research – a crosscurricular educational context could provide a meaningful, realistic setting in which to engage in doing mathematics and making learners' mathematical knowledge less inert.

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10 Embracing unpredictability

A rhizomatic approach to arts integration in literacies and literary education

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Introduction

Within several fields of educational sciences, researchers have shown an interest in notions of unpredictability in teaching. Researchers have begun to rethink learning and teaching in rhizomatic ways because of their interest in the unforeseen and the not predetermined. This chapter explores a notion of embracing unpredictability in transcurricular teaching by analytically exploring events from arts-integrated teaching in literacies and literary education. We adopt a rhizomatic approach (Deleuze & Guattari, 1987/2013) to theorize and try to understand the unpredictable in transcurricular teaching. With a rhizomatic approach, emphasis lies on that which is not yet known and on a multiplicity of intense connections and their movement in irregular and infinite directions. The rhizome as a theoretical approach provides us with possibilities to discuss unpredictability in the creative and interpretive processes of transcurricular teaching, in this chapter exemplified through arts integration in literacies and literature teaching.

As regards arts integration, Wiebe et al. (2007) submitted that a rhizomatic approach can enable integrative teaching practices, less prescriptive of the arts, arguing that integration must be understood broader than thematic overlaps in different subjects. For the arts to not act merely as a servant for another subject, Bresler (1995) maintains that arts integration should strive to be coequal. Our previous research and experiences of teaching literacies and literature with the arts demonstrate that despite thorough planning with formulated learning objectives in all included subjects, arts-integrated teaching can indeed unfold in very unpredictable ways (Höglund, 2017; Höglund & Rørbech, 2021; Jusslin, 2020, 2022). Therefore, Koff and Warner's (2001) suggestion that the goals for arts integration need to be set so that the project can "move into unexpected dimensions" (p. 145) is highly relevant. Wiebe et al. (2007) further argued that a rhizomatic approach can enable imaginative and flexible practices and understandings of arts-integrated teaching approaches. They suggested that a rhizomatic approach to integration "frees pedagogy from the processes which inevitably predict that implementation will look a particular way" (p. 270). As different subjects become integrated, the creative processes

DOI: 10.4324/9781003367260-12

can travel in unpredictable directions and cannot be predicted ahead of time (Jusslin, 2022).

Similar strains of thought circulate within literacies, language, and literary education. Teaching situations can travel in unforeseen ways, sometimes catching teachers by surprise (Kuby & Gutshall Rucker, 2020). Yet, this has implications for teaching. Kuby (2017) posed the question of "[h]ow might we plan in order to be flexible and see literacy (and learning more broadly) as unbounded, unpredictable, and inventive?" (p. 892). Similarly, within the context of language education, Waterhouse (2021) stated that pedagogy can happen in unexpected ways despite purposeful planning and that it is impossible to predict in advance how learning will unfold. This creates a destabilization of planned teaching. Moreover, several researchers have considered the potentials of undecidability, uncertainty, and unpredictability in literary education by, for example, stressing the importance of teaching students to handle uncertainty (Borsgård, 2021), embracing the not-knowing in literature teaching (Lindell, 2020), and advocating for upholding undecidabilities in the literature classroom (Johansen, 2019). Harstad (2018) emphasized the "unreasonable" of literature teaching that seeks to predetermine students' encounters with literature.

In exploring a notion of embracing unpredictability in transcurricular teaching, we present two vignettes (see Jenkins et al., 2021) created from data from two research projects that combined poetry with other art forms: dancing in primary education (Jusslin, 2020) and video-making in lower secondary education (Höglund, 2017). Analytically, the vignettes invite readers to engage with two events where unpredictability was at stake. The transcurricular teaching approaches are thus understood as arts integration, aiming to promote students' knowledge-creation in all included subjects (Bresler, 1995; Marshall, 2014).

In what follows, we discuss arts integration as a transcurricular teaching approach and present our understanding of rhizomatic approach. Afterward, we unfold the vignettes and conclude with a discussion of embracing unpredictability and its implications for transcurricular teaching, also situating the unpredictable of arts integration in literacies and literary education in relation to the notion of Bildung permeating the current volume (see Chapter 3).

Arts integration as a transcurricular teaching approach

The transcurricular teaching approach explored in the current chapter is *arts integration*, which is a pedagogical approach to teaching a subject in combination with an art form, for example, drama, dance, visual arts, or music. Arts integration can be an innovative pedagogical approach to promoting understanding of and knowledge in various subjects through creating and engaging with the art(s) (Dowell & Goering, 2018; Hanna, 2015; Koff & Warner, 2001; Marshall, 2014). The body of research on arts integration has steadily increased in the twenty-first century, but there are some ambiguities in

how arts integration has been described conceptually. Burnaford et al. (2007) noted the lack of a shared, global understanding of how arts integration is defined. For example, concepts such as interdisciplinary, transdisciplinary, arts-infused, and cross-disciplinary have been used when referring to arts integration (Bresler, 1995; Hanna, 2015; Koff & Warner, 2001; Marshall, 2014).

Our understanding and practical implementation of arts integration emphasize the goal to promote knowledge-creation in all included subjects, and we have worked specifically with dancing and video-making in combination with poetry in literacies and literary education (e.g., Höglund, 2017, 2022; Jusslin, 2020, 2022). We strive to work with what Bresler (1995) referred to as *coequal integration*, where the art form is an equal partner with the other subject and where contents, skills, and modes of thinking are included from all respective subjects. In the mid-1990s, Bresler stated that scholarly literature advocates for this integration model, which literature still does today. Researchers have stated that for arts integration to be successful in practice, the subjects need to be mutually reinforcing and learning objectives need to be formulated in both subjects (Hanna, 2015; Koff & Warner, 2001; Marshall, 2014). Bresler (1995) contrasted the co-equal integration model with a *subservient integration model*, where the art form serves and "spices up" the other subject. Such an integration approach leaves the arts on an instrumental level, and it has been criticized by arts education scholars (e.g., Giguere, 2011; Winner et al., 2013).

In alignment with the overall conceptual framework of the current handbook (see Chapter 2), we understand arts integration as transcurricular teaching, signifying deep integration between school subjects (see also Marshall, 2014). As a transcurricular teaching approach, arts integration blurs subject boundaries in the teaching approaches we discuss in this chapter; poetry intertwines with dancing and video-making, preventing us from drawing clear boundaries between, for example, what is poetry and what is dancing when students create poetry dances (Jusslin, 2020).

Unpredictability: a rhizomatic approach

We theoretically adopt a rhizomatic approach, which stems from Deleuze and Guattari's (1987/2013) philosophy of immanence, to explore how the unpredictable might unfold in arts integration. Deleuze and Guattari (1987/2013) refer to the notion of rhizome as a tuber that spreads in irregular directions. It is a root system that connects to other root systems and grows horizontally and unpredictably. The ginger root is a helpful metaphor in this rhizomatic understanding. How does ginger root grow? Does it or can it grow in similar ways? Or is it always different, unpredictable?

Deleuze and Guattari (1987/2013) presented six principles of the rhizome, which we briefly summarize in the following. The rhizome is different from traditional linear or dualist metaphors, which Deleuze and Guattari (1987/2013) refer to the upward growth of a tree. Rhizomes, in contrast,

grow in irregular, non-hierarchical ways; they put forth shoots in the middle and grow in unpredictable ways. A rhizome can have multiple entry and exit points, creating new connections, thus making it difficult to identify beginnings or ends. If a rhizome is broken, it will start up again and find new connections, travel, and grow in unpredictable ways. The rhizome is composed of a multiplicity of intense connections that sustain a creative energy of their own. As such, a rhizome is not something static created by units, but rather dimensions and directions in motion. Deleuze and Guattari (1987/2013) describe how the rhizome operates by variation, expansion, offshoots, and pertains to a map that is always detachable, connectable, and modifiable. Thus, rhizomes are continuously and consistently unpredictable.

In this chapter, the rhizomatic approach and its emphasis on that which is not yet known is interesting in relation to the destabilization of planned teaching we mentioned in the introduction. A rhizomatic approach attempts to go beyond the predetermined positions and the repeated, previously known ways of thinking and doing, which is a core idea of Deleuze and Guattari's (1987/2013) philosophy. Instead, it focuses upon the ongoing creation of moving in different irregular and infinite directions that are unpredictable. A rhizomatic approach allows us to explore the notion of embracing unpredictability in transcurricular teaching.

The rhizomatic approach also fuels our understanding of arts integration, building on Wiebe et al.'s (2007) reimagining of arts integration that uses the notions of rhizome and a/r/tography. *A/r/tography* emphasizes the intertwinements of artist/researcher/teacher and is a practice-based inquiry developed to emphasize an artful understanding of teaching and learning. Using a rhizomatic approach, Wiebe et al. suggested that a/r/tography can act as a relational bridge, where arts integration can grow in several, and unknown, directions all at once. More specifically, a rhizomatic approach to integration "renews and fuses what are traditionally separate roles" (Wiebe et al., 2007, p. 268). Such traditional separate roles can, for example, be dance and literacies (see Jusslin, 2020). Wiebe et al. (2007) further maintained that teachers sometimes tend to look for a technique or method to make arts integration as smooth as possible, searching for a kind of map. In contrast, they stated that a benefit of arts integration, seen from a rhizomatic approach, is the messiness, because the arts integration might move in multiple and unknown directions.

Next, we present two vignettes in which we invite readers to engage with events where we as teachers and researchers grappled and struggled with unpredictable happenings in arts-integrated teaching. The vignettes are created based on video-observations and our personal participation, observations, and memories from these events (Höglund, 2017; Jusslin, 2020). Following each vignette, we connect the vignettes with the theoretical approach of the rhizome and discuss pedagogical matters of concern in relation to transcurricular teaching that have arisen from these events.

Unpredictability hindered: "no chairs, no tables" rupture

During a research project that integrated dancing and literacies education (Jusslin, 2020), two classes of fifth-grade students integrated poetry reading and dancing. I (Sofia) collaborated with two primary schoolteachers and a dance teacher on this project. Engaging with the never seen before animal *Quinellan* in the picturebook *Djur som ingen sett utom vi* [Animals that no one has seen except for us] (Stark & Bondestam, 2016), the students in one of the classes worked in groups and scattered across different spaces in the school, working collaboratively to express and create their interpretations of Quinellan through dance. Although we had done several dance-based activities in relation to creative writing earlier, this was the first time we explored reading and poetry integrated with dancing. Poetry was rather unfamiliar to the students and some of them openly stated that poetry is dull. We were a bit uncertain how poetry reading and dancing would unfold. Therefore, we wanted to provide support and clear frames around the poetry reading and dance activity, steering the students' interpretative work toward working with emotions and messages using their voices, rhythm instruments (e.g., maracas and tambourines), and bodies in their dances (Jusslin & Höglund, 2021).

During the students' interpretative and creative work, the dance teacher, the primary schoolteachers, and I moved between the groups to support them. Two students, Isac and Casper (pseudonyms), suddenly moved away from the three other students in their group, who were sitting on the floor bent over the poem or standing and exploring different movements of the animal. I watched Isac and Casper move away, wondering what they were up to. The others in the group were negotiating who the animal Quinellan is and discussing the loneliness and sadness that she feels, echoing the sentences "Just below the surface lives/her silent twin brother/She says: 'You, my only friend'" (Stark & Bondestam, 2016, our translation). As Isac and Casper started moving chairs and tables, I walked up to them, wondering what they were doing, a bit unsure if their doings were at all related to the poem the others were working with. They responded shortly that they needed the chairs and tables. I reminded the students about the frames of the poetry and dance activity. In that moment, for me, this meant using solely their voices and bodies and creating music.

Later, when the group performed their poetry dance for the other students, the group had created a narrative about Quinella being bullied, expressing the sadness and loneliness she felt. Despite my reminder to use voices, bodies, and music, the students had extended their dance using materials, passing a piece of paper with a written cruel message between the dancers to set the bullying of Quinellan in motion. The piece of paper gave life to the students' message of the cruelty and the consequences of bullying, and after the performance, the students shared how their poetry dance expresses "how the truth always comes out," because Quinellan found out who had written the nasty message. At that time, for us teachers, the students had interpreted, expressed, and created Quinellan in an innovative and cross-artistic way.

The same lesson plan was executed with the other class of fifth graders directly after. As we approached the performances toward the end of the lesson, I realized that the dance teacher had enabled a student group to use materials when encountering a similar situation as I previously did. A chair became the rock on which a student who danced the Quinellan animal sat, looking down on her reflection, danced by another student who was lying under the chair and mirroring Quinellan's movements. As I watched this performance, it regretfully struck me that my earlier reminder, steering Isac and Casper away from the chairs and tables, hindered opportunities to interpret, express, and create Quinellan in other and different ways where the chairs and tables could have become important parts of their poetry dance.

What did we miss?

This vignette raises the question "what did we miss?" Isac and Casper took off in an unpredictable direction when going for chairs and tables – a direction I regrettably closed off as a teacher. The unpredictable was hindered rather than embraced, only within a few seconds. Indeed, as a teacher, I had the opportunity to metaphorically go off the script (the lesson plan and instructions) and follow the students' doings with chairs and tables – like the dance teacher did with the other class – but at that moment, I chose not to. I felt the need to control the messiness of the arts-integrated teaching. I disrupted Isac and Casper and the chairs and the tables, which can be understood as a rupture in the rhizome (Deleuze & Guattari, 1987/2013). This feeds into the question. Isac and Casper's rhizomatic path was broken and they were forced to move forward in other ways. In other words, the rhizome lived on, but without chairs and tables. My interfering with the doings with the chairs and the tables might have functioned as a creativity-fostering disrupter as well. Although I regretted my steering reminder within the hour of this event, I can only speculate what might have become of the students' poetry dance if I had not steered them away from the chairs and tables. One can wonder if putting an end to the chairs and tables required the students to do something new and different that they would not have done with the chairs and tables, perhaps using the piece of paper on which they wrote a cruel comment.

The question "what did we miss?" give rise to additional questions that have implications for transcurricular teaching – and teaching overall. Reflecting on what happens in this vignette, unpredictability was more a foe than a friend. But why is that? Is it always important to stick with the lesson plan, the instructions, and framework, and to seek control of what happens in the classroom? What happens when we as teachers shut down students' creative and innovative ideas, instead of seeing where it may take us in arts integration – and teaching overall? What do sought-after predictability and control of teaching do in relation to students' opportunities for knowledge-creation and creativity? Accordingly, this vignette showcases struggles with embracing the messiness of arts-integrated teaching and the unpredictabilities that it might hold.

Unpredictability allowed: "goofing around" creating intense connections

During a research project integrating visual arts and literature (Höglund, 2017), a group of eighth-grade students worked with video-making in response to poetry. Inspired by poet Molly Peacock's reference to poetry as "the screen-size art" (Hughes, 2008, p. 149), with its conciseness of form but not of content, I (Heidi) was interested in exploring the use of visual responses as a means of interpreting poetry. In doing so, I collaborated with a literature teacher and a visual arts teacher. In this vignette, the students worked with the poem *Jag vill möta* . . . [I want to meet . . .] by the Swedish poet and novelist Karin Boye (1900–1941), first published in 1927, a poem of their own choice.

The teachers emphasized an open approach to interpreting poetry. They emphasized the figurative meaning of poetic language, for example, by introducing literary concepts (e.g., imagery, metaphor, and simile) and discussing different formats of poems, rhythm, rhyme, and tone. They assigned the students to compose the digital video with four different phases: initial responses and writing a synopsis, making a storyboard, filming, and editing. Besides these instructions, some explanations on the format of storyboard, and a short technical introduction to the camera and editing software, the students were not given strict guidelines for the task; rather, they were given space and freedom for initiatives.

Although following a "rationale" for the video-making process, the students' process involved several exploratory and unexpected discoveries – often due to the materialities involved (see Höglund & Rørbech, 2021). The students found their way, for example, as they tested different settings, locations, and camera angles. As the students started filming, they were challenged to (re)negotiate their earlier work with creating a synopsis and storyboard. Apart from the video camera, the editing software made a considerable difference in the students' interpretive work, as they were experimenting with sound and visual effects, sequencing of clips, and various transitions. It is worth mentioning that the teacher was most probably aware of the pedagogical potential of exploring, since immediately after giving some basic instructions about the editing program, he said: "Now you may test as you go forward."

As I watched the students gather around the computer, testing and playing with different sound effects in the editing software, my initial reaction – and probably not an unusual one – was that I wanted them to stop "goofing around" and focus on the assignment. However, I did not intervene. At that point, I was slightly worried: Will they be ready on time, or even worse, will they get anything done at all? Now, however, I am glad that I did not intervene. It turned out that "goofing around" with different sound effects was an immensely valuable and important part of the process.

For the students, the sound effects in the editing program played a crucial role. Particularly their *testing* of different sound effects included trying out all – and I mean all – possible sound effects that the program offered. Hearing

the sound effect of church bells ringing, they joked about the characters in the digital video getting married. However, this remark, acting as an intense connection (Deleuze & Guattari, 1987/2013), threw the students to further elaborate their interpretation of not only finding and showing one's true self in relation to sexuality but also relating this issue to a social and political issue of topical interest at that point. At the time of the project, Finnish law did not allow people of the same sex to marry, and this issue was subject to widespread debate in the media and in politics. This example showcases the unforeseen connections and directions that students' "goofing around" with the editing software involved.

What can "goofing around" set in motion?

This vignette raises the question "what can 'goofing around' set in motion?" Instead of dismissing students' playful and seemingly unproductive messing around, what about acknowledging what such processes might set in motion? Such an approach underlines the necessity of shifting the focus of interpretive activity not as projected toward some textual end point but as forming relations and connections, often in unexpected ways (see Leander & Boldt, 2013). In a way, it felt like "goofing around" in the editing software drew away attention from the interpretative activity with the poem, creating frictions in the blending of poetry and video-making in the transcurricular teaching. However, it was the opposite – the "goofing around" became productive.

The vignette highlights the rhizomatic features of the messiness of "goofing around" as it included multiple entry and exit points in the exploratory trying out of sound effects, which set intense connections in motion. The intense connections of the "goofing around" sustained a creative energy of their own. The sound effect of church bells involved a creative energy that threw the students into unforeseen connections and relations. The "goofing around" with the sound effects sparked an intensity regarding the poem's topicality in contemporary society. Consequently, "goofing around" might disguise, reveal, or set in motion valuable doings and explorations, not always easily visible or even accessible for teachers.

Still, did we miss something? Even though the vignette in many ways allowed unpredictability, we need to be careful not to consider it as some kind of "best practice." Here, too, we can ask: What did we miss? Leaving students to "goof around" in arts-integrated teaching – or in any given teaching situation – will probably not be a productive default approach. The event of "goofing around" with the editing program involved several moments that could have been further explored and developed if, for example, noticed and picked up by the teacher. So rather than leaving the students alone to "goof around," these interpretive processes could be followed up and explored together with the students, exploring where they might take us: not just allowing unpredictability but embracing it.

Embracing unpredictability: moving toward *what happens if?*

The vignettes presented earlier showcase various forces and struggles in facing students' unpredictable doings in arts-integrated teaching in literacies and literary education. In closing the chapter, we argue for the pedagogical value of *embracing* unpredictability in arts integration – and other cross- or transcurricular teaching approaches – yet recognizing the challenges for teachers in such a mindset and teaching approach.

The two questions raised in relation to the vignettes – What did we miss? And What can "goofing around" set in motion? – gave rise to feelings of failure and regret as well as a fear of students messing around and not taking the assignment seriously, as showcased earlier. For us, such feelings were intertwined with the pedagogical choices we made in the arts-integrated teaching. (Re)considering the pedagogical choices that we make as teachers is by no means revolutionary; in contrast, it lies at the core of being a teacher. Intervening in what happens in the classroom is inevitably a part of being a teacher, and although teachers might regret certain pedagogical choices, we do not suggest that this affects students in bad ways. Still, we stress the need to pay close attention to how pedagogical choices produce possibilities not only to follow but also to divert from and reinvent the plan and formulated instructions in the moment of teaching. This accentuates a destabilization of planned teaching, which we admit is of importance in transcurricular teaching that does not have a ready-made script (see Chapter 3). However, planned teaching and an open-mindedness to students' unpredictable doings are not an either/or issue but a both/and. They do not need to cancel each other out, rather they need to coexist for teachers to be able to embrace the unpredictable. Such a coexistence is discussed by Klausen and Mård (see Chapter 3) as part of a Bildung-oriented teaching, where planned teaching allows for unpredictability. However, we recognize – and have experienced – challenges in maintaining such a both/and approach, which resonates with Kuby's (2017) highly relevant question about *how* to plan teaching to make space for unpredictability.

Therefore, we propose that the question of *What happens if?* might enable teachers to embrace the unpredictable turns and intense connections that can happen in arts integration and transcurricular teaching. Our proposal echoes Taylor (2018) who discussed that the question points toward doings as experiments for which we do not have a predetermined plan, map, or template. When teachers are struck with feeling the need to control, steer, or intervene, the question of *What happens if?* can act as an invitation to embrace the unknown. As showcased in the vignettes, despite thorough and thoughtful planning of arts integration as transcurricular teaching, teachers cannot know or anticipate where students creative and interpretive work will end up and what it can set in motion (Waterhouse, 2021, also see Chapter 3). Notably, it is difficult to fully foresee what knowledge students will create (e.g., Jusslin, 2022; Kuby & Gutshall Rucker, 2020, also see Chapter 3). For example, the planned teaching in the two vignettes had an open approach to interpreting

the poetry. There was no set goal, interpretation, or understanding to reach. Nevertheless, friction emerged when different subjects and art forms became integrated in the transcurricular teaching, and the pedagogical realities made us act differently as teachers and researchers, either hindering or allowing students' unpredictable doings. The frameworks and tools available in the doings were predetermined, leading up not only to the "no chairs, no tables" rupture, but also to the "goofing around" with the sound effects. Therefore, asking "what happens if?" could make the transcurricular teaching about collaborative doings and co-experimentation. We suggest that the rhizomatic approach is one way to be responsive to unpredictabilities in teaching, since it focuses on the multiple, flexible, and constantly changing connections. Notably, the rhizomatic approach moves from what is the expected result of teaching toward *what it might become* and *where the teaching might take* students and teachers. Again, this feeds the approach of embracing the openness and unforeseen, the "what happens if?"

Again, we acknowledge and have experienced that embracing unpredictability through the question of "what happens if?" might be challenging as it deviates from a clear map, template, or end result of teaching. This could move the transcurricular teaching toward an opportunistic approach or curriculum negotiation (see Chapter 2), where unpredictable moments of opportunities are seized, negotiated, and followed rather than constrained. We submit that embracing unpredictability particularly requires a (re)consideration of what *planning* can do and set in motion as well as how teachers transform the initial plan in relation to possible unpredictable doings; it requires a step across the threshold into the unknown, perhaps a messy unknown. Indeed, arts integration is messy, and embracing unpredictability opts for "reducing the inclination to clean up the mess" (Wiebe et al., 2007, p. 270). Such messiness might feel uncomfortable and unfamiliar – even scary – and trusting in creative processes can be challenging, even more so if teachers themselves lack experience of engaging in similar exploratory and creative arts-integrated processes. Nevertheless, this chapter points toward how embracing unpredictability might set in motion valuable doings, as well as make us (re)consider previous doings.

In conclusion, this chapter has problematized embracing unpredictability in arts integration as a transcurricular teaching approach. Still, it can also be relevant to teaching more generally. Consequently, embracing unpredictability calls for a particular responsiveness to students' unpredictable doings through a both/and approach where planned teaching coexists with the opportunities to divert from and reinvent the plan. It requires taking a leap of faith and trusting the process.

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11 Inspiring self-reflective dialogues through aesthetic learning processes

Learning by drawing

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Introducing aesthetic learning processes in schools

The concept of *aesthetic learning processes* refers to both rational knowledge and aesthetic expression, which can strengthen the complementary aspects of learning (cf. Karlsson Häikiö, 2016; Lindström, 2008, 2012). Our senses are activated through aesthetic learning processes. The word *aisthetikos* is Greek and means precisely the sensual, the perceptible (see Bale, 2009). This is the explanation for why aesthetics can be understood as a specific form of knowledge – perceptual knowledge – as we learn about the world through our senses.

Integrating and opening up aesthetic learning processes in schools and teaching is well in line with the aim to increase awareness and insights into the individual and the world around them. Wright (2010) proposed that what is special about aesthetic learning processes is that they provide children and young people with holistic meaning-making experiences which engage their bodies, hearts, and minds. Aesthetic learning processes contribute to learning through transformation by changing the way individuals think about their inner worlds and their relationships with the world (Sava, 1995). Individuals are exposed to different experiences through aesthetic learning processes that evoke their emotions and, hence, become meaningful.

The aesthetic forms of expression include dance, visual art, music, drama, movement, and poetry. Some of these are art subjects, including visual art and music, which exist as separate subject areas in basic education. The aesthetic forms of expression are used in schools and education in different ways, depending on the pedagogical goal the teacher is working toward. The major issue in arts education is aesthetic learning, where the "method of art" is expected to support in-depth learning not only in the arts, but across the curriculum. Lindström (2012) called this medium-neutral learning. When art is a subject, Lindström talked about medium-specific learning. However, art is often integrated into teachers' teaching, even if they are not fully aware of its potential. According to LaJevic, it would be important to explicitly explore "the arts as a way to *make meaning* of students'/teachers' lives and the world in general"

DOI: 10.4324/9781003367260-13

(2013, p. 2). The arts need to be more than a "coloring activity" in schools, instead of working to promote creativity and self-expression (LaJevic, 2013).

Lindström (2008, 2012) described how different aesthetic forms of expression can be related to learning through the following four perspectives: learning *about*, learning *in*, learning *with*, and learning *through* aesthetic learning processes. Learning *about* and *in* is about the acquisition of knowledge related to the art subject itself because the same goal can be achieved using different modes of expression and many different tools. Learning *with* and learning *through* opens for transcurricularity and integration (subject neutral). Aesthetic learning processes involve the attitudes and competences the learner can acquire through the deep engagement that different aesthetic projects can evoke.

The focus of this chapter is primarily on integrating aesthetic expressions and aesthetic learning processes with knowledge content from other subjects or subject areas. From this perspective, aesthetic expressions are used as a tool for learning other than knowledge within the art subject itself, here as an aesthetic method. The aim of this chapter is to discuss how aesthetic learning processes can support in-depth learning not only in the arts but across the curriculum as a transcurricular approach. We will explore a case study of teacher students' experiences with drawing as a learning method, discussing the challenges and opportunities posed by using aesthetic processes for promoting reflection and learning beyond the arts.

Meaning-making and engagement always need to be part of teaching (Selander, 2017). Therefore, a subject teacher needs to develop the ability to see her field in a wider context and not just focus on the specific subject area. According to Selander (2017), learning objectives and learning situations that engage and create meaning can be about the following:

> Community and interaction, the extent to which a subject area contributes to creating coherence and positive value for the individual, whether the subject area can contribute to perspectives on the self, and one's own existence, and whether it can lay a foundation for a possible future.
>
> (p. 104)

Østern et al. (2019) highlighted Selander's (2017) emphasis on dialogue, interaction, space for action, participation, and affective aspects of learning and co-responsibility as the central aspects of a new understanding of didactics. According to Selander, dialogical voices provide opportunities for reflection and the exchange of ideas where meaningful learning situations can emerge. Similarly, the sociocultural perspective on learning emphasizes the importance of communication and that knowledge is mediated through communicative tools (Säljö, 2005). Vygotsky (1978) argued that both linguistic and physical tools are mediating. The different representations, both linguistic and physical tools, can be used alongside each other, and this mix is called multimodality (cf. Kress, 2009; Kress & van Leeuwen, 2001). This is also

illustrated in the new didactic design – oriented triangle developed by Selander (2017). Starting from the previous classic triangle where the teacher, student, and content are in different corners of the triangle, Selander placed the student and teacher in the same corner. In the second corner, distributed resources are placed, and in the top corner, the goals and curriculum can be found. By the distributed resources in the triangle, Selander (2017) referred to digital information and other resources, such as multimodal representations. The multimodal resources mean, as mentioned earlier, that communication can take place in different ways, such as text, images, or bodily expressions (cf. Kress, 2009; Kress & van Leeuwen, 2001). Expressions are closely linked to how culture and context provide frameworks for interpreting and using different expressions. Kress (2009) argued that meaning cannot be created unless the framework and tools are offered in the culture in question. The distributed resources teachers choose, according to Kress, become crucial for how pupils and/or teacher trainees are given opportunities for meaning-making and learning (see also Ahlskog-Björkman & Björklund, 2016).

Teachers' teaching is still important, but in aesthetic learning, we especially stress multimodal resources.

Empowering teacher students to use aesthetic approaches

To become empowered to use aesthetic approaches to learning, such as art, music, drama, dancing, moving, or poetry, in their future teaching, teacher students need to become acquainted with how aesthetic learning processes may deepen their own learning in teacher education. Professional growth and an awareness of emotions, needs, and values can be enhanced through reflection. Korthagen and Vasalos (2005) especially highlighted the importance of reflecting on core issues regarding identity and mission, aspects that are important for both experienced teachers and teacher students to consider.

Teacher educators are inevitably modeling how to use various teaching methods during teacher education (Lunenberg et al., 2007). Teacher students are watching *what*, *how*, and *why* teacher educators teach in particular ways (the classic "didactical questions"), probably thinking if they really "practice what they preach." In our courses, we as teacher educators try to give examples of how to adapt an aesthetic and creative approach (see Ahlskog-Björkman, 2010; Björklund & Ahlskog-Björkman, 2018; Karlberg-Granlund, 2021; Karlberg-Granlund & Pastuhov, in press; Karlberg-Granlund et al., 2016). Teachers' – and teacher educators' – teaching methods, their beliefs about teaching and learning, and their relationships with their students inevitably affect the learning environments and potential for meaningful learning and creativity (Beghetto & Kaufman, 2014).

Our approach to learning emphasizes learning through a dialogue between students about the artifacts they have created, such as their self-made drawings, as well as dialogue with and through the artifacts themselves, which is in line with a sociocultural approach. We aim to provide students with active and

meaningful learning situations in which students can interact, communicate with each other, and, thus, deepen their learning. This is well in line with the perspectives presented in Chapter 3 of this volume about furthering personal development and Bildung by creating and opening possibilities for students to be autonomous, active, and reflective in creative processes with open and unpredictable outcomes.

By supporting teacher students to engage actively *with* and *through* various means in transcurricular ways (see Lindström, 2008, 2012 presented earlier), they become acquainted with diverse teaching and learning methods, exploring and developing their own qualities and competences individually and together with others. Preservice teachers, however, may have feelings of uncertainty in relation to the arts, which must be worked through because risk-taking and experimentation are important in teaching and learning practices. By having positive and even challenging learning experiences, their own learning deepens and broadens, which builds a solid foundation for their own future teaching.

Anderson et al. (2022, p. 2) highlighted the importance of "teaching for creativity" by giving the students creative opportunities and facilitating new connections in open-ended creative processes. In creative teaching, in turn, the teacher, together with her students, must tolerate the uncertainty that may arise and resist the implicit needs for control. Creative learning, though, helps the students "make and share new meaning about what they learn" (Anderson et al., 2022, p. 2; Beghetto, 2016; see also Chapter 10). Learning about learning and making learning visible are emphasized. We additionally propose that the teachers' (in our case, teacher educators') guidance becomes crucial in providing structure, clear aims, and concrete frameworks for the creative tasks, thus enabling risk-taking and meaningful learning within the learners' zone of proximal development (Vygotsky, 1978).

Frameworks for a creative task: learning by drawing a good teacher, good teaching, and a good learning environment

As teacher educators, we continually learn from each other and our students, striving to connect our teaching to research. In an action research approach, we systematically document the intentions and aims of our courses and the outcomes and student evaluations to further develop and enhance our teaching. Eva, who came from the background of being a handicraft teacher, intended to connect all her courses to aesthetic learning processes, while Gunilla, who had the background of being a class teacher, was a generalist who wanted to create possibilities for meaningful learning where the students can learn from their practical experiences. Although we teach different courses, we have found a common interest in promoting teacher students' reflection, dialogues, and learning through creative methods.

In this case study, we discuss how our teacher students have taken the challenge to deepen and broaden their self-understanding and views about being a teacher by making drawings of a good teacher, good teaching, and a good

learning environment, and engaging in dialogues with fellow students about their thoughts. This task was given to a large group of first-year teacher students in our different courses: in a general didactics course focusing on teachers' work in general and in a course about early childhood education (for children 6–8 years of age) in particular. The courses followed each other, having, however, a one-week practicum with an observation of teachers' work in schools in between.

The drawing task was given during lesson time, and the teacher students were provided with paper and color pencils. The students were invited to draw pictures about a good teacher, good teaching, a good learning environment, and then explain their drawings in texts. Then, they interpreted each other's drawings in dialogue in small groups of fellow students, focusing on what similarities and differences they noticed in their drawings and beliefs. Afterward, the students also answered a questionnaire about how the drawings and dialogues helped them to grasp and reflect on their own assumptions, along with how they experienced the working methods.

We have noticed that this small drawing task still has a large learning potential. Through the creative task, the students were empowered to become aware of their personal images of teaching and schools. The task encouraged them to reflect profoundly on their own experiences and remember their own time as pupils. By making drawings and becoming aware of what images they carried with them, they were supported to begin their own process of finding and creating their teacher identity during their first year of teacher studies. Becoming aware of one's own memories and life experiences is important because these may implicitly affect one's teaching (Korthagen, 2004; Murphy et al., 2004). Additionally, the task promoted reflection and dialogue about the implicit values and ideals of the group. Interpreting each other's pictures and sharing their reflections opened the teacher students to different understandings and helped them grasp something of the complexity of what it means to be a teacher. In the next section, we give some examples of how the students evaluated the creative task; here, we are primarily not interested in what the drawings look like, but rather in how the students experienced the task and how they portrayed their learning.

Student teachers' experiences of drawing

The following quotes come from the written evaluations after the teacher students made their first drawing (Moodle questionnaire in Didaktik I in autumn 2019, in total answered by 97 teacher students). Most of the teacher students concluded that both the drawing per se, and the interpretive dialogues were positive experiences, widening the teacher students' own perspectives and encouraging imagination:

> It was a good exercise in terms of reflecting on what a good teacher, teaching, and learning environment should be. You also got more perspectives when we discussed our drawings in smaller groups.

> It was fun and rewarding. I came up with more ideas when I first drew pictures and then wrote. It was also easier to explain my thoughts to others in the group when I had pictures to show.

> It was fun but also a task where you had to think.

> Fun and different. It was fun to use your creative side to display your thoughts.

> I thought it was very instructive. I think you can explain several things at the same time with one picture.

> It took a while to get started and know how to begin. It was also different in a good sense, with some activation and discussion. You also got new viewpoints from others in the class.

Some of the teacher students felt that it was a difficult task. Their experiences of the task seemed to interfere with their views about their competence to draw. Although the task was considered to be difficult, the students experienced that the given challenge was still able to be handled:

> Drawing was difficult. A good teacher should be so many things, so I think it was difficult to get everything into a drawing. I'm not very good at drawing either, so that might be a reason why I think the way I do.

> It was a bit difficult at first to get all the thoughts visualized, but it worked well once you got going.

> A bit difficult when it's quite a broad "area," but we had all drawn quite similar drawings, so we were thinking quite similarly. However, it was a very "eye-opening" exercise when you had to interpret everyone else's drawings.

> It was a bit difficult because I'm bad at drawing, and I don't get my idea of a good teacher drew as I liked, but it still went okay. It was nice because you must think a bit about it, how I want the school to be.

Drawing helped the teacher students really reflect on what a good teacher is like, recognizing that one can be a good teacher in many different ways:

> It was a bit of a challenge, as there are so many good aspects to a good teacher.

> A bit tricky, as there are so many similar ways you can draw it, but still I thought I got it well formulated and drawn in my picture.

Some of the students also perceived the creative and collaborative task as a good complement to the common ways of arranging university courses, where

the students may be more passive than active participants and textual tasks are usually given:

> It is very nice and fun to do something practical in the studies because many parts of the studies are spent just sitting quiet and listening.

> It was also a refreshing change to try to express your thoughts through drawings because much of the other studies involved expressing your thoughts in writing.

When the second course was also evaluated, the teacher students had been in schools to observe teaching. This affected their views on how they would like to be as teachers themselves and how they would arrange for good learning in a good learning environment. As the students compared their drawings from the two courses, they realized their own learning process:

> [Now, I have] a broader view of what good teaching and a good teacher might be. The observation during my practicum broadened my knowledge.

> You look more from the pupil's perspective, especially after the practicum.

> Lots of things in the classroom, for example, cozy corner, computers for everyone, horseshoe in groups/pairs. Much more descriptive text now and new ideas.

Drawing and explaining presumptions when starting the studies in the first year enhanced the teacher students' observation capacities during practicum in schools. Visualizing what a classroom may look like beforehand prepared the students to better grasp all the different arrangements and relationships in a classroom when they would enter. They had already trained their pedagogical eye (Swedish: *att öva den pedagogiska blicken*) before coming to school. This process even helped the students to start building their own teacher identity, thinking of how they wanted to be as teachers.

> Because you had to draw what immediately came to mind about what a good teacher/teaching/learning environment means, you draw what you think is most important. It made me think that these are the things that I intend to strive for as a future teacher.

> You start to think a bit more about how you want to be as a future teacher, and you could also think about the teachers you have bad memories of – what a bad teacher is like.

The reflective work with the drawings also prepared the teacher students for the upcoming tasks of curriculum analysis and lesson planning.

Illustration of the reflective learning process of one student teacher

As teacher educators, we have used the drawing method in our courses from 2017 onward. In their first didactics course, the teacher students were asked to draw a picture of a good teacher, good teaching, and a good learning environment in general. The second task that is given in the second course focusing on early childhood education was then more concrete and personal because they drew a picture of themselves as teachers and explained how they would arrange a good learning environment and teach young children in particular. In the following example, one teacher student explains her reflective learning process and the two drawings:

How did you feel about drawing the picture of what a good teacher, good teaching, and a good learning environment is like?

- At first, I found it difficult, but after thinking about it and thinking through the task, it got better. It was fun to draw a personal drawing with your own thoughts.

How did the drawing help you develop your view?

- I started by writing down my answers to the questions, and then, using my answers made drawing easier. While drawing, you really got to think about how you think a teacher should be.

How did you connect your thoughts to your past experiences from your own time in school?

- I thought a lot about my own school experience. I thought about what kind of teachers and teaching I didn't really like or appreciate, and then, I thought about what I have appreciated and what was good. What I thought was good, I wrote down using my own experiences, as well as my personal opinions and values.

What did you learn from looking at other people's drawings and discussing?

- In my group, we had quite similar opinions, but everyone had something different from the others' pictures, which gave us more insight. It was a bit of an "aha experience."

This student had taken the challenge of thinking thoroughly through her own school time and memories, becoming aware of her own values. Thinking, writing, and drawing were intertwined. Then, seeing each other's drawings and discussing with other students in the small group broadened her own view, and she even explained having an enlightening experience, that is, an "aha experience." When then comparing her two drawings from different occasions, she did not recognize so many changes between drawings 1 and 2, even though we teacher educators may saw an immediate progression in the pictures (see Figures 11.1 and 11.2):

What are the differences between the picture that you drew in autumn and your new drawing that concerns preschool teaching? What progression do you see?

- Not much difference, but I have learned more about learning and school.

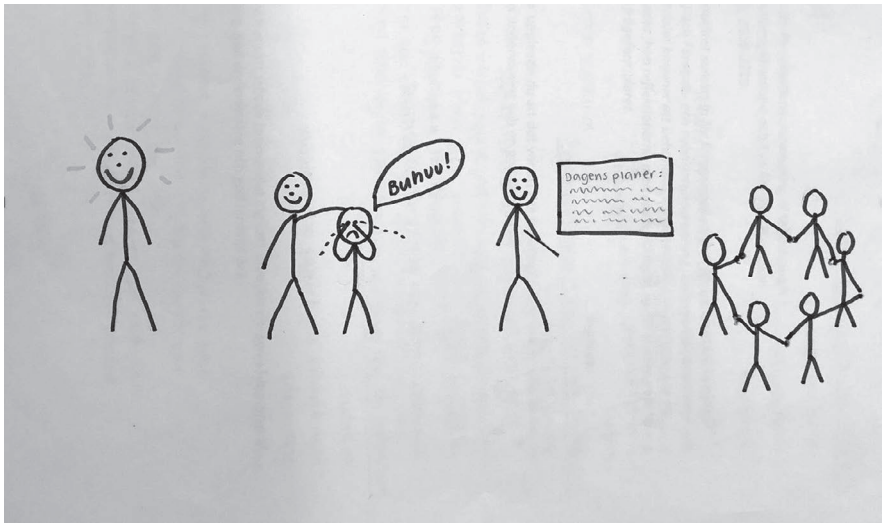

Figure 11.1 Drawing 1 by the teacher student (2018–2019).

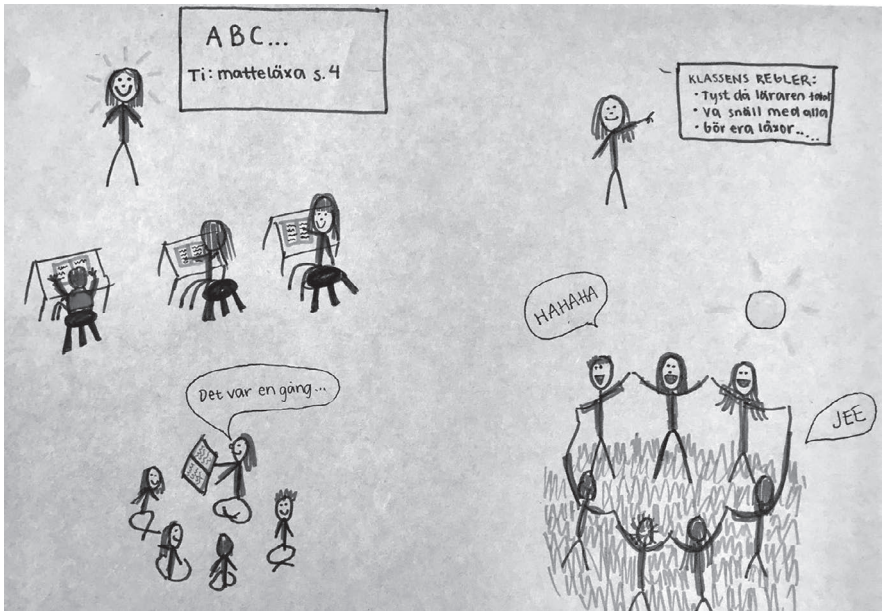

Figure 11.2 Drawing 2 by the teacher student (2018–2019, after the practicum).

Her uncertainty about progression between her pictures may illustrate the difficulties when drawing values. Even if she was not pointing out the changes in her pictures, she still knew she had made progress and wrote: "but I have learned more about learning and school."

When drawing two times, we, as well as many of the teacher students themselves, notice that the second drawing becomes more complex. As in the aforementioned example, the second picture has more concrete equipment in the class, like desks, books, and text on the blackboard. There are a lot of things happening. A smiling teacher is pointing at the "rules of the class" ("*klassens ordningsregler*" in Swedish): "Be quiet when the teacher speaks, be kind to everyone, carry your homework." One group plays or dances outside in a ring of pupils. Another group is sitting on the floor listening to a fairytale – "Once upon the time . . ." – and some pupils are working with math in their books; the homework is written on the blackboard. The teacher seems to be included in all these activities; she is engaging and communicating with the pupils in different ways. Both the pupils and teacher seemed to be happy, and the learning environment was peaceful and versatile. This idealistic view of what it means to be a teacher may not be in harmony with the reality that a new teacher will experience in schools. However, it is meaningful to become aware of what kind of learning environment and teaching one wants to achieve so as to work toward that aim.

Other examples of aesthetic learning processes

In the case study described earlier, we focused on making use of drawings to support teacher students' self-reflective learning and dialogues about good education. We hope that this example can inspire other themes for reflection and interpretation through similar methods because using creative and aesthetic expressions and promoting aesthetic learning processes can be valuable in various contexts. For instance, in a transdisciplinary collaboration between the school subjects religion and art, preschool children were inspired to draw and talk about peace (Ahlskog-Björkman & Björkgren, 2018). The theme of sustainable development was investigated by craft education students from different Nordic countries through making figures in clay (Koch & Ahlskog-Björkman, 2021). In this volume, Chapter 10 gives an example of arts integration in literary education. Despite aiming at promoting aesthetic learning processes, drawing can also be used as a qualitative research tool, for instance, to identify children's views about their learning environments (Mäkelä, 2018). Empowering children's voices in planning the physical environment in schools is in line with the UN's definition of children's rights (United Nations, 1989).

Conclusions and future implications

Our experiences from this quite small drawing task are that the arrangements for the promotion of aesthetic learning processes do not need to be complicated. When providing good instructions and giving enough time to think

and reflect, this task is suitable for creative and reflective work in groups of students. By drawing with the traditional tools of paper and color pencils, the students were given time to work with their understandings and presumptions of teaching and schools. We introduced the drawing task in our courses in 2017 and continued developing this method during the pandemic, then also integrating the use of digital elements because the students could choose to draw on a computer or with the drawing material they happened to have at home. We, however, have noticed that the structural circumstances around the drawing situation, such as what equipment and materials the students have and how much time is given for the task, are critical. Drawing as homework may not challenge all the students to deeply reflect on their beliefs, but drawing during the lessons instead opens a space for creative work and for both individual and collective reflection.

By giving a similar drawing task in two different courses, we have created bridges between our courses. Parallel with the students' learning about themselves and teaching, we, as teacher educators, have also broadened our own learning about how to teach and support our teacher students. We have found creative and active learning approaches fruitful, especially with a focus on how aesthetic learning processes may enhance teacher students' learning and development. Our work has the inherent aims of giving teacher students experiences of aesthetic learning processes and encouraging teacher students to use creative methods themselves in their future teaching. Through our and the teacher students' learning processes, we have grasped something of the challenges and meanings of moving out from our comfort zones into new terrains, as LaJevic (2014) clearly expressed:

> Engaging preservice teachers with the opportunity to take risks and venture out into uncertain spaces can help them move away from their comfortable art-as-doing activities and move into understanding art as a way of knowing, learning, and teaching.
>
> (p. 14)

Teacher students and teachers need to be brave enough to try teaching in new ways. In this chapter, we have focused on drawing as a method for deepening and broadening learning and promoting self-reflective dialogues. Drawings may capture imaginations, and they are products one can go back to, feel, and see. Other forms of aesthetic expression may not have as concrete an artifact unless it is filmed and documented. Nevertheless, aesthetic methods as a transdisciplinary approach may promote holistic learning and meaning-making. Creating something personal involves engaging in ways that promote reflection and learning. This transdisciplinary approach needs to be further explored together with students and pupils of different ages in various contexts about deep questions. In aesthetic learning processes, pupils learn to know themselves and express themselves, as well as learn to understand others, which supports Bildung.

Empowering teacher students and teachers to use aesthetic methods in their work would also be an important aim for the future. Focusing on values and implicit images that guide our work may be useful not only for teacher students, but also for experienced teachers. We argue that taking the time to draw a picture of good education and reflect and discuss in a small group of pairs would be a sustainable strategy to explore the possibilities and challenges of everyday work in dialogue. Becoming aware of one's ideals and identifying potential constraints to reach that ideal is then a process of aesthetic learning guided by meaningful questions about who one is as a teacher and who one wants to become, here with the pupils' best in mind.

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12 Analyzing domains of learning for crosscurricular teaching

Educational crafts in focus

Juha Hartvik and Mia Porko-Hudd

Introduction

Crafting can be described as man's ability to use tools to process materials into artifacts and thereby change living conditions (Alexandersson, 2007; Säljö, 2021). When looking at the Nordic countries, craft is found in both educational and noneducational settings (Nygren-Landgärds, 2003). In Finland, *craft* (fi. Käsityö, swe. Slöjd) has been a compulsory school subject for all pupils in basic education since 1866 (Nurmi, 1979). The English name of the Finnish school subject is also translated as *craft, design, and technology education* in global connections (Lepistö & Lindfors, 2015). This translation shows the wide meaning and content of the subject. The craft subject has clear similarities with school subjects in the Anglo-Saxon world that are classified under *technology education*, as well as *design and technology* (see Atkinson, 2023; Benenson & Piggott, 2002).

Craft involves investigative, creative, and experimental work, as well as choosing various materials, technical solutions, and methods of production (Finnish National Agency for Education, 2014). Craft consists of a vast variety of materials and techniques, such as wood, metal, plastic, and electronic work, as well as sewing, knitting, crocheting, weaving, embroidery, textile printing, and felting. The subject's multimaterial content has changed over time, and today, programming, robotics, and 3D printing can also be included. Teachers enjoy significant autonomy in shaping the subject content, which means that the content can vary greatly between schools (Lapinoja & Heikkinen, 2006).

Craft is expected to promote diverse learning and lead to socially desired outcomes in the learner. These requirements are set out in governing documents, such as curriculum foundations. Society becomes a central agent that places demands and expectations on the activities that take place in school. The learners' involvement in multimaterial holistic craft processes forms the basis for the existence of the school subject. Holistic craft processes include idea creation and the development of ideas, planning, and preparation for making, as well as the concrete making of the artifact. During all stages of this iterative craft process, self-evaluation and evaluation, together with others, are included (Pöllänen, 2009; Porko-Hudd et al., 2018).

DOI: 10.4324/9781003367260-14

In the general everyday discussion, craft is often labeled primarily as a carrier of the knowledge form *Techn*e (Aristotle & Brown, Book VI, 2009), which is knowledge that aims at the productive and effective "doing" in the world. Every so often, the craft subject's relevance for modern man is questioned (Johansson & Porko-Hudd, 2011). The artifact sometimes overshadows the more abstract learning of the process (Borg, 2009). This means that craft teachers and researchers need to justify and clarify the subject's diverse knowledge contribution to man and society (Hasselskog et al., 2018). Looking at definitions of Techne, Episteme, and Phronesis as forms of knowledge (Aristotle & Brown, Book VI, 2009; Gustavsson, 2004; Parry, 2021), the processes in educational craft can contribute to knowledge formation about how the world and society are structured and function and thereby actively take part in and develop them. Therefore, we also wish to emphasize that teachers in crafts need to adopt a broad view of the potential of the subject in itself and as part of crosscurricular teaching. We will elaborate on the domains of knowledge in crafts further on in this chapter.

In the conclusion of Chapter 3, it is highlighted that Bildung is a viable concept that can broaden the vision of the general education school's mission. At the same time, the authors of Chapter 3 call for a more detailed picture of what and how individual subjects and subjects together in crosscurricular teaching can contribute to the Bildung of the learner. In this chapter, we initially present two different models for learning in aesthetic subjects such as crafts. The first model was developed by Lindström (2012) and the second one by Huovila and Rautio (2008). By analyzing similarities and differences between the two models, a new model emerges. The new model is discussed by analyzing learning domains in a craft case. The aim of the developed model is to give both the individual teacher and teaching team that plans crosscurricular teaching a tool to systematically use and make visible learning and contributions to Bildung that crafts alone and crafts together with other subjects can enhance and lead to.

One model for learning in crafts

Over time, different theoretical models and terminology have been created to capture the breadth of learning. Concepts such as material and intangible learning, practical utility, and general knowledge, which focus on product and/or process, are included when learning is discussed. In the first model, Lindström (2012) defined learning in practical-aesthetic subjects, for example, arts and crafts, in terms of a conceptual framework consisting of a fourfold table in which each quarter stands for a separate form of learning: learning *about*, *in*, *with*, and *through* crafts (see Figure 12.1). The learning forms are not hierarchical, and they can flow and merge into each other in several ways. The two rows stand for medium-specific and medium-neutral learning, while the two columns stand for convergent and divergent learning.

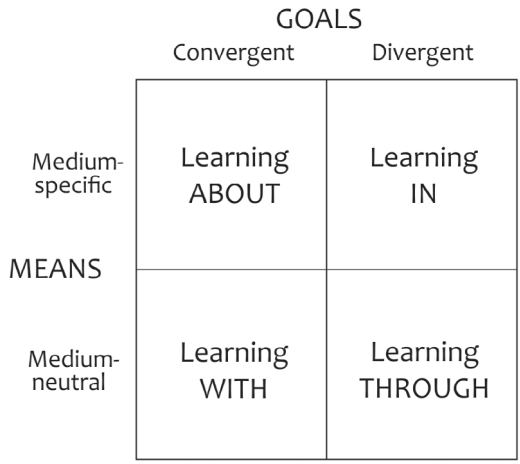

Figure 12.1 Four ways of learning in crafts (developed from Lindström, 2012).

The upper row in Lindström's model (2012) focuses on medium-specific learning within the subject at hand, in this case crafts. Learning is divided into convergent learning (about), where the goal is to achieve something that is stated in advance, and divergent learning (in), where the goal is to combine what one already knows in new ways. In crafts, the first quarter, learning *about*, refers to the mastery of domain-specific skills and working methods, as well as knowledge about materials, tools, and vocabulary. Within this quarter, crafting often takes a reproducing form (Sjöberg, 2009). In the second quarter, learning *in*, the learner applies domain-specific knowledge and skills in creative and innovative ways. Crafting in this quarter can be defined as innovative and reorganizing (Sjöberg, 2009).

The lower row in Lindström's model (2012) focuses on medium-neutral learning within the subject at hand. Learning is further divided into convergent learning (with) and divergent learning (through). In Lindström's model, learning *with* refers to the integration of the subject at hand with the subject matter from other subjects or disciplines. According to Hasselskog (2010), learning *with* crafts can refer to an integration of craft skills and something noncraft-specific. For example, the learner can make a piece of clothing that will be used to portray a character in a play performed in or outside school. To achieve this, the learners use their specific craft skills, such as constructing a pattern and handling the sewing machine. Additionally, Lindh (2022) stated that learning *with* is used in school when art is planned and integrated with other subjects to be used as aids, support, or illustration. However, there is the risk that an excessive focus on such subject-neutral use overlooks the subject's full educational potential (see Marner & Örtegren, 2003). Learning *through* refers

to the approaches and overall competences, as well as the all-round development that one can acquire through deep engagement in practical-aesthetic projects. According to Hasselskog (2010), when learning *through*, the focus is on the personal development of the learner. By challenging and drawing the learner's attention to the role of the ongoing craft work in a larger context, the learner's reflection and awareness of overall competences may be achieved.

When summarizing the contribution of Lindström's model to the development of a new model for analyzing the domains of learning for crosscurricular teaching, we focus on the division and virtual horizontal line between medium-specific and medium-neutral learning. From this model, we also take with us the idea that, in all school subjects, there are medium-specific and medium-neutral content and objectives.

A second model for learning in crafts

The second model for learning in crafts that we find interesting here is developed by teacher educators and craft teachers Huovila and Rautio (2008). They identified a need to create a theoretical tool that supports teachers in planning a timely and diverse form of teaching and learning in crafts. A further motive for the development of the model is the historical division of the craft subject in Finland into two different material areas related to gender: one focusing on textile craft for girls and the other focusing on technical craft for boys. The two material areas have been taught by two different subject teachers, often a female teacher in textile craft and a male teacher in technical craft (Lepistö & Lindfors, 2015). For several years, the process of considering the multimaterial content in craft as the learner's right, regardless of historical traditions or gender, has been topical. When planning teaching and deciding on didactic approaches, the teacher is assumed to have an overarching and diverse view of the qualities that can be achieved in crafts teaching, regardless of which materials and techniques are actualized. An additional motive for the development of the model is to make visible the holistic craft process, from idea creation to planning, executing, and evaluating. All of these steps need to be included in the path to a concrete artifact and versatile learning embedded in them. The model can also be used to communicate content and expected learning in dialogue between the teacher and learners. The model by Huovila and Rautio consists of four quarters (see Figure 12.2).

The first quarter, in the upper left-hand corner, focuses on knowledge and skills in craft. Here, the importance of learning about materials, tools, and procedures is highlighted. This is where teachers have found it easiest to formulate goals for learning and where learning has been the easiest to follow and verify. Compared with Lindström's model, the goals for learning in relation to this quarter are similar to what he called learning *about* crafts. In a situation in which the multimaterial craft subject is made available to all learners, teachers need to see the breadth of the subject and be prepared for collegial collaboration.

	GOALS	GOALS	
EVALUATION	knowledge and skills about craft	design and planning skills in craft	EVALUATION
EVALUATION	working skills in craft	personal growth skills	EVALUATION
	GOALS	GOALS	

Figure 12.2 Four fields of learning in crafts (developed after Huovila & Rautio, 2008).

The second quarter, in the upper right-hand corner, has goals related to planning. The authors mentioned aesthetic and technical planning. Considering holistic processes, we want to emphasize that planning needs to be concerned with both parts and larger wholes, for example, steps in the manufacturing and realization of ideas. At the same time, planning ability also needs to be practiced so that it is open to change when its realization is underway.

In the lower left-hand quarter, Huovila and Rautio emphasize objectives that relate to the manual, visible, and tangible aspects of craft. The craft subject is one of the few school subjects, in addition to physical activity (see Chapter 7), where learning connects to bodily processes. The results of work accumulate "layer upon layer" in an emerging, tangible artifact. If the work is not done, the product's growth stops. This type of activity provides excellent opportunities to focus on goals such as work readiness, endurance, problem-solving, and responsibility. When looking at the two quarters related to planning and working, craft as a process consisting of different phases is clearly visible in Huovila and Rautio's model, while the learning potential within the planning and execution of a craft work is not articulated in Lindström's model.

Finally, the lower right-hand quarter in Huovila and Rautio's model focuses on aspects of learning concerned with the development of personal and social qualities, as emphasized by the notion of Bildung. The learner becomes part of the surrounding society, its culture, history, and future. In crafts, the learner is, for example, guided by the principle of sustainable development to bear responsibility for consumption and the environment. Learning goals can focus on an appreciation of work quality and craft material, thereby increasing a sense of responsibility for them. Craft is seen as an activity in which the learners experience joy and satisfaction from the work and where their

self-esteem grows (see Chapter 3). Learners also develop their readiness to make conscious choices among available possibilities. This quarter in Huovila and Rautio's model has many similarities with Lindström's fourth quarter – learning through.

When summarizing the contribution of Huovila and Rautio's model for the development of a new model, we focus on the indirectly discerned process that is included in craft activity. The process's presence is revealed in learning objectives focusing on planning and targeted work activities.

A developed model emerges

The two models presented here have not only clear similarities but also exciting differences. Lindström's model can be described as more static; in a positive sense, it discusses the main types of learning that can come out of practical-aesthetic learning processes. Huovila and Rautio's model, in turn, has a more subtle emphasis on process. The model gives way for the process that takes place, or is expected to take place, when crafts are part of general education. Both models give clear visibility partly because craft is used as a goal in educational activities, but above all, craft is used to achieve development that exists outside the concrete craft activity. Therefore, they provide an opportunity to be combined, giving a foundation to shape a new model to support thinking about a wide spectrum of possible learning when both regular and crosscurricular teaching are planned.

From the two existing models, we take over four aspects that we integrate in our new, developed model. The first fundamental aspect that creates clarity in the new model is the division into medium-specific and medium-neutral areas for learning. The second aspect deals with the fact that one of the quarters in both models clearly focuses on basic skills and knowledge within crafts and, thus, is clearly medium-specific. The third aspect is the clearly medium-neutral quarter in both models. The fourth aspect is the idea of process thinking visible in Huovila and Rautio's model. Thus, the developed model consists of four domains of learning: (1) *knowledge and skills for planning*, (2) *unique subject content*, (3) *targeted work and activity*, and (4) *diverse competences, abilities, and attitudes derived from the subject* (see Figure 12.3).

By visually placing the domains overlapping the horizontal line, we show the dynamic changeability that learning content per se is not necessarily limited to either medium-specific or medium-neutral areas. Three of the domains in the model span both medium-specific and medium-neutral areas of learning, while one is clearly limited to the medium-neutral area. How large the overlaps between the areas are has to do with a series of aspects that influence and are present in situations where materials are transformed into artifacts and learning.

In addition to the four aspects that we take with us from the two models described earlier, we highlight the concept of Bildung as a new, clarified contribution when the domains of learning in crafts are analyzed and discussed.

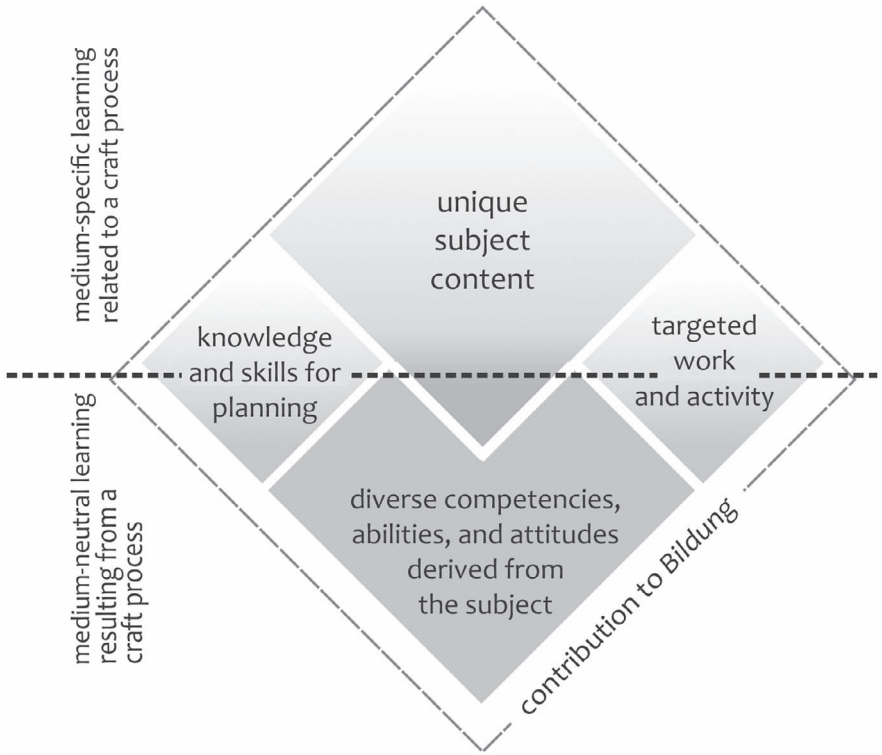

Figure 12.3 Domains of learning in educational crafts.

In the scope of school subjects with different knowledge contributions to the learner's life management, craft contains domains of learning that would otherwise be difficult to obtain. Thus, *contributions to Bildung* frame all domains of learning in educational crafts. Especially in democratic societies, there is a strong desire for general education to develop individuals' ability to manage their lives in a responsible way. Ambition always goes hand in hand with the idea that the individual should handle the situation with others and continuously consider the world in which we live.

To open the many folded competences needed in crafting, we next describe a case. The idea here is to highlight the complexity that exists when a person chooses or is expected to take on a crafting process. In addition to discussing the versatility of a craft area familiar to us, we encourage teachers of other subjects to analyze their subject content similarly. This analysis helps the individual teacher recognize the possibilities of one's own subject in a cross-curricular context. This process is also about opening one's subject to other teachers, thus favoring the planning and executing of crosscurricular collaboration and teaching. In an educational context, there is always an interplay

between teaching and learning. Some form of teaching activity is often needed for the identified learning potential to be reached.

An analysis of the learning potential in a craft project: the case of knitting a pair of socks

The starting, focus, and goals of a craft project can vary, especially in educational settings. The presented case has no ambition of showing all the knowledge and skills that are activated and developed. A similar discussion can be conducted in relation to all conceivable materials and technologies within crafts. In the same way, potential teaching and learning content will be affected by, for example, didactic choices. The learner's current knowledge, skills, and possible next level of ability also affect how the domains found in the developed model are emphasized and appear in the learning process.

When taking on the task of knitting a pair of socks, a great variety of knowledge and skills is needed. The task has endless variations and alternatives. To begin with, the crafter needs to decide for whom the socks are being made, what size they need to be, and what kind of socks one wants to knit: baby socks, woolen socks to be used in boots, summer socks with lace patterns, or some other kind of socks? Another decision is whether to follow a pattern made by someone else or if one wants to make a pattern on one's own. Here, existing possibilities need to be related to one's own abilities. When using a pattern made by someone else, technological literacy is required to analyze whether the degree of difficulty of the pattern is suitable for one's ability. Furthermore, the crafter needs technological literacy to interpret the pattern in text, abbreviations, and symbols. If a pattern is used, the crafter needs knowledge and understanding of the possibilities and limitations of the craft technique, in this case knitting. The crafter also needs to make choices about suitable yarn material, thickness, color, price, availability, and sustainability. All these decisions are influenced by whether one works alone or has access to supervision during the process. All of these decisions are within the domain of knowledge and skills for planning.

The discussion about starting a craft project highlights the strong connection between knowledge and skills for planning and *unique subject content*. The crafter needs to acquire the basics of how to perform a technique and, step by step, develop the execution. Questions such as what kind and amount of yarn, what size, length, and number of knitting needles, and what pattern is most suitable appear and need to be decided upon. Questions related to the material aspects of craftsmanship are extended to consider the bodily performance that belongs to the current technology and is needed when the material is to be transformed into an artifact. For example, when starting the knitting project and casting on the first stitches, the crafter needs to train finger and hand movements that lead to a correct, functional, and aesthetically desirable result.

When the crafter has made the basic choices described earlier and acquired the required bodily skills, as well as understanding and readiness to practice the craft technique at hand, new skills, knowledge, and decisions are awakened. In this case, choices need to be made concerning how to knit the leg of the sock, what kind of heel one wishes to knit, and how the foot and toe of the sock are knitted to achieve the desired result. Also, no sock knits itself. The next domain that is inevitable in the transformation from material, such as a ball of yarn, to an artifact, in this case a pair of socks, consists of *targeted work and activity*, which is a constant commute between thinking and performing. The more experience the crafter has, the more automated the work phase, or parts of it, will be. The technical performance develops for each stitch, and the knitted surface becomes more even. At the same time, the crafter's resources are freed to think beyond what is most necessary in the "think–do" process. Problems of different kinds that need to be solved may also occur during the process.

In targeted work and activity, the crafter can constantly revise the original plan for the artifact and the process regarding, for example, degree of difficulty, technical execution, and aesthetic choices. This procedure is governed by several factors, which can range from the skill level of the crafter to changing needs and available time limits. As mentioned earlier, no artifact makes itself. A goal-oriented and persistent action from the crafter is needed. Persistence is continuously rewarded when each completed submoment immediately becomes visible in the emerging artifact. Gratification from solving a difficult task is also discussed in Chapter 3. Each stitch builds on the earlier, and thousands of them formed over several hours to finally make up a complete sock that can be evaluated and used. When the first sock is finished, the crafter needs to start the making process all over again to make a sock of the same size for the other foot.

In the presentation of this case, we have so far focused on medium-specific work actions and learning opportunities. Next, we will reflect on some of the medium-neutral learning opportunities. Regarding knowledge and skills for planning, we claim that the skills acquired in craft processes, such as knitting a pair of socks, can also promote planning skills in other situations. Skills, such as creativity, visual, and technical planning, predictability of working order, and awareness that different approaches can lead to the same desired result, are also useful when life management in general is in focus. Also, overall multifaceted problem-solving and decisions that resonate around the available time, financial resources, aesthetics, and functionality in the artifact's use are important medium-neutral competences. We claim that the choices one makes in the medium-specific area contribute to practicing one's ability to making both concrete and more abstract planning choices in a medium-neutral area. In educational settings, the opportunity to make choices has the function of training, aiming to broaden and deepen the crafter's ability for decision-making. The ability to make choices depends on many factors, such as the crafter's earlier experience and the motive–result ideal (Lindfors, 1999) given the process at hand.

The unique subject content of the case presented earlier shows the advanced knowledge and skills that are needed and developed when a low-technology craft activity, such as knitting, is practiced and a seemingly basic artifact takes shape. The path from novice to expert involves the training of various knowledge bundles. Motoric skills are practiced and refined. The hand – eye coordination and the interaction between artifact and crafter is trained, refined, and even automated. We believe that these knowledge and skills are not limited to the medium-specific area alone, but become generic abilities that the individual can use and further develop in medium-neutral areas outside craft.

In educational settings, the crafter's versatile encounters with materials and tools can contribute to knowledge in, for example, the various subareas of sustainable development and conscious choices based on them, technological literacy in connection with both the work at hand and also, in a broader perspective, awareness of life cycle thinking in relation to products. Cultural awareness can be achieved by relating the present and future to the history of which we are a part. Also, reasoning around aesthetics, economy, ecology, and technology can be made concrete and realistic for the learner. In these relatively large and intangible fields, one should also value the crafter's constant counting, memorizing, keeping track of different parts of the whole, taking notes, comparing, and assessing the product and/or process both individually and with others. Even though the contents listed here are practiced within a concrete crafting process, they can easily transfer to medium-neutral areas that strengthen a person's general knowledge and skills.

The third part of the described case is concerned with the manual and observable work process needed when material is transformed and made into an artifact. The completion of tasks always requires purposeful activity and work. In crafts, purposeful intellectual work is combined with purposeful manual work and intertwined into a chain of events expected to lead to knowledge and skills expressed and stored in a tangible artifact. At the same time, working methods in crafts can be seen as rewarding. Each oscillation between thought and action leads to an immediately observable visual and material change in the emerging artifact. The change is most often relevant and desired, but often it can also be unexpected and unwanted. This calls for the crafter's perseverance, confidence in one's own skills, and the ability to constantly evaluate the emerging artifact and revise the ongoing process. Because learning is embedded in the process of making, persistent work from the crafter is needed.

The last domain in Figure 12.3 deals with the crafter's development of *diverse competences*, *abilities*, and *attitudes* derived from the craft subject. When knitting, the crafter needs to make several choices and make different decisions. When the work progresses, one's ability to critically follow the development of the work becomes involved, and sometimes one ends up going backward in the process. Not only perseverance, problem-solving, and the ability to take setbacks, but also the joy of succeeding, are steps on the path toward the finished artifact. A unique aspect of the craft's productive nature is that the tangible artifact can be given to someone else. This can be decided

at the beginning of the process, or it can be arrived at as the work develops. Empathy in the form of bringing happiness and wellbeing to others can affect both the artifact and the person who makes it. We also need to be aware that crafting and all the good that is pursued in the process can lead to feelings of ignorance, questions about what one has or has not learned, and even feelings of failure. Craft is a process in which both success and failure are very tangible. Self-reflection and sane criticism of one's own work helps one develop so that "reflection in" and "reflection on" (Schön, 1983) the process can be supplemented with forward-looking "reflection for" (McAlpine et al., 1991) when similar projects are to be taken on in the future.

The overall goal of a general education school is to develop the learner's capacity to manage their life situation in a positive and constructive way. Through the description of the domains of learning and analysis of a craft case, we argue that craft can contribute to questions about how the world is – epistemic knowledge – what one can do in the world – technical knowledge – and what one ought to do in the world – ethical knowledge (see Chapter 4).

Although we have discussed the possibilities for diverse learning through a case within a specific subject, we are also aware of the importance of the general education school being diverse as a whole. The different subjects' domains of learning vary and contribute to a person's Bildung. Ellen Key coined the classic statement that Bildung is what remains when we have forgotten everything we have learned. With reference to Key (n.d.), we regard it important that a learner in school receives diverse impulses so that the knowledge, skills, and attitudes one can forget – and possibly later reactivate – are as wide and deep as possible. In other words, everything that happens within a craft process and the learning that takes place in it *contribute to Bildung*. Next, we focus on the teachers' collegial work with the goal of shaping crosscurricular teaching.

Contribution to Bildung as a shared responsibility for crosscurricular teaching

As noted in Chapter 2, there is a need to think about crosscurricular teaching from the point of view of the school, teachers, and learners. In addition to Bildung, we also see empowerment (Suojanen, 1999; Zimmerman, 1995) and autonomy as central concepts. Empowerment can be seen as the active component of the process in which Bildung and autonomy are included. Bildung concerns all the powers of an individual, and autonomy refers to the possibility to operate in an individual and a collegial arena (see Chapter 3). Empowerment is the ability that enables someone to act self-confidently in a certain area. While the discussion concerns schools in democratic societies, these three concepts are present and need to constantly be refined for both the learner and the teacher.

Unlike teacher autonomy understood as isolation and reluctance to change (Lortie, 1975), autonomy is here emphasized in light of Allwright's

definition (cited in Little, 1995) as "a constantly changing but at any time optimal state of equilibrium between maximal self-development and human interdependence." Lapinoja and Heikkinen (2006) discussed teacher autonomy with support in Kant and Habermas and outlined a "mechanism" in which individual autonomy precedes public autonomy. The train of thought here is that the teacher needs to engage in a reasonable dialogue in relation to something that "is." By taking a stand for what "is," an individual position or individual autonomy is created. In a public arena, individual stands meet to open, discuss, and argue with the aim of arriving at a collective understanding of the currently prevailing view of the "good" and how to jointly achieve it. It is about having a picture of "what is?" What "can and needs to be done?" What is "ethically defensible and the right thing to do?" We regard the process of analyzing domains of learning in one's own subject as the creation of an awareness of the subject one is familiar with. With this individual autonomy, the teacher then enters into a collegial discussion of crosscurricular teaching in a public autonomy arena. In the context where teaching in specific subjects and crosscurricular activities is planned and carried out, individual autonomy needs to be framed by the reality that is and the expectations that society places on the school (see Chapter 3). Human interdependence is interpreted here as dependence and respect for the school's collegium and society's expectations of what happens in the school.

When planning crosscurricular teaching, it is important to be aware that subjects' backgrounds, working methods, and interest in knowledge differ. The subjects in school are based on academic subjects, but the form they take can have different relationships with the background sciences (see Englund & Svingby, 1986). A school subject may be a simplification of an established field of study and academic tradition, but it may also have sources of knowledge other than science. Hence, their contribution to Bildung differs. In the case of crafts, it became a school subject long before there was established research in the field (Lindfors, 1991). Society, including its traditions and needs, strongly influenced the design of the subject (Hartman, 2021). Later, research in crafts and the development of scientific disciplines within the area at universities in Finland (Government Decree, 2017) have come to support, enrich, and influence the design of craft as a school subject.

Planning crosscurricular teaching raises challenges of both a micro and macro nature. Röj-Lindberg et al. (2022) strongly emphasized that the emergence of crosscurricular teaching requires respect, curiosity, and knowledge of the teacher's subjects involved. In this way, small but decisive steps are taken to overturn Beane's (1997) thesis that schools are not made for crosscurricular teaching. The diverse backgrounds and traditions of subjects affect the process.

We are convinced that all school subjects can be analyzed in a similar way as we have analyzed the craft subjects summarized in Figure 12.3. The same opportunity exists to first think about what is medium-specific in the subject and to reason about medium-neutral contributions that the subject has.

The model in Figure 12.4 is to be regarded as a practical tool for teachers planning crosscurricular teaching. The model is an example of crosscurricular cooperation between crafts and three other subjects. The number of subjects that are brought into collaboration can, of course, vary. After analyzing one's own subject and forming a currently prevailing position on the subject's content, opportunities, and contribution to Bildung, the teachers meet in a collegial arena to, with joint efforts, shape the frameworks for crosscurricular teaching with the student's total Bildung and empowerment in mind.

Röj-Lindberg et al. (2022) referred to Gresnigt et al. and stated that the visibility of the subjects, the collaboration between subjects and teachers,

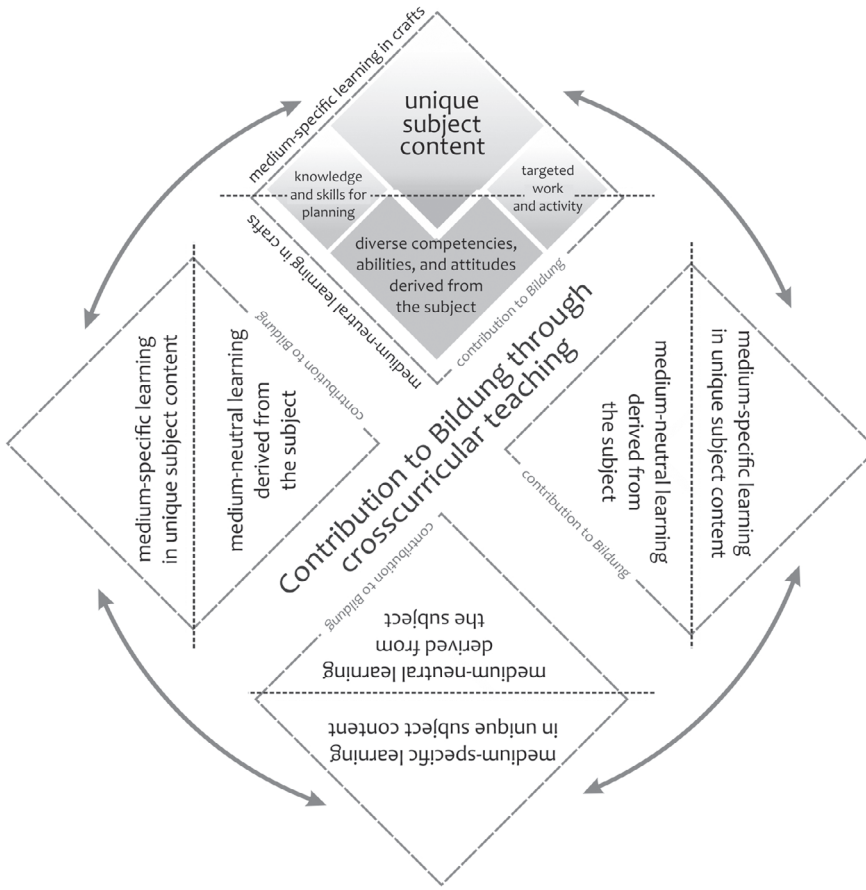

Figure 12.4 A tool for analyzing domains of learning in crosscurricular teaching.

and the role and involvement of learners vary when crosscurricular teaching is examined in a continuum from multi- to transdisciplinary teaching (see Chapter 2). The model in Figure 12.4 can be interpreted and used in different ways, depending on the needs and starting points for the collaboration. For example, if crosscurricular teaching is based on the idea that teachers define a specific subject content, then the model can be used to analyze common content and objectives within both the medium-neutral and medium-specific domains of the subjects. We believe that the model and the support for planning also work when transdisciplinary teaching is planned. In situations where the learners sovereignly choose the content and direction of their work, for example, phenomenon based, the teachers still need to have such readiness that each subject on its own and the subjects together can support the development of the learner within different domains of learning.

Conclusion

Our contribution to future processes where teachers embark on shaping crosscurricular teaching with the aim that different subjects contribute to a holistic Bildung of the learner centers around the models in Figures 12.3 and 12.4. With a craft case, we have shown how and what kind of versatile learning – and, thus, contribution to Bildung – an otherwise narrowly defined content of a subject can have. We have further suggested that teachers who wish to shape crosscurricular teaching can analyze their own subject and its content in a similar way. By asking what medium-specific and medium-neutral areas the subject has, it is possible to create a discussion arena for teachers and spur discussions about which domains of learning touch and overlap when teaching modules are planned. In this way, common domains of learning and contributions to Bildung are identified, as well as domains of Bildung that can be regarded as falling primarily within the responsibility of a specific school subject.

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Part III

Contemporary themes calling for crosscurricular approaches

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13 Sustainability teaching

Toward an empirically grounded model

Martin Hauberg-Lund Laugesen and Nikolaj Elf

Introduction

Since the 1980s, Education for Sustainable Development (ESD) has inspired disciplinary practices primarily in natural science subjects and, to some extent, social science subjects as well as "interdisciplinary approaches" (Læssøe, 2020). Simultaneously, other green transition-oriented teaching paradigms, for example Critical Ecopedagogy and Environmental and Sustainability Education, have emerged and contested the ESD paradigm while offering teaching practices that accentuate the *whats*, *hows*, and *whys* – that is, the basic didactic questions of content, method, and justification – of sustainability teaching (see McLaren, 2013; Karrow & DiGiuseppe, 2020). On empirical grounds, we argue that a robust general didactics of sustainability ought to be based on a purposefully vague conception of *action competence* as normative ideal that can then be practically translated into subject-specific as well as crosscurricular and transcurricular contexts. On a fundamental level, sustainability calls for cross- and transcurricular teaching simply because of the disciplinary complexity inherent in the phenomenon.

In this chapter, we draw on the ethnographic data from the research project *Green Transition in Lower-Secondary Education* (2021–2025) to examine pedagogical and didactic opportunities and challenges involved in cross- and transcurricular teaching focusing on sustainability and the green transition. The chapter's main intention is to introduce a model of sustainability didactics reflecting a notion of *quality teaching* in ESD. By way of offering an early explanation of what this contested notion of "quality teaching" entails, we can say that "quality" is always socially constructed in specific teaching situations based on teachers' and students' experiences of the teaching in question. Whereas *teaching quality* is used throughout as a neutral concept referring to the quality of teaching, *quality teaching* is used as an analytical concept for referring to teaching of high or good quality. We will return to the discussion of quality teaching later in the chapter (see Section "Investigating green transition in lower-secondary education"). Our chapter concludes with a discussion of Bildung based on the two cases pointing toward a *post-anthropocentric* understanding of sustainability teaching.

DOI: 10.4324/9781003367260-16

First, we would like to make a conceptual clarification: whereas sustainability as such comprises both social (people, culture), economic (money, commerce), and ecological (nature, environment) aspects, green transition emphasizes the *ecological* dimension of sustainability. It refers to a development toward ecologically sustainable modes of production and consumption via the substitution of carbon-intensive industries with sustainable ones where both natural and human resources are not used so intensively that it gradually undermines the conditions of possibility of a healthy and balanced Earth and population well within the planetary boundaries. In what follows, we make use of the expression *sustainability teaching* to refer to teaching that to some extent deals with the climate and biodiversity crisis and various sustainable responses to it.

Frontline knowledge of sustainability didactics

Earlier didactic research has already addressed environmental issues, emphasizing a Bildung perspective. In the 1980s, Wolfgang Klafki addressed what he called *the ecological question* as a focal point in his critical-constructive didactics (Klafki, 1992). Specifically, he suggested the notion of *epoch-typical key problems* as a reference point for planning and realizing teaching promoting students' so-called *categorical* Bildung (see Chapters 4 and 5) – environmental degradation and global warming being just one example of such problems. Klafki's position has, however, faced criticisms, some arguing that his approach is too abstract and detached from the everyday practices of schooling and the individual school subjects (Kiel, 2018). Others have criticized his position for overemphasizing the privileged role of humans, society, and culture as means and end goal for dealing with epoch-typical key problems, hence not taking the non-human sufficiently into account (Paulsen, 2022).

Several attempts have been made to apply a Bildung approach informed by Klafki to contemporary teaching practices. One internationally acknowledged example of this is the *action competence* approach to ESD (see Jensen & Schnack, 2006). While the much-debated concept of *competence* might suggest a more instrumental approach to didactics (but see Chapter 3 for a conciliatory approach to Bildung and competences), Mogensen and Schnack (2010) have advocated a Bildung-based approach accentuating a nonaffirmative and dialogical pedagogy focused on a facilitating teacher role acknowledging the inherently democratic nature of modern schooling and enabling students to reflect on and, ideally, act upon sustainability challenges in local settings. Such action-oriented sustainability teaching will necessarily go across subjects and thus involve crosscurricular elements (e.g., Mogensen & Schnack, 2010, p. 60 ff).

Attempts have also been made to merge the German-Scandinavian understanding of didactics with American pragmatism based on John Dewey's pedagogical philosophy, proposing a model that describes and frames sustainability

understood as a *commitment toward a change in habits* (see Öhman & Sund, 2021). Based on empirical ESD research, Öhman and Sund argue that sustainability commitment should be a common goal for ESD, "and that a sound commitment is situated at the intersection of the intellectual, emotional, and practical aspects of sustainability" (Öhman & Sund, 2021, p. 17). Öhman and Sund further stress that the relationship between the intellectual, emotional, and practical aspects of ESD is reciprocal and must be researched and practiced accordingly: "If one or two of the aspects are missing, or if there is an imbalance between them, the commitment risks being misleading or vague" (ibid.). Only if teaching succeeds in engaging students in these three aspects does teaching have a chance of resulting in a sustainability commitment uniting the head, the heart, and the hand in pro-environmental actions. This pragmatic framing of ESD mirrors a core idea in classical Bildung thinking (see Chapter 3). To bring about sustainability commitment as a learning outcome, teachers should pay more attention to the *aesthetic-affective dimension* of teaching quality when planning and executing their sustainability teaching. We return to this point later in the chapter.

Despite the considerable international success of the action competence approach to teaching sustainability, it has also been criticized for emphasizing a prescriptive perspective toward *good* teaching. Lysgaard and Bengtsson (2022) have argued that because core problems of today's climate and biodiversity crisis are *wicked* – that is, ungraspable and unsolvable by way of simple, linear, and human-scale models of causality (see Rittel & Webber, 1973) – attempts to address them in teaching should be tentative, experimental, and context-sensitive, and that expected learning outcomes are difficult to anticipate in advance (see also Chapter 10). This critique is, perhaps, especially relevant for educational practices that translate action competence into a definite set of so-called *key competences* (see Öhman & Sund, 2021, p. 2). As we see it, it is a didactical strength of the action competence approach that the educational end goal of ESD is open for concrete, practical interpretation as long as the teaching remains loyal to the core commitment of cultivating, in students, "the willingness, commitment, knowledge, skills and confidence to engage in" sustainability issues (Sass et al., 2020, p. 6).

Another critical perspective on ESD comes from subject didactics, where it has been argued that the rationale behind school subjects should be rethought in light of the climate and biodiversity crises. One such example from a first language (L1) context is the work of Sasha Matthewman (2014) that challenges the didactical self-conception of L1 teaching globally. As Matthewman puts it programmatically: "Full awareness of climate change disrupts the way that we read and write texts that reference nature – which should matter very much to the teaching of English" (Matthewman, 2020, p. 245). As a tool for timely revision, Matthewman proposes a three-dimensional model of ecoliteracy that has been empirically corroborated in cross-disciplinary teaching including L1, social science, and the arts. The ecoliteracy model consists of (1) an *eco-operational* dimension focused on technical competence, (2) an

enviro-cultural dimension demanding a wider understanding of environmental and cultural knowledge in relation to imagined and real contexts, and (3) an *eco-critical* dimension focusing on how literacy practices arise out of powerful environmental and cultural interests (Matthewman, 2020; see also Chapter 10). Thus, contemporary research and development of subject didactics do add further nuance to the ways in which the climate and biodiversity crisis, sustainable development, and green transition can be incorporated into specific school subjects in a context-sensitive manner (see Bergthaller et al., 2014; Matthewman & Morgan, 2013). A development, however, that has only recently begun.

Based on recent ethnographic fieldwork, we suggest that there is a contemporary need to consider the aforementioned concepts in a holistic perspective, uniting them in a more comprehensive model of sustainability didactics. The model we will go on to propose is relevant for all school subjects and can also be used to analyze and plan cross- and transcurricular teaching events. But before we get ahead of ourselves, let us first present the research project that this chapter draws upon.

Investigating green transition in lower-secondary education

In a Danish context, more and more teachers in all school subjects would like to integrate sustainability elements into their teaching (Rasmussen & Qvortrup, 2023; Jørgensen & Lysgaard, 2020), while at the same time expressing a high degree of uncertainty as to whether they are able to plan, realize, and evaluate such teaching in ways justified by the rationale and expectations of schooling in general and specific subjects in particular (Epinion, 2021). This is thought-provoking considering the pressing need of developing high-quality teaching practices focused on sustainability in and across subjects as a constructive response to the climate and biodiversity crises.

The methods for teaching sustainability are mostly cognitive and fact-focused or "scientistic" where an expert teacher in predominantly natural science subjects disseminates his/her knowledge to students positioned as unknowing (see Jensen & Schnack, 2006, p. 480; Bonnett, 2007, p. 708; Læssøe, 2020, p. 15). However, this is not what current ESD research advocates. Thus, just as ESD research regrettably tends to be severed from actual practices, real-life teaching also tends to be regrettably severed from relevant empirical findings of ESD research. A closing of this internationally well-known gap between theory and practice (Tryggvason et al., 2022) therefore seems desirable for researchers and teachers alike.

To our knowledge, no in-depth case studies have yet been conducted on the *quality* of sustainability teaching based on a contextually sensitive framework and with a comparative focus on mono- and crosscurricular teaching focusing on student and teacher interactions and perspectives. It is among the core intentions of the research project *Green Transition in Lower-Secondary Education* (henceforward GT) to do just that. GT investigates quality

dimensions of sustainability teaching exploring how schools and teachers address and practice ESD in mono- and crosscurricular ways, with an explicit focus on the teacher and student experience. Specifically, we ask what characterizes the quality of mono- and crosscurricular sustainability teaching in and out of Danish classrooms and ask, further, how quality teaching can be clarified conceptually in an ESD context. Methodologically, GT is designed as a mixed-methods research project involving (1) qualitative ethnographic field work at three case schools newly certified as SDG schools (referring to UN's 17 Sustainable Development Goals) that took place from October 2021 to March 2022 and (2) a nationwide large-scale vignette survey with both teacher and student cohorts. Data for the survey part of the research project were collected digitally in November–December 2022. Grounded in qualitative, ethnographic methodology, GT takes a situated, first-person perspective on sustainability teaching foregrounding students' and teachers' experiences and appraisals of teaching in local school contexts. This chapter only draws on findings from the qualitative fieldwork.

GT investigates the quality of sustainability teaching because of a current lack of clear definition of what constitutes quality teaching in ESD. The literature on this topic that already exists has a primary focus on the quality of school development and the so-called *whole school approach* to ESD, even if some relevant quality criteria for teaching also have been articulated. However, these criteria have been formulated on such an abstract level that they might appear difficult for teachers to use when planning sustainability teaching events. A good example of this weakness is found in the otherwise rich and internationally widely disseminated publication *Quality Criteria for ESD-Schools* from 2005, where one finds didactic recommendations such as the following:

- The teachers listen to and value the concerns, experiences, ideas, and expectations of the students, and their plans are "flexible" and open for changes.
- The teachers encourage cooperative learning and experiential learning.
- The teaching takes into account the value of practical activities by linking them to students' concept development and theory construction.
- The teachers facilitate students' participation and provide contexts for the development of students' own learning, ideas, and perspectives.

(Breiting et al., 2005, p. 15)

There is nothing inherently wrong about such prescriptions or quality criteria. But they are vague and generic in relation to specific school subjects, hence less concrete and useful than might be otherwise desired by a teacher in, say, L1, maths, physics, geography, etc.

Throughout the development of the ESD field there has been a steady influx of different implicit and explicit understandings of *quality*. From an emphasis on facts, knowledge, and behavior modification to a focus on critical thinking, student autonomy, and democratic participation, the didactics

of ESD continue to be an object of much debate (see Breiting, 2011, for an account of the historical development of ESD). The ongoing mainstreaming of ESD highlights the importance of developing and disseminating a new and better (*qua* more nuanced and precise) language for talking about quality teaching in ESD with the potential of enriching both research and practice.

Drawing on a three-dimensional theory of teaching quality, GT distinguishes between (1) logical, (2) psychological, and (3) moral dimensions of teaching quality. Whereas dimension (1) involves explaining, defining, and demonstrating contents of teaching, dimension (2) involves teacher gestures that motivate, reward, and socialize students. Finally, dimension (3) involves character-forming promotion of virtues and subjective attitudes (e.g., courage, solidarity, helpfulness, and sustainability) (Fenstermacher & Richardson, 2005, p. 195). To Fenstermacher and Richardson's three-dimensional theory, GT adds a fourth dimension of teaching quality, namely, the so-called *aesthetic-affective* dimension with a focus on embodiment, sensations, and emotions – in other words, what sustainability teaching *feels like*. We add this fourth dimension based on new research findings pointing toward the importance of promoting a teacher focus on pupil sensations and emotions to heighten the quality of sustainability teaching (Ojala, 2017, 2013). This four-dimensional conception of teaching quality is grounded in pragmatism (Dewey, 2018) emphasizing the *experiential* nature of teaching quality: quality must be experienced in specific settings (e.g., action-oriented and problem-based teaching), be appraised by someone (student, teacher), and revolve around something (subject matter) to be the quality that it is. Quality does not exist objectively, in itself (Wittek & Kvernbekk, 2011; Elf, 2021). Further, teaching quality cannot be directly measured quantitatively in a satisfactory manner (Berliner, 2005; Dahler-Larsen, 2019, p. 125), wherefore GT subscribes to an experiential conception of quality to be developed theoretically based on analysis of both qualitative *and* quantitative data (Stake, 1995). Ultimately, GT investigates quality teaching in ESD through a commitment to:

1. a multidimensional understanding of teaching quality comprising *prescribed*, *experienced*, and *documented* qualities of teaching distributed across four dimensions of teaching quality: *logical*, *psychological*, *moral*, and *aesthetic-affective*.
2. an analytical foregrounding of the dynamic interplay between the contents, methods, and justifications of teaching practices (i.e., the didactical what, how, and why).
3. a pragmatic understanding of education conducive to the development of a practical model of sustainability didactics that is both theoretically robust, empirically grounded, and contextually sensitive to local school practices and their organizational infrastructure or *practice architecture*.

(Kemmis et al., 2014; Öhman & Sund, 2021)

We now move on to take a closer look at the quality of cross- and transcurricular sustainability teaching through two case examples from GT. We will go through the examples one by one and end each of the expositions with some analytical reflections on the teaching quality they exhibit.

Two examples of cross- and transcurricular teaching

In what follows, we illustrate some of the opportunities and challenges involved in sustainability teaching. Sustainability and its associated topics demand to be dealt with in cross- and transcurricular ways simply because of their inherent complexity. In each of the way, the two case examples from GT show (1) how sustainability teaching involves multidisciplinary perspectives and (2) some of the things that teachers must be aware of when using crosscurricular and/or transcurricular approaches to sustainability teaching. We understand cross- and transcurricularity according to Mård and Klausen's conceptual clarification: "Crosscurricular teaching refers to integrated teaching situations where subjects are visible or recognized, whereas transcurricular refers to teaching approaches of deep integration between subjects" (p. 7 in Chapter 2).

Whereas case 1 shows how crosscurricular sustainability teaching involves a potential pedagogical pitfall due to the social chaos that project-based group-work can entail, case 2 shows how transcurricular sustainability teaching can heighten the teaching quality by engaging the aesthetic-affective dimension of teaching. While it is an implicit didactic aim of both cases that the students learn to become action-competent beings morally responsive to the predicaments of an unsustainable world, this shared aim is expressed very differently in the two examples. We begin by looking at how *entrepreneurship* can function as a lever for sustainability teaching in a crosscurricular manner and subsequently dive into an example of transcurricular sustainability teaching from a *nature theme week*.

Case 1: crosscurricular entrepreneurship

Case 1 stems from a large public school in a suburb to one of Denmark's larger cities. It has approximately 800 students, several tracks per year, and all years from start to finish of primary and lower-secondary education. The case example is a project week called "Project Edison" with a focus on entrepreneurship. Schools all around Denmark can sign up for this annual project week sponsored and developed by the Danish Fond for Entrepreneurship that works to promote innovation and entrepreneurship among children and adolescents. The project week is self-proclaimed as *interdisciplinary*, and throughout the week two teachers take turns to facilitate the students' group work, at times assisted by one of the school's pedagogues. In the fall of 2021, the overall theme for "Project Edison" was "Climate: how can you make a difference?" We followed a class of sixth graders. The children worked in groups

intentionally set up by their class teacher Lærke to secure at least one academically and socially strong pupil in each group. The students had to come up with ideas for solving climate-related problems in society – solutions, that is, that should be able to be sold on the market, thus potentially generating a profit. The didactical design of the project week thus had a double focus: (1) making a positive sustainable difference for the climate and (2) making a sellable product for the (inter)national market. The implicit message seemed to be *it should pay to do good*.

At some points during the project week, the teaching would rightfully be characterized as crosscurricular because of the *visibility* of the individual disciplines contributing to the students' group work, whereas at other points the teaching was transcurricular because of the *invisibility* of the subjects involved. At some points the class teacher Lærke would explicitly remind the students of stuff they had learned earlier in specific subjects (L1/Danish, nature/technology, etc.), whereas at other points during the week both Lærke and her co-teacher Andreas would not make such explicit declarations about the disciplinary sources of the learning they wanted the students to recall and make use of. The project week was thus characterized by an ongoing and seemingly unintentional sliding from *crosscurricular* to *transcurricular* modes of teaching. The cross- and transcurricularity of the project week both gave rise to frustration and enthusiasm for the students. Some liked the spontaneous and somewhat messy crossing of disciplines, while others were discouraged and confused by the relative lack of clear content designations and pedagogical structure of the week. Commenting on the relative disciplinary boundarilessness of the project week, Lærke says in an interview:

> There are some who are really good at figuring it out and then there are some who cannot figure it out at all when there is no structure: "What should I do next? What do I now have to find out?" That they must take the initiative themselves is really difficult for some of them. And they clearly fall through during this week.

Another aspect of the project week that challenged the teaching quality by taking up a significant amount of time and space was the unruliness of many of the students. As one of the academically diligent students told one of us: "Our class is known as one of the noisiest at the school. It could be nice with more grownups. There is a lot of noise in here." On many occasions, the classroom and the adjoining hallway served as scenes for chaotic energy and intense movement of bodies that were not engaged in relevant studious activities. Footballs were kicked around, markers were used to draw silly and dirty stuff on the white board, high-pitched yells boomed around, boys tugged at the girls or each other, etc. Distraction pervaded the teaching for extended periods at a time. Especially during the intervals of teaching where Lærke was the only teacher present with the whole class. She exerted herself significantly

just to keep order and secure a social environment conducive to learning and project development. As she told us:

> I don't mind performing [være på]. I think it's great to perform. I think it's funny, right. But I just can't be in 20 places simultaneously, right. So, it would actually be really good with some extra hands in a week like this.

With reference to Fenstermacher and Richardson's three-dimensional model of teaching quality, we can say that the entrepreneurship project week was a clear illustration of how the need for the teacher to engage in the *psychological* dimension of teaching can challenge meaningful activities and learning in the *logical* dimension of teaching. The almost constant noise and disturbances had to be managed by Lærke, which made it very difficult for her to engage in meaningful dialogical facilitation of the groups. For instance, Trine, a studious pupil, called on Lærke repeatedly (four to five times during a couple of minutes) for help to further her work on her group's prototype, but Lærke was so occupied with some unruly boys kicking a football at each other that she could not prioritize to provide Trine with the help she legitimately called for. Thus, instead of actively nurturing the students' learning processes and the maturation of their projects, Lærke had to almost constantly put out fires. At one point on the third day of the fieldwork, she looked at one of us and said with forced irony in her voice: "Yes, now you can soon look forward to going back home again," indicating that she was well aware that the teaching quality had been less than satisfying. The distracting messiness and energetic social nonsense exhibited in case 1 demonstrate a central pedagogical pitfall of cross- and transcurricular teaching, that might end up challenging the quality of project-based sustainability teaching.

Case 2: transcurricular nature theme week

Case 2 stems from a small rural public school in the countryside in Jutland, Denmark. It has approximately 80 students, one track per year, and only up to sixth grade. The case example is a theme week focused on *nature*. Throughout the week, all disciplines contributed as contexts for learning about and with nature. From baking pies with locally grown apples in home economics, creating herbaria with leaves from nearby trees in art class, exploring a dissected deer in nature/technology, and community singing about animals and plants to start each day of the week.

During the week, we followed a mixed group of students consisting of children from kindergarten class to sixth grade. On the fourth day of fieldwork, the group attends the workshop on "sustainable hunting," where teachers Susanne and Johannes, who are privately a married couple, introduce the students to hunting and how it contributes to a sustainable management of wildlife in Danish forests. Teachers Susanne and Johannes start by introducing the students to what hunting is and how it can be done sustainably. They

show images of knives, deer, and rifles on the projector and tell the students about how hunters create more sustainable forest areas by shooting certain amounts of deer during specific periods of the year. By doing so, hunters contribute to a healthy balance between the flora and fauna in forests so that there is enough food for the deer to eat, without them growing too plentiful and becoming vulnerable to diseases and sudden food shortages, etc. The hunters, they tell the students, do it "to help nature," and Susanne adds that by shooting a certain number of deer each year, "[t]he hunter actually takes care of the animals." Susanne and Johannes also tell the students about the shooting and killing itself and calms the students' worries by saying that the deer "does not really register that it has been shot." Susanne tells the students that she often perceives Johannes to be very happy and content when he comes home after a day of hunting in the forest. In her own words: "The hunter also gets a good experience out of it. I can feel it on Johannes when he gets home after a hunt. He is thoroughly happy." Susanne and Johannes thus highlight the experiential value for humans of engaging local forest environments and the deer that live there – even if the outcome of the encounter turns out to be fatal for the deer.

Afterward they take the students out into the school courtyard to show them the intestines and internal organs of an actual deer that Johannes himself shot just the day before. The students are all drawn to the spectacle and are invited to look at, smell, touch, and even cut in the organs with a sharp scalpel. While the students explore the deer's organs, Susanne and Johannes tell them more about the deer's anatomy and quiz them about what the various parts of the deer are called and what they do anatomically (e.g., liver, tongue, windpipe, alimentary canal).

Susanne and Johannes' teaching takes on a genuinely transcurricular quality. Their teaching draws on a wide range of school subjects, but they never preface what they tell the children by naming the disciplines of the various contents and/or methods. Implicitly, they draw on both biology (human-like anatomy of deer), nature/technology (technical aspects of shooting and processing deer), history (development of deer populations in Danish forests), mathematics (calculation of deer populations), geography (dynamics of forest environments), and Danish (pronunciation of difficult words). They also briefly touch upon ethical questions concerning whether it is right for humans to shoot deer and intentionally manage nature – topics relevant for, say, social sciences and religion.

It is evident from the aforementioned descriptions that Susanne and Johannes' teaching heavily involves the aesthetic-affective dimension of teaching quality and further that they strive to realize the dark pedagogical learning potentials of so-called *significant life experiences* (see Lysgaard et al., 2019; Tanner, 1980; Chawla, 1998). The children will most likely remember this day vividly for a long time to come – if they ever forget it. As Susanne told one of us right before the bell rang out: "That is also what one remembers from one's own school days" alluding to the pedagogical value of vivid sensuous

experiences potentially evoking strong emotional responses as part of teaching. The aesthetic-affective dimension can thus be used as a lever for strengthening students' learning in the logical and moral dimension, we would argue. Teachers' intentional facilitation of aesthetic-affective pupil experiences thus constitute a significant pedagogical asset for cross- and transcurricular teaching because experiences can forge ties between and across otherwise separated school subjects.

However, whether Susanne and Johannes' calming the students' worries by telling them that the deer does not feel any pain or suffering when shot by a hunting rifle is an example of *good* qua *morally defensible* teaching can be disputed, due to the implicit insensitivity of Susanne and Johanne's *white lie* about the shooting of deer (see Fenstermacher & Richardson, 2005, p. 189 ff). On the other hand, from a student perspective, it may be a good teaching strategy if this leads to not overwhelming students with sad and negative feelings that are not conducive for their engagement in the learning activities of the nature theme week. This is a central pedagogical dilemma when involving dramatic stuff such as dead animals in one's teaching (see Chapter 8).

A new model of sustainability didactics

Having presented the two cases mentioned earlier, we now present a new model of sustainability didactics of practical value for teachers. As the subtitle of our chapter suggests, the model has been developed through analytically validating dialogues with the teachers who have participated in GT and whose teaching we have observed during fieldwork. Figure 13.1 (see next page) is our proposed model for a sustainability didactics that we will empirically qualify through analysis of the two cases.

The model is informed by a sociocultural and communicative-dialogical theoretical framework commensurable with basic didactic notions and established triadic thinking within subject didactics (see Elf, 2021; Ongstad, 2021a, 2021b; Bakhtin, 1986). We have elaborated the model as a diagram *to be realized* through teachers' own didactical analysis and teaching planning. We have placed *ESD teaching events* in the center of the model, and it should, therefore, be perceived as the central analytical unit. ESD teaching events could be viewed as any observable *utterance* (including both talk and doings), intentionally or unintentionally related to sustainability. ESD teaching events are constituted by the interplay of the three basic didactic questions: what, how, and why? Events are further to be analyzed and planned through the four-dimensional theory of teaching quality based on Fenstermacher and Richardson and GT: the *logical*, *psychological*, *moral*, and *aesthetic-affective* dimensions of teaching. According to the model, all three didactic questions should be answered with respect to the four dimensions of teaching quality, hence the rotating arrows between What?, How?, and Why?. Also visible in the model is the invariable framing of teaching events by the broader context of cultural practices of the

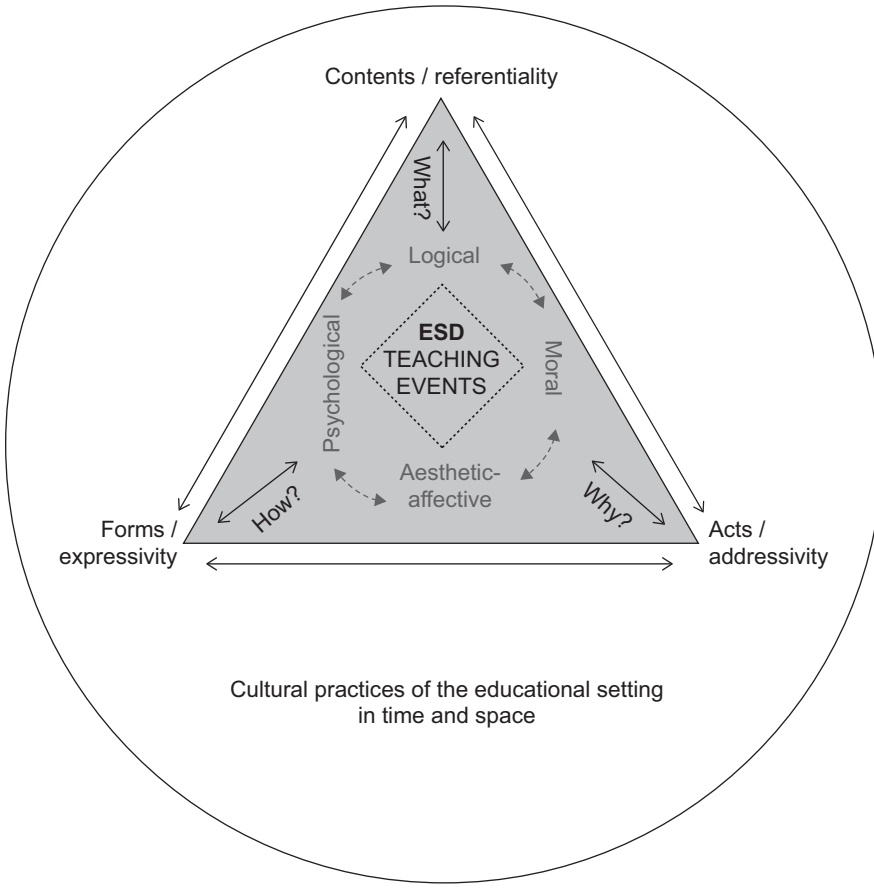

Figure 13.1 A model of sustainability didactics.

educational setting in time and space always already co-shaping utterances (Ongstad, 2021b, p. 102), as also illustrated in the two cases.

The model does not address the question of whether teaching events *should be* mono-, cross-, or transcurricular. At first sight, it might seem most obvious to view this as a sub-question to the overall didactic how? question concerned with *forms and expressivity* of ESD teaching events, but not necessarily only so. The decision to plan and execute sustainability teaching in a mono-, cross-, or transcurricular manner could also be dealt with from the points of view of the what? question concerned with *contents and referentiality* or the why? question concerned with *acts and addressivity*. Generalizing our claim, we would argue that the *curricularity type* of sustainability teaching should be considered as a derived consequence of the particular emphasis that the individual

teacher or teacher team lay on the different elements of the model during the planning phase of the ESD teaching event(s) in question. Put differently, whether a given teacher or teacher team choose to teach sustainability in a mono-, cross-, or transcurricular manner will depend on how he/she/they decide to answer the three basic didactic questions of what, how, and why in light of the pedagogical possibilities of the logical, psychological, moral, and aesthetic-affective dimensions of teaching quality.

Ultimately, these are pragmatic matters that should be dealt with in equally pragmatic ways. As the model also explicitly shows, the *cultural practices of the educational setting in time and space* will invariably be a relevant contextual factor to consider when answering the what?, how?, and why? questions and pondering the potentials for learning that the four dimensions of teaching quality hold in store. In the context of certain classes, a particular emphasis on the aesthetic-affective dimension can be suitable and contribute to the quality of transcurricular sustainability teaching (as in case 2). In the context of other classes, a strong emphasis on the psychological dimension is simply necessary and might eventually challenge the quality of crosscurricular sustainability teaching (as in case 1).

The model we propose can be used as a "didactic thinking tool," on several levels: in practical ways, as a *planning tool* for sustainability teaching; as a *sensitizing* conceptual framework for analyzing and reflecting on what happens during ESD teaching events (see Blumer, 1954); and/or for retrospective evaluation of sustainability teaching, acknowledging that while teaching should always happen according to a more or less well-defined plan with inbuilt teacher intensions, what happens in actual teaching is most often than not something else due to the contingent nature of teaching itself (see Hopmann, 2007; see also the discussion of unforeseeable trajectories of pupil action when encountering artifacts, objects, and technologies in Chapter 10). Having now presented our model of sustainability didactics, we move on to discuss the concept of Bildung in light of the two cases mentioned earlier to further illustrate the practical value of the model in a tangible manner.

What is the place of Bildung in cross- and transcurricular sustainability teaching?

How do the two case examples of cross- and transcurricular teaching involve Bildung (see Chapter 3)? In the two cases, we particularly looked at the *experienced* aspect of the four dimensions of teaching quality. In case 1, the groups are pedagogically supported by their teacher(s) to take shared responsibility for the problems involved in the climate crisis through developing concrete problem-solving technologies. The project week thus supported the students' development of action competence, exemplified in this context as the ability and willingness to (1) understand crucial problems, (2) to devise an action plan or design a product that can make a difference, and (3) to carry out relevant actions or construct a useful product. The potential for Bildung is

here related to the students' engagement in collective efforts to come up with good ideas, useful designs, and realistic prototypes for technologies capable of making a sustainable difference. As Jensen and Schnack have put it, ESD is all about making "students capable of envisioning alternative ways of development and to be able to participate in acting according to these objectives" (Jensen & Schnack, 2006, p. 472). As part of the project week, the students engaged in critical discussions of what is wrong with contemporary modes of production and consumption in society and were subsequently prompted to come up with constructive ideas for how to solve these problems and right the unsustainable wrongs of past generations.

The downside to such an approach to Bildung, however, is that students are easily worn down by the heavy burden of intergenerational responsibility. As one pupil, Christian, spontaneously said out loud on the first day of the project week responding to the purpose of the week (i.e., "Climate: how can you make a difference?"): "But we cannot do that. Because we are only students. We cannot change that." Reaching back to our proposed model of sustainability didactics, the *act and addressivity* constituent in the lower-right corner plays a predominant role in the teachers' planning; however from the experiential student perspective, we can now say that the teacher(s) behind the project week would have been wise in assigning more teachers as facilitators to the class of sixth graders due to the students' general unruliness and the crosscurricular complexity of both the problems (climate crisis) and solutions (sustainable innovation) addressed in the project week. Awareness of this need would probably have emerged had the teachers been able to plan the project week with the help of the model of sustainability didactics presented earlier. Especially if they had explicitly deliberated on what was to happen in the psychological dimension of teaching when answering the *how?* question regarding *forms and expressivity*, the teachers would have become conscious of the risks of low teaching quality involved in having only one teacher being present throughout most of the lessons during the project week.

In the case of the nature theme week, focus was on how intense aesthetic-affective nature experiences can boost students' development of nature connectedness, world-caring values, and sustainable habits. As such, the *form and expressivity* constituent of the ESD teaching event played a crucial role for enabling learning and Bildung processes, which would also involve the *content and referentiality* and *act and addressivity* constituents of the ESD event. Through their shared exposure to the dead deer and the fact-oriented, no-nonsense dialogue with their teachers about sustainable hunting, the students were initiated into a world of natural balances that is both awesome and scary or revolting at the same time. On our way from the classroom and out into the school's courtyard, one pupil erupted without addressing anyone in particular: "This is incredibly exciting!" However, during the exhibition and exploration of the intestines and organs of the deer, another pupil exclaimed: "I think it is really nasty to touch an animal's entrails. Gross!"

Whether the students reacted to the spectacle of the dead deer and its organs with excitement or revulsion, all students seemed to have been exposed to something *real*, that is, something they will remember and be able to refer to when they have to deal with the killing of animals, sustainable forest management, life and death in general, and all sorts of other topics and phenomena they might encounter in and out of school. In this manner, they have both been initiated into the natural world and been given the opportunity to take a critical stance to certain human practices regarding non-human species. This also constitutes a Bildung process and contributes to the students' character formation as inhabitants of what we colloquially refer to as *the natural world*. Thus, in the end, the didactic analysis of case 2 provides good reasons to critically revisit the tendential anthropocentrism in the Humanist tradition from the Enlightenment to the present day; a tendency that has been particularly visible in post–World War II Bildung theory and practice that have laid a heavy focus on specifically human affairs (democracy, multiculturalism, globalization, active citizenship, etc.), while backgrounding those otherwise crucial elements of early Bildung thinking that emphasized the importance of the non-human and the Planet itself as part of a holistic Bildung thinking (see Chapter 3). Case 2 thus gives ample grounds for revitalizing the aims of an *ecocentric* notion of Bildung where the critical socialization involved in Bildung does not take place exclusively in relation to humans and human cultures, societies, and democracy, but also in relation to the manifold plants, animals, vibrant matter, and multiple ecological dynamics that define the biosphere of Earth (see Kvamme, 2021; Taylor, 2017; Bennett, 2010).

We take the two cases to illustrate very different ways to support students' *sustainable Bildung* beyond the anthropocentric constraint of didactics of the past. Such an expansion of the notion of Bildung calls for a critical discussion of what each school subject is, and what it can become. Teachers as well as school leaders must acknowledge that school subjects are not closed entities immune to change. Rather, they are complex, dynamic, and didacticized versions of broad fields of knowledge that usually span across individual disciplines such as biology, history, physics, social science, and humanistic subjects. It follows that school subjects and the teachers that teach them ought to reorient themselves and didactically embrace the potentials of cross- and transcurricularity, especially when it comes to sustainability teaching and sustainable Bildung. Planning of teaching would then call for teachers to actively collaborate with co-teachers teaching other subjects to be able to address the multiple knowledges related to sustainability as an epoch-typical key problem. This will demand a rethinking, rephrasing, and recultivating – in short, a redidactization (Ongstad, 2022) – of current teaching practices.

Such a redidactization of sustainability teaching involves a specific understanding of Bildung, where Bildung is not understood as a stable end product of teaching and learning activities serving as an answer to the why? question

of teaching. Instead, Bildung must be understood as a processual by-product emerging *through* the students' active engagement in these activities. For this reason, Bildung is not only situated in the lower-right corner of our model (*acts and addressivity*), but is distributed across all dimensions and components of the model. As a teacher or teacher team, you would thus have to consider all aspects of the model in order to get a clear sense of how a certain series of lessons could probably make up a Bildung process for the students you are dealing with.

Conclusion

A sustainability didactics that deserves to be called *timely* must, we argue, involve a revitalization of Bildung thinking, or a *post-anthropocentric turn* toward pedagogical practices comprised of mono- as well as cross- and transcurricular teaching that includes considerations for non-humans into the answering of the three core questions of didactics (i.e., what?, how?, and why? of teaching). There neither is nor should be any universal way in which sustainability teaching should always take place. Rather, researchers and teachers alike should strive for local and pragmatic didactizations of sustainability and its related topics and issues. The model that we have proposed earlier presents what we consider to be a *workable* sustainability didactics resisting the temptation of the universal and inviting teachers and teacher teams to make use of the model in context-sensitive and meaningful ways.

Finally, it is our hope that the empirically grounded model of sustainability didactics that we have presented and illustrated earlier will be seen as a first attempt to bridge the regrettable gap between research on sustainability teaching and actual teaching practices. Because the model has been developed in dialogue with actual teachers at actual schools committed to developing high-quality sustainability teaching, we hope that other teachers and schools wanting to do the same will find inspiration and value in the model, and we encourage both researchers and teachers to try and apply the model in further research and teaching.

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14 Climate change as a socio-scientific issue in upper secondary education

Addressing wicked problems through crosscurricular approaches

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Introduction

> We use the term "wicked" in a meaning akin to that of "malignant" (in contrast to "benign") or "vicious" (like a circle) or "tricky" (like a leprechaun) or "aggressive" (like a lion, in contrast to the docility of a lamb).
>
> (Rittel & Webber, 1973, p. 160)

Climate change is an example of a so-called wicked problem (Rittel & Webber, 1973). According to the Paris Agreement (United Nations [UN], 2015), the legally binding international treaty intended to combat climate change, global warming should be held "well below 2°C above pre-industrial levels" and efforts made "to limit the temperature increase to 1.5°C above pre-industrial levels" (p. 3). These goals represent a challenge more than sufficient to fulfill the criteria for a wicked problem, as economic and political interests conflict with the ecological realities. As of 2023, no democratic state has implemented a climate plan that adequately meets the requirements of the Paris Agreement. Moreover, according to Willis et al. (2022), political systems might need to be reformed before the climate crisis can be addressed.

Undoubtedly, the solutions to wicked problems are neither precise nor permanent, while the range of available solutions are limited to what is feasible and imaginable from the perspective of the most powerful global political and economic actors rather than being based on what is most crucial for the climate. Furthermore, stakeholders' worldviews form how they distinguish wicked problems and how they develop related solutions (Kawa et al., 2021). In contrast to "tame problems," wicked problems have unintended consequences within an infinite time frame, and those unintended consequences are impossible to trace (Rittel & Webber, 1973). There is no escape from wicked problems. They pose an existential threat to humanity's survival (Birdsall, 2022) and cannot be resolved without changing the very society that created them (Rittel & Webber, 1973). To accentuate the wickedness, Levin et al.

DOI: 10.4324/9781003367260-17

(2012) suggest the concept of "super wicked problems," which have the following four features: "time is running out; those who cause the problem also seek to provide a solution; the central authority needed to address it is weak or non-existent; and, partly as a result, policy responses discount the future irrationally" (p. 123).

It is challenging to address these kinds of huge problems through education, and the education of today might not even be extensive enough to do so. An alternative could be the approach Klafki (1998) posits based on the concept of Bildung (see also Chapter 3). More specifically, to didactically address urgent global issues, such as the environmental crisis, social inequity, and war, Klafki (1998) proposes working with what he calls "epochal key issues" (epochentypische Schlüsselprobleme). Wicked problems such as climate change are definitely epochal key issues. Climate change education, according to Klafki's (1998) approach, encourages students to argue based on critical reflection as well as empathy. Consequently, wicked problems are epochal key issues that cannot be grasped from merely a disciplinary and cognitive perspective.

Given their inherent complexity, wicked problems demand transdisciplinary approaches (e.g., Gibbs & Beavis, 2020; Kawa et al., 2021). Thus, conventional education alone cannot deal with such challenges, prompting researchers to call for multi-, inter-, and transdisciplinary educational approaches (e.g., Evans, 2015; Wolff, 2022), which in the school context entail multi-, inter-, and transcurricular teaching – that is, crosscurricular teaching (see Chapter 2). In the research context, cross-disciplinarity occurs in many forms. Hence, multidisciplinary research implies the interaction of several disciplines, whereas interdisciplinary research implies coordinated collaboration among researchers from many disciplines (Pohl & Hadorn, 2008). Transdisciplinarity represents the most advanced form of collaboration and requires joint research and learning processes involving both researchers and non-academics (Wolff, 2022). Therefore, transdisciplinary research involves researchers, policymakers, and other stakeholders being engaged in a common multidimensional learning process that strives toward achieving real-world changes (Gibbs & Beavis, 2020; Roux et al., 2017). When we use the term "crosscurricular" in this chapter, we refer to education based on all the forms of interplay or collaboration described earlier, whereas the term "transcurricular" refers to the most complex form – that is, transdisciplinary research (see also Chapter 2).

Education needs to shift toward stronger crosscurricularity to meet the demands of climate change (Rousell & Cutter-Mackenzie-Knowles, 2020). In addition to crosscurricularity, there have been research-based and political requests for educational actions to identify solutions to the climate change dilemma. There have also been requests for transformative learning. The transformative learning process encourages students to reflect on their previous experiences and preconceptions, including hidden values and assumptions. The aim is to make them think critically and become part of rational discourses (Mezirow, 1991). According to the United Nations Educational,

Scientific and Cultural Organization (UNESCO) (n.d.), the mitigation of climate change requires an education that holistically addresses the ecological, economical, and social dimensions of the problem and aims to foster change at both the individual and societal levels. Sustainable Development Goal (SDG) number 13 – that is, "Climate action" – calls for the implementation of transformative learning approaches to encourage engagement. This is not an easy task, as transformative learning is a complicated process developed for adult learning, and further, it is not possible to predict its outcomes (Taylor, 2009). As a sense of hope and efficacy is necessary to drive climate change mitigation, a central aim of climate change education is to empower students. Indeed, people who are both willing to act and capable of making informed decisions represent the most crucial prerequisites for a sustainable future.

In this chapter, we discuss climate change as an example of a wicked problem and a socio-scientific issue. We argue for the importance and urgency of including climate change in education. Moreover, based on a review of previous research and Finnish policy documents, we present alternative routes to a cross-curricular teaching approach more generally. The chapter begins with a review of relevant literature and then continues with a discussion of how the core curriculum of Finnish upper secondary education deals with the climate change topic. Our focus here is on geography education. As the present study is limited to a discussion of curriculum and literature, it does not reflect the real situation in the classroom, which is beyond the scope of this chapter (but see Chapter 13 for an empirical study of education for sustainable development in two Danish classrooms). Although geography has a long history as a discrete subject, in different parts of the world it is variously associated with the humanities, social studies, and natural sciences fields (Lambert et al., 2015). In Finland, geography belongs to the science field within the school curriculum and includes both physical and cultural geography. Taking Finland as an example, we aim to highlight crucial didactical elements built on a cross- and transcurricular approach when teaching about wicked problems. Yet, we will first present the challenges and obstacles from a science education perspective, starting with the notion of scientific literacy, which is widely recognized as an overall aim of science education.

Scientific literacy aiming for climate action

The aims of science education are relevant to how contemporary society addresses wicked problems such as climate change. In this regard, science education intended to foster scientific literacy is crucial, although there are many interpretations of what such literacy actually entails. Roberts (2007) proposes two visions for scientific literacy, which he describes as "idealized extremes." Vision I focuses on the content and processes of science, with the aim being to, for example, learn basic science content relevant to further studies. By contrast, Vision II focuses on real situations, wherein science knowledge aims at fostering, for instance, critical reflections and informed decisions concerning issues involving science (Roberts, 2007; Roberts & Bybee, 2014).

Climate change is an extremely complex process that is difficult for students to understand (e.g., Lee et al., 2020; Sjöblom et al., 2022). In addition, the growing amount of fake news and misinformation regarding various scientific issues represents a significant cause for concern (Nguyen & Catalan-Matamoros, 2020) and these news contribute to climate change denial (Jylhä, 2018; Valladares, 2021), which hampers mitigation efforts (Jylhä, 2018). Hence, there has been a call for a renewed focus on scientific literacy among the public (Valladares, 2021). Accordingly, critical reflection, knowledge, and understanding are all considered cornerstones of climate change education. This is important because critical reflection without knowledge of scientific research methods may result in waning confidence in science.

More recent research on science education has contributed to the development of a third vision of scientific literacy – namely, Vision III (e.g., Liu, 2013) – which is more strongly related to society, including elements of social engagement and both individual and collective agency (Valladares, 2021). Sjöström and Eilks (2018) discuss Vision III in relation to the concept of Bildung in the sense of how students develop and learn through interaction with surrounding society. They describe the aim of Bildung-oriented science education to be the "transformation of both the individuals/citizens/subjects and the society towards sustainability and development" (Sjöström & Eilks, 2018, p. 82). Consequently, the third vision of scientific literacy is crucial to Bildung-oriented science education. However, the development of Vision III does not imply that Vision I and Vision II are obsolete (Kubisch et al., 2022; Liu, 2013; Valladares, 2021). In fact, according to Valladares (2021), scientific knowledge and thinking are crucial in relation to both participation in democratic processes and society's efforts to address global risks. Furthermore, Vision II and, particularly, Vision III require interdisciplinary and transdisciplinary approaches to education (Kubisch et al., 2022). In addition, they stress that the realization of all three visions of scientific literacy can also meet the requirements of sustainability. As extremely complex and value-based wicked problems demand both a Bildung-oriented science education and transcurricular teaching (Sjöström & Rydberg, 2018), student teachers and upper secondary school students have started to call for transcurricular education that encourages the development of students' agency. Students and preservice teachers appreciate the importance of climate change education, although they are skeptical of their capacity for change (Winter et al., 2022). Consequently, future teachers require training during their professional education on how to teach wicked problems and socio-scientific issues in a way that empowers students.

Another concept used in educational research that relates to both scientific literacy and climate change is "climate science literacy," which was defined by the United States Global Change Research Program (USGCRP) in 2009 and subsequently developed by climate scientists and educators (Shwom et al., 2017). It includes seven principles or critical conceptual knowledge statements for achieving climate literacy. Aside from having a scientific understanding, a

climate-literate person also knows how to assess information concerning climate, communicate about climate and climate change, and transform informed and responsible decisions into appropriate actions (USGCRP, 2009). Shwom et al. (2017) propose two additional principles to ensure the inclusion of a social science perspective. These principles concern knowledge of climate change as a social and psychological phenomenon as well as of the role of social contexts in climate change mitigation and adaptation (Shwom et al., 2017). The integration of biophysical and social principles within a crosscurricular approach supports a Vision-III-oriented conception of scientific literacy.

Climate change as a socio-scientific issue

As climate change relates to both society and science, it is definitely a socio-scientific issue (SSI). Such issues have traditionally played a crucial role in the promotion of scientific literacy within the field of science education (Zeidler et al., 2019). As an educational theme and research domain within science education, SSIs address sustainability and wicked problems of various kinds. SSIs are also seen as means of working crosscurricularly. Indeed, Evagorou and Nielsen (2019) describe SSIs as issues involving a scientific element and relating to many disciplines and domains, including the political, financial, ethical, and religious domains. Wan and Bi (2020) refer to a study that categorizes socio-scientific topics into six main groups: environmental issues, safety and health, resources and energy, ecological systems, biotechnology, and new materials. Hence, they argue that these topics should be included in the science curriculum to help prepare students to act more sustainably and to become more responsible citizens. In this context, climate change is a self-evident example of an SSI.

SSIs in education can, if the teaching is well planned and well carried out, enable a crosscurricular approach to teaching and learning by combining, for example, reading skills, science, social studies, mathematics, art, moral reasoning, epistemological development, and peer debate (Zeidler & Nichols, 2009). According to Zeidler and Nichols (2009), SSIs naturally integrate school subjects rather than separate them, which can contribute to a more beneficial science education. Zeidler (2014) describes four SSI fundaments, which form the basis for scientific literacy from a sociocultural perspective. First, SSI problems should be personally relevant, controversial, and ill-structured, and they should involve scientific evidence-based reasoning. Second, in the classroom, the topics should encourage discussion and argumentation. Third, the topics should include moral reasoning. Fourth, the topics should be designed to form "virtue and character as long-range pedagogical goals" (Zeidler, 2014, p. 699). All these goals are also goals of Bildung-oriented teaching (see Chapter 3).

One of the main motives for the integration of science with other disciplines is to promote both critical-thinking and problem-solving skills (Czerniak & Johnson, 2014), which are considered crucial to climate change

education. Another key motive is the fact that research concerning science education depicts a long-term development with a consistently declining interest in school science and science careers among young people (Osborne, 2003). Among the reasons for this are the disconnection between science education and students' everyday lives. According to Kubisch et al. (2022), relevant topics, including climate change and the role of science in triggering social, economic, and political action, have been neglected. A focus on SSIs can serve to counter this phenomenon and make science more relevant to young people. Working on SSIs in the classroom represents a way of contextualizing science and connecting scientific knowledge to everyday situations (Czerniak & Johnson, 2014), which accords with the perspective of Bildung (Willbergh, 2015).

The linking of science content to everyday life – where there is no subject division – renders science relevant and has the potential to increase students' interest. As various media sources regularly discuss climate change, it has become highly topical for students. Yet, how can climate change education be carried out in schools in a way that is relevant? Based on a review of 49 studies focusing on the assessment of climate change education interventions, Monroe et al. (2019) argue that effective environmental education focuses on personally relevant and meaningful content and uses active and engaging teaching methods. When it comes to climate change education, engaging in deliberative discussions, interacting with scientists, addressing misconceptions, and finally, implementing school and community projects are all promising approaches (Monroe et al., 2019). Interestingly, very few of the reviewed studies describe interventions involving a crosscurricular approach that combines the natural and social sciences. Nevertheless, sustainability problems benefit from cooperation among several disciplines, including at the school level (Kubisch et al., 2021), and the results of the literature review by Monroe et al. (2019) point to strategies relevant to crosscurricular teaching.

In a collaboration among high schools and universities during a one-year school project, more than 100 experts from the climate change, environmental ethics, biology, and geology fields cooperated with teachers and students (Keller et al., 2019; Kubisch et al., 2022). Due to including active and engaging teaching methods, as well as involving cooperation with scientists, the project represents an example of transcurricular teaching (see also Wolff, 2022) that meets the criteria for successful climate change education (Monroe et al., 2019). The fundamental idea was to involve students in research concerning real-world problems in both school and out-of-school settings, beginning with a kick-off event involving climate change experts from various disciplines as well as politicians and activists. This was followed by school lessons on climate change and individual research projects related to the natural and/or social sciences. The project culminated in an Alpine research week, during which the students worked in collaboration with scientists and were involved in research concerning the impact of climate change in Alpine regions. Hence,

the perspective is transcurricular. The evaluation of the project was based on data obtained from pre- and posttests, and it revealed that climate change education was successful in the fostered learning environment, which involved transdisciplinary and/or moderate constructivist theories (Keller et al., 2019). For example, the 343 participating students generally rated the innovative methods applied in the project as very beneficial to promoting their understanding of climate change. Both quantitative and qualitative data proved that the classical lessons delivered during the project contributed the least to the students' understanding (Keller et al., 2019).

Crosscurricular climate change education in general upper secondary education

In Finland, compulsory education includes pre-primary, basic, and upper secondary education, with students being enrolled from 6–18 years old. After completing their basic education, students choose either general upper secondary education or vocational upper secondary education. Most Finnish students continue to general upper secondary education, which is considered preparatory for higher education. According to the curriculum, students should not only gain subject-specific knowledge but also develop transversal competences. In educational discourses, the transversal competence concept is used synonymously with generic competence, key competences, twenty-first-century skills, and various other concepts (Wolff et al., 2022). Moreover, it refers to the cognitive and meta skills students might require in their future studies, employment, and daily life, in addition to the skills required to manage in a world characterized by digitalization and change (Finnish National Agency for Education [FNAE], 2020). According to the national core curriculum, these transversal competences are integrated into course objectives and the assessment of upper secondary studies (FNAE, 2020), as well as into the national matriculation examination (Gullberg, 2022).

In the Finnish core curriculum, climate change and sustainable development in general are specified in both school subjects and the transversal competences as requiring crosscurricular teaching. The curriculum lists six transversal competences: wellbeing competence (see Chapter 8), interaction competence, multidisciplinary and creative competence, societal competence, ethical and environmental competence, and global and cultural competence (FNAE, 2020). Climate change can be found within the multidisciplinary and creative competence category, where students learn to reflect on solutions that are sustainable and connected to the environment, economy, technology, and politics, as well as "to produce and evaluate alternative future scenarios from an individual, collective and ecosystem perspective" (FNAE, 2020). The aim of the ethical and environmental competence category is that students are familiarized with the research evidence and practices associated with climate change mitigation and the "activities that can help change these phenomena in a more sustainable direction" (FNAE, 2020).

Geography is one of the subjects into which climate change can be easily integrated. The aims of geography education are both mono- and transcurricular (e.g., Butt & Lambert, 2014), as it aims to foster active global citizenship and develop students who promote a sustainable future. These aims accord with the spirit of Vision III concerning scientific literacy and also with the concept of Bildung (Sjöström et al., 2017). The transversal competences specified in relation to geography within the Finnish core curriculum are emphasized, with the focus being on how students are expected to develop the skills necessary for participatory (regional) planning and to accept global responsibility as active citizens (FNAE, 2020). These subject-specific implementations of transversal competences match with some of the characteristics of SSI education (Zeidler, 2014), as regional planning and participation in planning for a sustainable society can be perceived as personally relevant and engaging, while regional planning demands consideration of various perspectives.

Internationally, there is an attempt to develop a crosscurricular understanding of climate change through incorporating the topic into various subjects within the curriculum, especially geography. According to Onuoha et al. (2021), geography has a responsibility to encourage students to act in a way that reduces the burden of climate change. They even state that climate change, as a topic, is appropriately situated in the geography curriculum (Onuoha et al., 2021). According to Skarstein and Wolff (2020), a sustainability approach in relation to the geography subject both develops content knowledge and fosters engagement in sociopolitical issues such as climate change. On a global scale, sustainability issues, including climate change, have been incorporated into the geography curricula of different countries. Butt and Lambert (2014) refer to this as a double-edged sword, as geographical content knowledge could be set aside in favor of more urgent topics. The disciplinary development of geography has resulted in numerous specialized fields of research, although these fields do not function clearly as support and resources for geography as a school subject. Thus, geography can be seen as a field that has many peripheries but no core (Martin, 2005). Crosscurricular aspirations, such as sustainability education and climate change education, are crucial rationales for geography education, although they cannot serve as a substitute for subject knowledge.

Interestingly, climate change is not mentioned among the overall aims of the geography subject, nor is it featured in the descriptions of the transversal competences of the subject within the Finnish core curriculum. However, it could be included in the "global challenges" topic. By contrast, climate change constitutes a substantial part of the first (and only compulsory) course in geography, which focuses on climate change and sustainable development. Climate change processes and the reasons for and effects of climate change as well as extreme weather events are listed among the central content and can be seen as crosscurricular, as understanding climate feedback mechanisms requires conceptual knowledge of biology (e.g., the carbon cycle), chemistry (e.g., greenhouse gases), and physics (e.g., planetary movement). Climate

change mitigation and adaptation also require knowledge of social issues (Monroe et al., 2019; Sjöblom et al., 2022). Consequently, subject teachers need content knowledge from several disciplines as well as specific pedagogical content knowledge if they are to ensure successful teaching and the promotion of students' climate literacy. In addition, subject teachers need didactic tools to teach content and initiate both critical reflections and tangible actions.

In the Finnish core curriculum for upper secondary education, in addition to geography, climate change is mentioned in the descriptions of courses concerning seven subjects, including physics, worldview studies, and various languages. Yet, how the topic is taught depends on the subject teachers' interest and willingness (Gullberg, 2022; Lambert et al., 2015), as well as on the monodisciplinary rationale and history of the subject (see also Chapter 13). In terms of the implementation of the Finnish curriculum, there exist possibilities to develop cross- and transcurricular climate change education within the local curricula at a municipal level. A transcurricular approach can be realized as an optional thematic course designed locally and collectively by a team of teachers representing several subjects. Alternatively, a crosscurricular approach can be implemented by designing study units that include two to three existing courses from either the local or national curriculum that thematically work together.

Didactical challenges in climate change education

Climate change is a wicked problem and an SSI that appears to be a priority within the Finnish core curriculum for general upper secondary education. However, the topic is distributed as a general topic across the curriculum, which may lead to a lack of clarity and fragmentation. There is a gap between policy and practice in this regard in both Finland and elsewhere, meaning what is recommended by researchers and stated in the curriculum is not necessarily implemented in the classroom (Lambert et al., 2015; Stevenson, 2007). Even if the policy intention is to make all teachers responsible, this may lead to no one taking responsibility. In the Finnish educational system, teachers are free to structure their own teaching. How climate change as an SSI is portrayed and problematized, as well as how climate science literacy develops, are therefore results of teachers' pedagogical and didactical reasoning and decisions. From the split content, teachers may collect the pieces together to shape more complex pictures for students if they are capable and willing to unite subjects. There are also other challenges. For instance, the Finnish core curriculum does not state or describe how scientific literacy should be taught, which is probably also the case in other countries. Another problem concerns how to encourage ethical discussions and the formation of students' worldviews, which are essential elements when working with wicked problems in education and, more generally, with Bildung. In the following paragraphs, we will discuss the didactical challenges connected to climate change education through the didactical questions (what, why, and how) related to the literature reviewed in

this chapter. The questions intertwine and overlap in a way that makes them difficult to separate from each other, and consequently, we will discuss them in parallel.

Teachers are key agents in relation to successful crosscurricular climate change education. In Finland, it is usually a teacher with a background in science who teaches geography. According to Zeidler (2014), science teachers experience more challenges when it comes to including ethical perspectives in their teaching. The teachers in this category are more likely to prefer Vision I concerning scientific literacy than Vision II due to their extensive content knowledge and interest (see Chapter 13 for similar observations). The challenges experienced in relation to incorporating other perspectives could also be due to insecurities about leaving the objective science perspective and experiences of curricular overload. By contrast, Zeidler (2014) also refers to a study in which students with a good understanding of science content produced better arguments during an SSI discussion, which led to stronger civic capabilities.

According to Roberts and Bybee (2014), there is a risk that teachers who focus on Vision I use social and personal perspectives and situated-oriented materials as solely a motivational resource, while teachers who focus on Vision II include less science content. Climate change, as an SSI, would benefit from a wider view of science education that prepares students to actively, scientifically, and collectively participate in societal problem-solving (Holbrook et al., 2022). The inclusion of situated or personally engaging material is vital to the development of Vision II and Vision III perspectives as well as climate literacy, although it is not called for by the core curriculum. Course materials can include exercises that focus on ethical questions or local perspectives, but it is up to the individual teacher to allocate lesson time for such perspectives. In addition to presenting science content, Holbrook et al. (2022) propose a trans-contextualization phase that extends students' learning beyond the classroom. Their qualitative study identifies a need for trans-contextualism to prepare students for civic action, although it also highlights challenges on three levels: teacher level, curriculum level, and student level (Holbrook et al., 2022). There is most likely a general need to focus on such didactics in teacher education.

When it comes to the choice between teaching subjects or working crosscurricularly, it is all about hierarchy. According to Ross (2000), crosscurricular subjects have a lower status when compared with core or elective subjects. Moreover, to develop climate change education, teachers' professional ownership and specialization should be promoted (Eilam, 2022). Within the Finnish core curriculum, climate change is included in the sustainability topic and spread across several subjects. Eilam (2022) considers this tendency problematic, since sustainability as a concept remains vague and controversial, while climate change is more clearly defined and scientifically grounded. To promote climate literacy, climate change should be assigned more space and resources within the curriculum (Eilam, 2022). In the Finnish general upper

secondary context, this is possible at the local level because the local curriculum is constructed in the municipalities, although it may be more difficult in other education systems.

As mentioned earlier in this chapter, crosscurricularity in general upper secondary education in Finland is implemented in, for example, the form of transversal competences. However, the advantages of crosscurricular teaching might be endangered if crosscurricularity is limited to a competence approach. If the competences rather than the central content of school subjects are in focus, the core content might be neglected (Butt & Lambert, 2014). Crosscurricular issues such as climate change must also be anchored in profound subject knowledge. It is crucial that students develop skills and competences in parallel with subject content. Geographical knowledge provides substance and examples. It also contributes to a deepening of the understanding of various sustainability education-related and climate change education–related themes, including

> population growth and movement; biomes and ecological change; biodiversity and endangered species; energy mining, renewables and post-carbon economies; water security, quality and distribution; weather and climate; food production, distribution and consumption; earth science and geological time scales (and the possibility of the Anthropocene).
>
> (Lambert, 2013, p. 88)

An alternative way of ensuring crosscurricular teaching regarding climate change involves creating curricular space. Eilam (2022) proposes the establishment of climate change as a "disciplinary-subject": in other words, establishing climate change as a discipline and including climate change in the curriculum as an independent school subject. Eilam bases this argument on several factors but emphasizes both practical and theoretical justifications as well as the lack of empirical evidence for successful crosscurricular approaches to including climate change within the curriculum. However, the content knowledge Eilam (2022) identifies is related to observed changes in the climate, drivers of climate change, the risks and impacts of climate change, the adaptation and mitigation of climate change, socioeconomic factors, policy and governance, and ethics, all of which have been obtained through interdisciplinary research (Eilam, 2022). But climate change as a subject in its own right places high demands on teachers; otherwise, the subject content might remain monocurricular.

Conclusion

It is challenging to integrate school subjects, and a solid content knowledge base is required if teachers of individual subjects are to succeed with such integration. Moreover, pedagogical content knowledge is also required, which poses a challenge for subject teacher education. Since educational studies are limited in terms of time, there is already too much content to cover. Thus, there is no simple way to handle this kind of wicked problem

in education. An alternative for teachers is to collaborate with colleagues who teach other subjects and to discuss and plan the teaching together. However, collaboration and transcurricularity may be difficult to achieve for structural reasons such as unsuitable schedules and lack of time (Gullberg, 2022). These factors constrain the aspirations expressed in the curriculum. Yet, young students today participate in school strikes and demonstrations on behalf of the climate. Many are ready to stand up for the future, although to be able to mitigate climate change they need knowledge and tools from both the field of science and society, which should duly be integrated into a broad Bildung perspective (Klafki, 1998; Sjöström & Rydberg, 2018). A Bildung perspective (see Chapter 3) emphasizes the individual's role as part of humanity in the past, the present, and the future, which entails obligations and responsibilities. Therefore, education policy, teachers, and their didactics have to stand up for both students and the climate. Living in a world with climate change, students have the right to Bildung, to become critically engaged in their society, and to develop knowledge-based agency. According to Andersen (2020), Bildung is both freedom and responsibility, independence and interdependence.

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15 Education for democracy and democratic citizenship

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Introduction

Educating democratic citizens who are committed to the values and principles of democracy and who are actively willing to develop democracy is at the core of crosscurricular teaching and closely related to another central theme of this book: Bildung. As pointed out in Chapter 3, "progressivist, democratic, and nonaffirmative approaches" can also highlight particular aspects of Bildung. A democratic approach emphasizes Bildung's social aspect, and in democratic societies, social aspects are strongly connected to democratic life, its principles, and its values.

Cross- and transcurricular teaching is the basis for a successful education within and for a democracy. Content related to democracy needs to be studied in different school subjects, but democracy is more than knowledge. Fostering democratic values, attitudes toward democracy, and democratic skills requires teaching that is persistent, regular, and both cross- and transcurricular. This is at the center of this chapter, where we reflect on the idea of education for democracy in the context of crosscurricular, especially transcurricular teaching.

Teachers are crucial to implementing education for democracy and democratic citizenship in classrooms and schools. Traditionally, schools have been institutions that follow the contemporary and permanent structures and activities of democracy rather than radically challenging and renewing themselves and society. Politicians define the basic guidelines for the development of schools, which does not mean that schools and teachers do not have power concerning their profession and work. The autonomy and pedagogical freedom of teachers and schools vary between societies. Thus, teachers' possibilities for acting as proactive developers of democracy instead of being merely reactive also vary. In principle, the teacher's role, according to typical school curricula in democratic societies, is to be an active educator for students' democratic participation.

However, active social participation and interest in, for example, politics among young people is lower than expected (Edling & Mooney Simmie, 2020; Männistö, 2020; Raiker et al., 2020). Additionally, in the present state of research on democracy and education, there are many studies describing

DOI: 10.4324/9781003367260-18

initiatives at a general level, but specific knowledge is still fragmentary (Barrett & Pachi, 2019). Furthermore, a comparative approach is difficult because democratic cultures have evolved historically and may differ from one another, even though democratic countries share the same values and principles. In countries with a strong culture of representative democracy, schools typically follow the representative principle via student councils. In addition, school systems are different. For example, Finland is an example of a homogeneous school system in which all pupils study in a nine-year comprehensive school close to their home. Private schools and schools representing alternative pedagogy are rare, while in England, on the other hand, schools follow a class society practice, in which, for example, boarding schools exist for upper-class children. In many countries, private schools are a significant part of the school system, with a background often based on religious or alternative pedagogies.

Education for democracy as a way of life

Like education for democracy, democracy has many faces, and an unambiguous definition does not exist. Instead, the basic conditions for democracy, including rights such as freedom of speech and opinion, enable all citizens to engage in political activity in a democratic society. Since ancient Greece (e.g., Aristotle, 1998; Thucydides, 2005), the core question of democracy has been how to live as free citizens together in a shared society. In ancient Greece, the shared world was very concrete because citizens with full rights could meet each other in the city center. In more complex societies, direct democracy has its limitations. Thus, representativeness is characteristic of most modern democracies at all levels of society, including schools (students' councils). Contemporary democracies are plural societies where human plurality, where all people are equal, and respected citizens, should exists everywhere. According to Mouffe (1999), this should be a guiding principle for democratic societies, and democracies should enable this for all citizens, especially those at the margins. Mouffe especially argued against the proponents of deliberative democracy, like Jürgen Habermas, who defended rational decision-making and argued that the best argument should win in the public sphere (Mouffe, 1999). There is a danger of making democratic education too strongly dependent on rational discussion because this tends to benefit students with special argumentation skills and exclude those from less privileged backgrounds.

John Dewey (1966) stated that democracy should be learned by living as democratically as possible in school. Thus, according to Dewey, school subjects, as well as other school activities, should be organized in such a way that communal life and democracy are implemented in the everyday life of classrooms and schools. In other words, democratic life is not a separate part of school life but an essential part of human life across and beyond the different subjects. Dewey was a fervent supporter of democracy and has remained the most important philosopher of education for democracy. His image of school

as a minor society, a place where pupils can grow into democratic citizens by practicing democracy in school and having many rights and duties in the school community, has been developed in, for example, Gert Biesta's (2006, 2019) thinking, in which school represents a way of living connected to equality, justice, participation, and communality.

Democratic citizenship can be implemented in various ways in schools, depending on what kind of democracy and education for democracy teachers and schools represent. Westheimer and Kahne (2004) defined three types of citizens (see Table 15.1); they emphasized that good democratic citizenship is a broad concept and is manifested in a variety of practices. Thus, it is important for teachers and school communities to reflect on their own actions and professional identity by asking the following: What kind of democratic citizens does our school educate?

Increasingly over the past ten years, education for democracy has been approached from the viewpoint of competences. The basic question, then, is what democratic competences should be at the core of teaching in schools. The Council of Europe (CoE) released the *Reference Framework of Competences for Democratic Culture* (RFCDC) in 2017 (CoE, 2017), and all member states of the CoE have been committed to implementing the RFCDC in their educational systems and policies. The RFCDC was developed for use in primary and secondary schools, higher education, and vocational training institutions to strengthen the culture of democracy in education. It was constructed and coordinated by the CoE, here by using a large number of experts in the fields of education and the social sciences. Thus, it constitutes a framework based on scientific research and theorizing about the culture of democracy in education. The RFCDC's 20 competences are divided into four categories: values, attitudes, skills, and knowledge and critical understanding (see Figure 15.1). The framework fosters a culture of democracy in schools from various perspectives, from the policy level to classroom practices. It also enables the creation of guidelines on how to strengthen a culture of democracy in schools and, more broadly, in education (Lenz, 2020). The CoE has supported the implementation of the RFCDC through teaching materials and projects such as "Free to Speak – Safe to Learn: Democratic Schools for All," a CoE project for schools all over Europe.

The practices of education for democracy vary greatly nationally and in schools and classrooms because of varying curricula, the general culture of democracy, school cultures, and teachers' own attitudes and commitment to education for democracy. However, schools in all democracies attempt to promote active citizenship, which is developed via sharing power with students. All teachers have the autonomy to implement this idea in their own context, even though cultural and normative frames may vary. In school cultures that provide strong autonomy to teachers, education for democracy may vary a great deal, especially when comparing classrooms. In school cultures where autonomy is more limited, the differences are smaller (Raiker & Rautiainen,

Table 15.1 Types of Citizens Needed to Support Effective Democratic Society According to Westheimer and Kahne (2004, p. 242)

Kinds of Citizens			
Personally Responsible Citizen		*Participatory Citizen*	*Justice-Oriented Citizen*
Description	Acts responsibly in his/her community Works and pays taxes Obeys laws Recycles, gives blood Volunteers to lend a hand in times of crisis	Active member of community organizations and/or improvement efforts Organizes community efforts to care for those in need, promote economic development, or clean up environment Knows how government agencies work Knows strategies for accomplishing collective tasks	Critically assesses social, political, and economic structures to see beyond surface causes Seeks out and addresses areas of injustice Knows about social movements and how to effect systemic change
Sample action	Contributes food to a food drive	Helps to organize a food drive	Explores why people are hungry and acts to solve root causes
Core assumptions	To solve social problems and improve society, citizens must have good character; they must be honest, responsible, and law-abiding members of the community	To solve social problems and improve society, citizens must actively participate and take leadership positions within established systems and community structures	To solve social problems and improve society, citizens must question and change established systems and structures when they reproduce patterns of injustice over time

2017). Typical practices at the school level include student councils, different types of voting, pupil-centered projects, and various discussion sessions. Just as democracy develops through diverse experiments, education for democracy has a basis in experiments. At its most radical, experimentation can develop an alternative option for a general school system, such as Freinet schools, which emphasize a democratic way of life through pedagogical methods, as well as those spaces strengthening cooperation and collaborative working in classrooms and schools (Freinet, 1990).

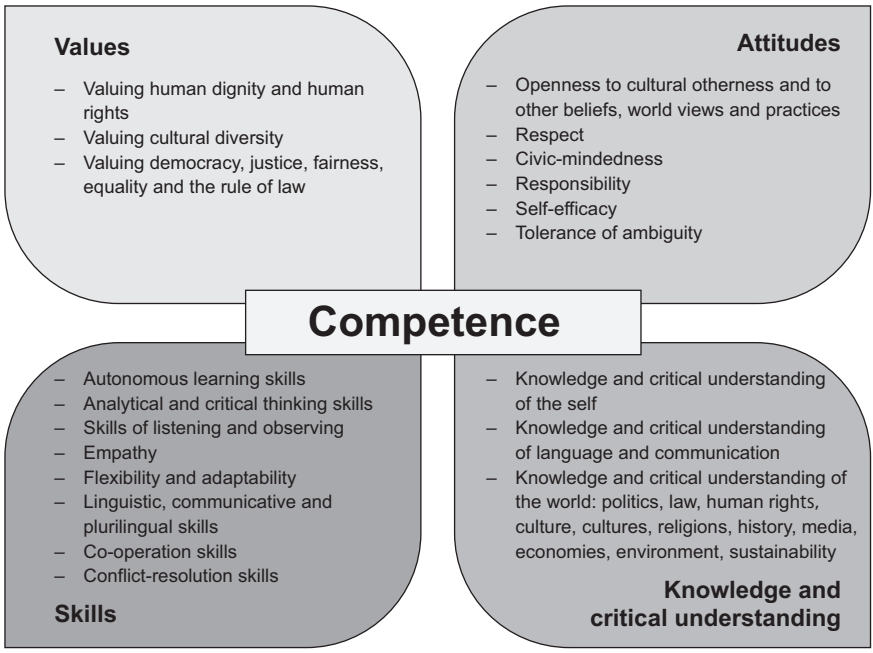

Figure 15.1 CoE's 20 competences for democratic culture: the RFCDC "butterfly."

Education for democracy and crosscurricular teaching

Democracy should be the basis not just for society, but also for schoolwork. If schools do not promote the idea of democracy, the nature of society would change dramatically. Thus, education for democracy belongs to the entire school community, which fosters it by means ranging from the teaching of diverse subjects to the operational culture of the school (see Table 15.2).

The principles of democracy can permeate a school culture holistically through a transcurricular approach. In practice, however, all school systems are far from this ideal in the democratic countries when one considers, for

Table 15.2 Examples of Crosscurricular Teaching in Education for Democracy (Following Table 2.1)

Crosscurricular Teaching		
Crosscurricular Teaching	*Transcurricular Teaching*	
Multidisciplinary	***Interdisciplinary***	***Transdisciplinary***
Democratic competences are integrated on subject's teaching	Teaching democratic participation	Principles of democracy are visible part of school culture (democracy as a way of living)

example, John Dewey's thoughts on education for democracy. Dewey's idea of school as a minor society requires radical changes in school culture and its routines. However, school culture changes slowly. The traditions of school are strongly connected to school subjects and crosscurricular teaching from multidisciplinary and interdisciplinary perspectives. In contrast, the transcurricular approach is a more radical perspective on education for democracy, requiring a holistic and continuing democratic perspective on school work in everyday life (Raiker et al., 2020). In this chapter, we focus on the transcurricular approach toward education for democracy in teacher education developed at the Department of Teacher Education at the University of Jyväskylä. First, we provide an overview of crosscurricular (multidisciplinary and interdisciplinary) practices in education for democracy.

Crosscurricular practices in education for democracy

Alongside crosscurricular teaching, democracy is part of the content of subject teaching, traditionally in the subjects of history, social studies, and philosophy. Many skills that are prerequisites for learning and practicing democracy, such as linguistic and communicative skills, are at the core of language learning. All competences (see Figure 15.1) can be connected to distinct school subjects based on curriculum analysis, as has been done in Andorra, where the RFCDC has been implemented strongly in the national curriculum and generally in the entire education system (GFOSS, 2018).

Typical crosscurricular teaching in education for democracy involves the manner in which subject teaching includes the methods and actions that develop the skills, values, attitudes, and/or knowledge essential for a democratic culture. Cooperation skills are a good example of democratic competence practices that can be present in all subjects. In addition, analytical and critical thinking skills, listening and observing skills, and linguistic, communicative, or plurilingual skills are at the core of basic education in all democratic countries, while diverse subjects that have a special nature and character can be linked to specific competences, such as history to empathy (historical empathy), team sports to respect, and ethics/religious education to openness to cultural otherness and other beliefs, worldviews, and practices (see more in Chapter 3 on Bildung, Chapter 6 on dialogic teaching, Chapter 8 on wellbeing and skills for life, and Chapter 17 on language and literacy).

The objective of crosscurricular teaching is to develop transversal skills and competences. For example, the Finnish National Curriculum for Basic Education (2014) defined seven multidisciplinary learning modules representing interdisciplinary crosscurricular teaching. One of these multidisciplinary learning modules is *participation, involvement, and building a sustainable future*. Schools implement this module in various ways. It can be integrated into subject teaching when it comes to a crosscurricular approach. The learning module can be part of the school's operational culture when it is continuous and active, such as through participation in social activities, class

councils, or implementing systematic dialogic discussion in classrooms, which is close to the transcurricular approach in education for democracy. A typical way to implement crosscurricular teaching in education for democracy is project weeks, when students hone their participatory skills in different contexts.

The transcurricular approach to education for democracy

As mentioned earlier, the transcurricular approach is not a typical way of implementing education for democracy in most countries. However, educators cannot be blamed for a lack of effort, even starting from John Dewey, who already tried to put the idea into practice in his own school experiments. In the absence of ready-made, established models, the transcurricular approach is still in an experimental phase, especially implemented by individual teachers at the classroom level (see, e.g., Kristiansson, 2021), but there is a tendency toward a broader approach. An example is our own experimental work, where the aim was to develop teacher education according to the idea of democracy as a way of life. As part of this process, a group of student teachers, called Derby, started studying democracy education in 2020.

The Derby group's design was based on a vision of a close and complex interconnection between school and society. The basic premise of education, which also served as the starting point for education, was to see the school in society and society in the school. Our experience with teacher education at that time indicated that social issues and education for democracy were discussed in teacher education as such but that the themes were often dealt with in a superficial manner (see Kasa et al., 2021). The themes emerged in a few courses, with a focus on the orientation and knowledge of the teacher of the course in question. However, longer-term implementations with a broader and deeper focus on the topic were absent. At the same time, the general discussion in the field of educational science, as well as the public debate on school more broadly, was based on a psychology paradigm, meaning questions about the relationship between school and society were not brought to the attention of students or teachers in mainstream teacher education. In other words, from a psychological perspective, certain issues in education, especially those that emphasize societal problems in schools and schooling, were only partially dealt with and were explained in a misleading way because they tend to see these problems from the individual point of view (see, e.g., Brunila et al., 2021). We believe that a more societal perspective would provide better explanatory models to understand the role of education in society and broader knowledge for future teachers to understand and be creative under the diverse cross-pressures that teachers undoubtedly face in their work and in their lives.

In addition to the emphasis on the relationship between school and society, another cornerstone of our design and subsequent implementation was a concern for radical equality among all people. Rancière's (1991) concept of equality of intelligence served as a theoretical model that did not fit into the university context without mediation (in Finland, teacher training is carried

out as university education so that classroom teachers graduate with a master's degree in education). As teachers and researchers, we were caught up in the hierarchical structure of the university and of scientific research, which we were trying to break at the same time. Furthermore, the students had adopted a model from their own school experiences, according to which the teacher was an authority of knowledge who decided the level at which knowledge would be passed on. We deliberately wanted to change this by emphasizing our own limits and the fact that we do not know everything but want to support collaborative knowledge-making.

At the same time, it was necessary to realize that equality (as a value) had to be lived out in everyday life. In our experience, it was easy for teachers and teacher-trainees to commit to equality as a principle, but difficulties would arise when this was translated into different practices in everyday schoolwork. This is something we experienced both in our own attitudes toward students and in the way students treated one another in a more or less egalitarian way.

The third cornerstone of the experiment was related to equality as well. It consisted of teachers' (including us as the supervisors of the group) perceptions of their own insecurities and imperfections and of turning these into assets. At the design stage, we felt it was important to emphasize that there was no single model of a "teacher" to which all teacher-trainees should conform. Instead, the starting point was that we all were – and would remain – very different, so the task was to learn to live and work together in that diversity in a way that valued and nurtured one another's humanity and competence. We felt that, regarding this, as well as the other cornerstones, our role and example as instructors of the group were paramount. It was important to highlight our own insecurities about the different teaching situations and topics and, more broadly, about our perceptions of our own teaching and identity as teachers.

The experiment was both planned and implemented in a team-teaching manner. During the planning phase, a larger group of teachers was involved in the design of the training, but the activities were led by the teachers, who also jointly delivered the training. Although there is some discussion of team- or co-teaching in Finland in general and in teacher education specifically, there are not many examples or models of it. Part of the aim of this team-teaching was to break down perceptions of the teacher as a "lone wolf" working independently behind closed doors. We believe that breaking this perception is crucial to enabling democracy as a way of life in schools (see also Chapter 5).

A further cornerstone of the experiment was inquiry-based learning, aiming to combine theory and practice. This meant that our aim was to create a working culture that would encourage experimentation and, above all, offer students (despite the COVID-19 pandemic) as many opportunities as possible to try out the experiments in practice. In this way, we sought to provide students with meaningful learning experiences (see, e.g., Kostiainen et al., 2018; Kostiainen & Pöysä-Tarhonen, 2019; Tarnanen & Kostiainen, 2020) that would provide and concretize new perspectives for students and for us on what democracy as a way of life could be.

From this starting point, teaching for democracy as a way of life was established by studying the various aspects of teacher education and, ultimately, education for democracy from a transcurricular approach. In practice, this was carried out in the Department of Teacher Education at the University of Jyväskylä, whose structures supported and enabled the development work. First, during the experiment and at the time of writing this chapter, the department had a phenomenon-based curriculum, meaning teacher education was built up around five different phenomena: learning and guidance; interaction and collaboration; education, society, and change; competence and expertise; and scientific knowledge and thinking (on the phenomenon-based curriculum and especially the transition process to it, see Naukkarinen & Rautiainen, 2020; Naukkarinen et al., 2022). These phenomena were also the topics of the individual courses in the basic studies of educational science that the group carried out during their first year of study. In other words, the basic studies were conducted by exploring these phenomena, and in later studies, the treatment of the phenomena was expanded and deepened. The phenomenon-based curriculum allowed for the long-term development of the topics to be covered and the linking of individual courses so that the same phenomenon could be dealt with in many different courses from different perspectives.

Guided by these plans and under a set of constraints, a group of 19 students and 2 teacher trainers started their journey toward democracy as a way of life in autumn 2020. Soon after, we realized that pursuing a democratic way of life was not a simple process. On the one hand, working in a new group – with different perceptions, expectations, and interaction skills of the individuals – and the difficulties in group interaction that arose because of those drove the group into a crisis. On the other hand, the principles of equality, freedom, and responsibility; co-learning and co-teaching; and collective knowledge formation also caused crises for individual students and the group because they were not familiar to the students, and learning these new things took time. For example, responsibility and freedom could be intimidating for students who were accustomed to an atmosphere in which the teacher was the leader of the class and teaching. As the group's instructors, we tried to break this perception and build a culture that encouraged activity, experimentation, and exploration and supported students' autonomy and agency. We did not leave crises unaddressed, but we dealt with them together with the students, which, in retrospect, had a democratizing effect on the group's culture (Hiljanen et al., 2021; also see Fornaciari & Männistö, 2017). In other words, dealing with crises was an activity in which democracy became part of the group's way of life.

In a variety of practical experiments (three in total during the first academic year), the students were able to practice activities and assume responsibility unknown to them from their previous school paths. These experiments were important both for building the spirit of the community of the group and for learning overall. The joint planning and ownership of the projects and shared experiences created a sense of cohesion within the group. Additionally, the fact that the experiments allowed students to transform the theoretical

knowledge and skills acquired during their studies into practical learning situations gave depth to the learning of phenomena. This was also supported by the fact that, in addition to planning and implementing the experiments, the students studied the outcomes of the experiments and reflected on what could have been done differently to achieve an even better or different result. All this supports the democratic lifestyle, which itself (but especially the pursuit of such a lifestyle) is a process of building a lifestyle through trial, error, and then new trial. Put differently, a democratic way of life is not a clear-cut entity but is instead formed in a living process of reconciling the expectations, desires, and meanings of different actors in a full-time process, which is very much in line with the ideal of Bildung (see Chapter 3), which here pertains not only to individual students, but to a whole learning community (see also Chapter 8). In this sense, it is important that the group was driven into crises because interpreting crises as spaces showing the dysfunctionality of old ways of thinking and acting prompted the invention of new ones (see Hämeen-Anttila et al., 2013). As such, experiments served both as places of learning and as points of reference, the development of which was of paramount importance to democracy as a way of life.

After the first year, work and studying in the Derby group were less intensive, and courses were largely carried out in other groups. However, it was important that the group work did not stop completely after the first year; therefore, two courses were completed in the same group. One of the courses was tailored so that the group was largely maintained, and the theme of the course was democracy education. A few special education students also joined the group. The group's starting point was an inquiry-based learning assignment carried out in a primary school in Jyväskylä.

We examined the views of the Derby students on meaningful teaching experiences in relation to democracy education during the first two years of study (Fornaciari et al., 2023). We found that the students' meaningful learning experiences were broadly distributed over the entire period of study, and the experiences were thematically distributed over a wide range of topics. In other words, although we had designed themes in which education for democracy was supposed to be concentrated, it seems that, surprisingly, some of the students' meaningful experiences did not fully correlate with the themes and activities that we had planned to be significant. On the one hand, it seems that the students saw meaningfulness from their own perspective, and the meaningfulness in these situations was linked to their own situation in their journey to be a teacher. On the other hand, it seems that democracy as a way of life supported not only some predetermined aspects of democratic education, but also the students' overall growth (see Fornaciari et al., 2023).

From a transcurricular perspective, this finding is interesting. It seems that, when democratic education is done or at least attempted in a transcurricular way, it allows students to grasp the topic they are studying from their own premises and standpoints. We argue that the outcome would not have been the same if the studies had been more strongly subject specific; some students

might never have found the meanings we wanted to offer them. With some, we might have gone deeper into the subject at the expense of potential "drop-outs." Either way, we are almost certain that not everyone's attachment to democratic education would have been so personal, making the cultivation of students' identities as democratic educators more difficult.

Conclusion

Democracy is not self-evident. Instead, it is prone to vulnerability and is in progress all the time. Thus, if school represents an institution of democracy, it must focus on this, emphasize that teachers are educators of democracy, and promote diverse, crosscurricular teaching in school, educating democratic citizens via versatile methods, phenomena, and content (see Figure 15.1). Democracy is a common value and the basis of our social life, which should be based on empowering the interaction between citizens and, in the school context, between students.

In many initial and in-service teacher training sessions, we encountered teachers and student teachers who doubted their own expertise in promoting democracy in their work. Thus, the question of what kind of expertise educators of democracy need (compared with the current situation) is relevant. We emphasize curiosity and interest in education for democracy together as a school community. Nobody can strengthen and construct democracy alone, but it can be done together. Thus, we argue that education for democracy will strengthen if teachers, together with students, show openness, interest, and curiosity toward one another and develop teaching for democracy toward democracy as a way of living. If this is achieved, schools could also become proactive instead of reactive actors in a society in which expertise belongs to the community, not merely to individuals.

Because democracy is a phenomenon that is not strictly confined to school subjects and comprises more than knowledge and skills that are taught only in specific subjects in schools, democracy education should take place in cross- and transcurricular teaching. In our teacher education development work, we have tried to do this, and the results are encouraging. Students' democratic education skills have developed significantly, and everyone has had the opportunity to engage with democracy education from their own perspective. This has enabled students to grow in their own direction, fostering their Bildung and supporting the creation of a democratic way of life. From this perspective, cross- and transcurricular teaching truly is a win-win situation.

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16 Teaching for entrepreneurial Bildung in school

Nina Mård and Karolina Wägar

Introduction

Teaching and learning entrepreneurship has become a central goal of education in many countries in recent years. This trend is promoted by transnational organizations such as the European Union and OECD, the ambitions of which are to improve the entrepreneurial capacity of citizens and organizations. Entrepreneurship is conceived of as a valuable competence that students need in order to tackle complex and contemporary issues in life, by finding creative and innovative solutions (EU, 2022). As for entrepreneurship education, it is promoted by stakeholders to enhance global citizenship as the current globalization and marketization of societies require flexible, mobile, and internationally employable citizens. In a rapidly changing world, creativity and innovative thinking is needed in contributing to economic and sustainable growth both locally, nationally, and globally (Lackéus, 2015).

The introduction of entrepreneurship education in schools has brought forth a number of challenges. From an educational perspective, entrepreneurship is a policy-driven concept derived from economic research with strong business connotations (Dal et al., 2016). This has led to uncertainty among teachers and scholars about the pedagogical aims and means of entrepreneurship education. In a narrow view, entrepreneurship education can be understood as specific courses with the aim of training students to start and run their own business. In a wider view, entrepreneurship education is not necessarily about starting new companies, but rather to equip students with general life skills such as creativity, flexibility, innovation, and collaboration. The wider understanding of entrepreneurship education, and its potential of providing students with desirable skills and mindsets, is promoted by many educationalists. This is also reflected in curriculum documents, as the aims of entrepreneurship education often are defined in terms of helping students to find their own potential regarding the desirable skills of entrepreneurship, no matter if they are about to run their own businesses or not (Fejes et al., 2019; Neck et al., 2014).

The curricular aims of entrepreneurship education are, however, not easy to transform into classroom practice. Several studies have reported teacher

DOI: 10.4324/9781003367260-19

confusion and sometimes even unwillingness to adopt the entrepreneurial educational standards (Fejes et al., 2019; Haara et al., 2016). Besides being considered having a heavy bias toward entrepreneurship rather than education (Fellnhofer, 2019), entrepreneurship education has been described as ambiguous; it is unclear what it actually is and what distinguishes it from other educational practices due to its broad aim of developing general life skills (Fejes et al., 2019; Haara et al., 2016). Compared to many other subject areas, it lacks a solid socially and historically accepted knowledge base due to its contemporary and crosscurricular nature (cf. Nylund et al., 2017). In the absence of common epistemological starting points and a theoretical foundation, it is considered fragmented (Dal et al., 2016).

Consequently, entrepreneurship education has an identity problem as being foreign to education and educational theory. Through its focus on students acquiring desirable skills and mindsets, it has been linked to learning theories in an attempt of pedagogization. For example, Gibb (2005; see also, e.g., Middleton & Donnellon, 2014) posits that entrepreneurship education is about practicing entrepreneurial behaviors, attributes, and skills, which is done by students learning *about*, *for*, and *through* entrepreneurship. Learning about entrepreneurship denotes students learning phenomena and concepts linked to entrepreneurship. Learning for entrepreneurship implies students preparing for becoming entrepreneurs, being a pragmatic approach with the aim of sharing practical knowledge and skills with students wanting to become entrepreneurs. Learning through entrepreneurship is the process of engaging in an actual entrepreneurial experience. It implies an experiential method, in which students engage in entrepreneurial activities and processes with the aim of strengthening general skills such as creativity, innovation, and collaboration.

In a wider view, the "learnification" of entrepreneurship (cf. Biesta, 2019) suggests that it is strongly compatible with the competence-oriented approach to education that is influencing contemporary curricula. Accordingly, the entrepreneurship competence framework EntreComp (2022) presents 15 competences, each including a number of different skills, that describe what it means to be entrepreneurial. This is the case both when applying the narrow perspective to entrepreneurship education, that is, as the development of competences linked to starting and running one's own business, and when applying the broad perspective, that is, as general competences needed in life and especially working life (Neck et al., 2014).

Competence-oriented education has an outward focus, defining desirable competences and skills needed in contemporary and future society. Similarly to entrepreneurship education, it has been debated whether it is compatible with educational theories or not, especially regarding students' Bildung processes (Willbergh, 2015; see also Chapter 3). The educational dilemma of entrepreneurship is enhanced by the fact that it has not been framed through Bildung-oriented didactic theories. This holds both for a discussion on how to *teach* entrepreneurship, not only how it is learnt by students, and how it

may or may not promote students' overall Bildung, especially regarding the emphasis on marketization and employment, and the competence discourse.

Hence, the challenges experienced by teachers in carrying out entrepreneurship education are related to didactic and pedagogical concerns. This implies not only core didactic questions about content and methods, but also how to define and understand entrepreneurship in terms of contributing to students' Bildung processes. In this chapter, we intend to discuss entrepreneurship education through the lens of teaching and what it implies for teachers. Leaning on Bildung-oriented didactic theory (see Chapter 3), we suggest a concept of *entrepreneurial Bildung* to serve as a didactic concept supporting teachers. Entrepreneurial Bildung signifies entrepreneurship as a pervasive aspect of Bildung in its focus on creating both individual and collective value, thus trying to overcome the dichotomic confusion that traditionally characterizes the field.

In the following, we outline entrepreneurship education as a crosscurricular phenomenon, which goes both across and beyond different school subjects through its overarching potential of promoting entrepreneurial Bildung. We subsequently discuss entrepreneurship education as value creation, and how the concept of entrepreneurial Bildung may support teachers in apprehending entrepreneurship teaching as promoting different forms of values in students' thinking and doing. Finally, we provide some practical implications of teaching for entrepreneurial Bildung in schools.

The term entrepreneurship education is perhaps the most commonly used concept for linking entrepreneurship and pedagogical practice (Fellnhofer, 2019; Wilms Boysen et al., 2020). In this chapter, we accordingly use the concepts of entrepreneurship education and entrepreneurship teaching to address such approaches. However, we acknowledge that there are also other concepts frequently used, such as entrepreneurial learning (Hietanen & Järvi, 2015), pedagogical entrepreneurship (Dal et al., 2016; Haara et al., 2016), enterprise education (Elo & Kurtén, 2020), and entrepreneurial education (Lackéus, 2018).

Entrepreneurship education across and beyond the curriculum

Entrepreneurship is an interdisciplinary field of research influenced by economics, political science, sociology, psychology, and organizational theory. It encompasses several perspectives on what constitutes entrepreneurship; from a view of entrepreneurship being new venture creation and business growth (Gibb, 2005), innovation (Schumpeter, 1934), and the identification and use of business opportunities (Shane, 2000), to understanding entrepreneurial traits and competences (McLelland, 1961, 1987).

Entrepreneurship education is similarly crosscurricular in its nature and not established as an independent subject area in most curricula. In many cases, teaching entrepreneurship is an overarching goal of education for both younger and older students. Launched by the European Commission in 2016,

the European entrepreneurship competence framework, EntreComp (2022), is widely used as a guideline for developing entrepreneurship education at all levels of society – from primary education, to universities, and to workplaces. Its aim is to create a common language of entrepreneurship education between different levels of education and its focus is on supporting the development of an entrepreneurial mindset. Thus, at an European level, entrepreneurship education has gained ground and the European Commission has set out to promote entrepreneurship education in all EU countries. However, how entrepreneurship education should be implemented in different countries and curricula is not specified (European Commission, 2023).

Referring to the mentioned academic disciplines, entrepreneurship education is often viewed as closely related to the school subject of social sciences. Many curricula place the traditional content related to entrepreneurship education, such as economics and employability, within the subject content of social sciences (cf. Finnish National Agency for Education, 2014). Nevertheless, when relating to the broader goals of fostering general life skills, scholars have in recent years explored the possibilities of developing entrepreneurial skills and abilities in a wide range of school subjects, such as science (Elo & Kurtén, 2020), foreign languages (Weicht et al., 2020), mathematics (Palmér & Johansson, 2018), and environmental studies (Komodiki et al., 2021).

The discussion of how entrepreneurship education can be promoted within different subjects applies to crosscurricular thinking, especially through intradisciplinary approaches on how specific content, methods, and skills within different subjects contribute to students' entrepreneurial learning (cf. Chapter 2). Often though, entrepreneurship is taught through crosscurricular efforts that include several subjects (cf. Fejes et al., 2019; Mård, 2020). However, in its overarching aims of developing life skills, entrepreneurship education can also be viewed as going beyond existing subjects and calling for new, transcurricular approaches to teaching that include authentic and unpredictable activities (cf. Chapters 2 and 10). Our suggestion of thinking in terms of entrepreneurial Bildung is one way of challenging dominant practices.

Entrepreneurship education as value creation: laying the ground for entrepreneurial Bildung

According to Dahlstedt and Fejes (2017), there has been a notable shift in the discourse on entrepreneurship education, related to the discussion about its aims. From seeing entrepreneurial skills, such as problem-solving and responsibility, as abilities needed for the good of society and solidarity, entrepreneurship education today is often seen as promoting entrepreneurial skills as means for making individual life choices. This current focus is derived primarily from a logic of "market relevance" and the abilities are weaved into specific activities, such as starting and running one's own business (Fejes et al., 2019). Seen from this perspective, entrepreneurship education becomes a vehicle for educating employable, flexible, and "market relevant" individuals who can be

productive and competitive in a global labor market. In the same vein, Wilms Boysen et al. (2020) state:

> The different aspects of entrepreneurship, innovation and creativity produce a pedagogical dilemma in education, in the sense that individual achievement and competitiveness might represent a contrast to collectivism and collaboration. Accordingly, this dilemma can also be found in the design of entrepreneurship education.
>
> (p. 212)

A traditional view of entrepreneurship holds that economic profit is the main driver of all entrepreneurship and economic activity in society. However, economic profit is just one dimension of the *value* entrepreneurship brings. When understanding entrepreneurship as a process of generating value for both oneself and society as a whole (Bruyat & Julien, 2001) and as a process of transforming business opportunities and ideas into different forms of value (Vestergaard et al., 2012), the seemingly dichotomous nature of entrepreneurship education evaporates. In fact, many contributions within entrepreneurship education are grounded on a value-based, multi-stakeholder perspective of entrepreneurship (e.g., Sarasvathy & Venkataraman, 2011; Neck & Greene, 2011). Lackéus et al. (2016, p. 790) put forward the concept of "learning-by-creating-value-for-others" and define it as letting the students learn by "applying their existing and future competences to create something preferably novel of value to at least one external stakeholder outside their group, class or school."

The concept of value is further explored in Lackéus (2018), who propose five kinds of value creation relevant for entrepreneurship education. *Economic value creation* is about reaching benefits by delivering what others need and want; *enjoyment value creation* is about the pursuit of joy and fun; *social value creation* is focused on helping others; *harmony value creation* is oriented toward collective values such as fairness, ecology, equality, and the common good; and *influence value creation* is about increasing influence or power. All five dimensions can be seen from the perspective of both the individual value and collective (altruistic) value. For example, economic value creation is often seen as a self-oriented process of creating wealth for oneself, however, it can also be seen in terms of creating value for others as their needs and wants are met. Similarly, harmony value creation is commonly regarded as being collective and altruistic in nature – on the other hand, through harmony value creation, the individual also seeks individual value such as personal meaning and fulfillment.

A value-based perspective of entrepreneurship education challenges the view of it as struggling with the opposites of individual versus collective, and altruism versus competition. The value-based perspective emanates from the idea that students learn entrepreneurship by creating something of value to an external stakeholder – thus, the boundaries between individual and collective,

collaboration and competition, the common good and individual gain are blurred. It also meets this dichotomous either–or thinking by acknowledging its validity and by formulating a position beyond it, a position that includes both dimensions. It suggests that both dimensions are meaningful and valuable in their own sense when teaching entrepreneurship: individualism as the process of self-cultivation and development of an autonomous personality, and collectivism as the individual connecting to other people and taking part in the promotion of the common good. Both aspects should be developed in parallel and never as competing with each other (cf. Uljens & Nordin, 2022).

Our suggested concept of entrepreneurial Bildung builds on this conciliatory, value-based understanding of entrepreneurship education. At its core lies the principle of value creation for both oneself and others, thus signifying the interplay between individuals and society emphasized in classic Bildung-oriented theory (see Chapter 3). Entrepreneurial Bildung considers the needs of today's and future generations to get acquainted with the marketized and global structures dominating contemporary society. This implies knowledge of structures on both micro- and macro-levels, as globalization makes the connections between individual, local, national, and global interdependent. Without such knowledge, sometimes referred to as financial literacy (Amagir et al., 2018), it is hard to understand the contemporary world or one's own relation to it. However, entrepreneurial Bildung does not only assume well-informed individuals but individuals who have the tools to critically examine existing structures in relation to other dimensions of human life, and who are willing and ready to act responsibly (see Chapter 4). This draws on the different values proposed by Lackéus (2018) in how to consider values of, for example, fairness, ecology, equality, joy, and solidarity, in order to promote altruism and a better future for all people and the planet while concurrently striving for sustainable economic development.

Toward teaching for entrepreneurial Bildung in school

The concept of entrepreneurial Bildung can serve as a didactic concept of how to teach entrepreneurship in school. In our understanding, a didactic concept provides guidelines for teacher reflections on defining aims and content for teaching (cf. Künzli, 2000). Thus, in this context, a didactic concept should provide structure and clarity to what entrepreneurship education is in the context of a classroom and in the practice of teaching. Accordingly, entrepreneurial Bildung as a didactic concept can support teachers by suggesting relevant aims and content areas for entrepreneurship education, providing a coherent knowledge base embedded in pedagogy and educational theory rather than economy or policy-driven concepts.

Drawing on Bildung-didactic theory, the concept of entrepreneurial Bildung acknowledges the many skills and competences suggested for entrepreneurship education. These can serve as central aims and goals of teaching, no matter if entrepreneurship is taught through crosscurricular or transcurricular

approaches (see Chapter 2). However, it challenges the idea of defining teaching only through competences and skills, and raises questions of appropriate teaching content for entrepreneurship education (cf. Ryen & Jøsok, 2021). The question of content has been a hot potato in entrepreneurship education, relating to its narrow and wider understandings (Lackéus, 2017). Recently, there has been a rising interest in exploring how entrepreneurial skills can be developed in subjects not primarily related to economics and social sciences, as previously indicated. Nevertheless, the efforts to shift focus away from the core of entrepreneurship to general life skills are part of the identity dilemma of entrepreneurship education. This raises the question of whether it introduces anything other than new words for abilities that have long been central in education, such as problem-solving, creativity, responsibility, and flexibility (Fejes et al., 2019). Accordingly, empirical studies (e.g., Fejes et al., 2019; Mård, 2020) indicated that teachers tend to use economic and work life–related content, although they emphasize the wider aims of entrepreneurship education.

Instead of sidelining questions of content in favor of desirable skills and competences that should be developed, the pedagogization of entrepreneurship education would benefit from elaborations on how to approach the core content. According to Klafki (1998), the content of teaching should address contemporary structures and phenomena in society. Seen from the perspective of entrepreneurial Bildung, students cannot only be presented with existing structures and phenomena, but have to challenge them as well (see also Chapter 4). Teaching for entrepreneurial Bildung should be open to unpredictable moments of how students may understand and approach entrepreneurship (cf. Chapter 10). This is supported by the idea of students applying broad meanings to the content, which is fundamental in Bildung-oriented teaching (see Chapter 3). This counts especially for critical examinations of both narrow and broad understandings of entrepreneurship, and discussions on economic structures in relation to other values of human life, such as democratic, aesthetic, sustainable, and ideological dimensions. Questioning who creates value to whom in society and what the actual value for society is helps students reflect on individual and collective value creation related to entrepreneurship. Thus, leaning on principles of Bildung as an overall formation of students, the concept of entrepreneurial Bildung can support teachers in opening up different aspects of humanity and human agency related to entrepreneurship.

Conclusion

In this chapter, we introduce entrepreneurial Bildung as an overarching didactic concept for entrepreneurship education. We set out to examine entrepreneurship education through a didactic lens in order to understand the aims and content of teaching entrepreneurship. Entrepreneurial Bildung draws on classic ideas of Bildung and the dialectic relationship of the individual and

society, challenging the traditional dichotomy in entrepreneurship education. By exploring the value-based perspective of entrepreneurship, we found that there is strong support also within literature for dissolving this dichotomy. If we understand entrepreneurship education in terms of creating different forms of both individual and collective value, entrepreneurial Bildung can be regarded as the way to go about this when teaching students in the classroom. The links between a value-based perspective of entrepreneurship education and entrepreneurial Bildung is an interesting avenue for further research.

The concept of entrepreneurial Bildung can help teachers and educators to comprehend the complex task of teaching to promote students' Bildung-processes. Entrepreneurial Bildung sheds particular light on the entrepreneurial and economic dimensions of humanity and citizenship, but does so in an open process with the many dimensions of humanity in mind. Although distinguishing between different aspects of Bildung may challenge its strive for cohesion and unity (cf. Chapter 3), it can support teachers in teaching for contemporary and future needs of both individuals and society. The crosscurricular aims of entrepreneurship education allow teachers to explore teaching for entrepreneurial Bildung through a variety of subjects, and also through approaches that go beyond existing subject-related practices. However, to gain validity and functionality in different contexts, the concept of entrepreneurial Bildung needs to be further developed and empirically tested in classroom practices.

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17 Language and literacy across and beyond the curriculum

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Introduction

In this chapter, we explore the role of language and literacy in crosscurricular teaching. The complex role of language in school contexts is initially scrutinized by means of two complementary functions of language in school, that is, language as a goal and as a means of learning. As a goal of learning, focus is on language as a school subject mainly as it relates to foreign language teaching (e.g., English or German in Finland) and second language teaching (e.g., English for multilingual students in the United States or United Kingdom). Language as a means of learning not only concerns the language classroom, but notably all subject classrooms. Thus, language as a means of learning takes us into the field of literacy, which in this context mainly entails students' ability to effectively use reading and writing for learning purposes in all subjects (see, e.g., Shanahan & Shanahan, 2008).

Notably, the millennium shift brought two different research-based turns to the fore that have had a prominent impact on how languages and language learning in school are perceived today. The first turn, the social turn, changed teaching perspectives from individual-centered cognitive learning processes toward language learning as a social phenomenon and practice (see, e.g., Firth & Wagner, 1997, 2007). The second turn, the multilingual turn, builds on multi-competence (Cook, 2016) and a multilingual mind as a starting point and normalcy where a monolingual norm has long been dominating (May, 2014, 2019). Whereas the social turn underlines the importance of participant-based, jointly constructed communication for language learning, the multilingual turn views the languages of bilingual and multilingual students as an entity that should be evaluated in its own right. This, again, brings about opportunities for using language as a resource by drawing on the multilingual learners' full language repertoire when using and learning languages. Thus, within both turns, it is stressed that the language competence of individual students is dependent on how they linguistically engage with others in different contexts. Consequently, language skills do not develop in a vacuum, nor are they based only upon students' inner capacities. As languages are usually our main way of communicating, the popular and predominant

DOI: 10.4324/9781003367260-20

role of the communicative functions of languages, prompted by the two turns, has softened the previous rather strict opinion that languages are taught only during explicit language lessons. This also creates opportunities for language learning in crosscurricular endeavors.

Whereas language as such is essential for all human communication, one important tenet for the inclusion of language in crosscurricular teaching lies in the inherent possibilities of working toward a wide variety of intercultural aims. After all, one of the main reasons we learn languages is to be able to engage with people from backgrounds other than our own. To this end, a central value-related intercultural aim is the development of an ability to relate to difference and diversity, which in globalized, postmodern societies signified by individual variation in worldviews increasingly turn intercultural encounters into complex processes of meaning-making (Kramsch, 2014). Such encounters also provide insights and help develop self-awareness that can be crucial for students' own identity formation, for example, to develop as multilingual and multicultural individuals. Fleming and Byram (2019) reflect on an integrated perspective of Bildung and language education, suggesting that confrontation with alternative worldviews can be an opportunity not only to understand the other, but also to become aware of one's own perspective, to critically assess it, and to transform it into new ways of thinking. They bring forth the German academic context, where the intercultural approach to Bildung is an important approach regarding both theory and praxis of education including ethics in encounters with difference and diversity (see also Chapter 3). Thus, these aspects of Bildung not only pertain to the context of language education, but also contribute to the curriculum as a whole.

In a discussion of Bildung in relation to language education, Hu (2015) notes that Humboldt, who was not only a philosopher but also a linguist, emphasized possibilities for holistic growth and the fostering of social responsibility. Hu suggests intercultural, aesthetic, critical, and creative aspects of language education to constitute aspects of Bildung, as a contrast to more reductionist, one-sided instrumental-functional views of language learning. The aspects related to Bildung stand in contrast to today's neoliberal principles and the instrumental view of knowledge that oftentimes appears to be entrenched into the reality of schooling (see Chapter 3; see also Byram, 2010, on the purpose of the cultural dimension in language teaching related to Bildung and how language education could include more content connected to citizenship education).

In order to present a more holistic and contextual framework for the role of language in crosscurricular teaching, we first open up the two perspectives: language as a goal and as a means of learning in all subjects. We then use well-established bilingual and multilingual education programs such as language immersion and CLIL as an example to illustrate how both perspectives have relevance for emergent bilingual students' academic achievement and language development. In light of the two perspectives presented and insights gained from bilingual and multilingual education, we then turn our

focus to crosscurricular teaching involving language. We discuss both opportunities and challenges, ending with reflections on how a language perspective can contribute to crosscurricular teaching and Bildung through a dialogic approach in the classroom.

Language as a goal of learning

The view of language teaching adopted here and espoused by the Common European Framework of Reference for Languages (henceforth CEFR; Council of Europe, 2001) builds on a communicative and action-oriented approach, where active, diverse language use and meaningful interaction form important prerequisites for language learning (compare Bardel, 2022). As opposed to traditional, formalistic approaches that focus on grammatical accuracy and proficiency, communicative approaches focus on communicative competence, that is, the ability to use language effectively for different purposes and in different situations. The communicative approach builds on the assumption that languages are best learnt as they are being used. Through engagement in authentic interaction with others, the learners naturally employ strategies of production, comprehension, interaction, and mediation, which, in turn, support learning (Bardel, 2022). Thus, the active role of the learner is emphasized, and other aspects of student-centeredness are also promoted as language learning is effective when communication is meaningful (there is an authentic purpose for and need to communicate) and relevant to the needs of the learner.

In addition, within language education at large, a gradual expansion of curricular aims and core content has taken place in several steps, particularly during the last 30 years. As recognized in the CEFR, successful communication and participation in communicative events both require and develop a number of general competences, such as knowledge of the world, social skills, attitudes, and the ability to learn (Council of Europe, 2001, pp. 101–108). This development has seen not only the inclusion of an increased variety of cultural aspects into previously mainly linguistic dimensions of language learning, but also an extension of cultural aspects from largely culture-specific content knowledge toward a broader notion of intercultural competence. This overall development of learning goals is in line with the perspectives of Bildung put forward in this handbook (compare Chapter 3).

Language as a means of learning

As language is used in all school subjects to convey meaning, access to language becomes a prerequisite for equal access to education. It is therefore increasingly emphasized that all teachers teach in a way that supports the development of language and literacy alongside content knowledge and subject-specific skills, that is, recognizing language as a means of learning (see, e.g., Cummins & Early, 2015). This heightened emphasis is reflected in recent projects focusing linguistically sensitive and language-aware teaching in all subjects (see, e.g., Bergroth

et al., 2022). Such language-sensitive teaching supports the development of literacy strategies and creates bridges between students' everyday language and the academic language of different school subjects. To this end, research proposes the teaching of both generic and subject-specific literacy strategies (see Fang & Coatoam, 2013; Shanahan & Shanahan, 2008). This includes active and regular work with a wide range of learning strategies, most notably those connected to reading and writing. For example, by applying reading strategies to texts studied with the students in the classroom, teachers support students' understanding of content in real time. At the same time, the students are supported to develop these reading strategies also for independent use. To develop writing strategies, students are guided to be aware of the purpose of different texts and, accordingly, of their different structures: for example, how descriptions of historical events differ from those of natural phenomena. Through these active work processes, students are provided with opportunities to process information through spoken and written interaction, which allows them to more efficiently learn new subject-specific concepts and general academic language.

With growing linguistic and cultural diversity reflected in mainstream education, language-sensitive teaching pertains to multilingual students in particular. However, it also benefits students whose first language is the school-language, as the expansion of basic everyday language into subject-specific or more academic language happens gradually for everyone with increased literacy engagement. This means that language-sensitive teaching scaffolds and strengthens the content learning of all students, while also contributing to the development of such transversal skills as (multi)literacy strategies and language awareness. Multiliteracy refers to the fact that literacy strategies are employed not only for verbal texts, but also for visual and audio materials as well as, for example, numeric and kinesthetic symbol systems. Language awareness connects strategies of language learning and language use, for example, the ability to draw on one's full language repertoire to infer meaning when encountering words one does not understand. Strengthening students' language awareness also serves as a means of learning more broadly: in addition to benefiting students' language learning, it also serves to facilitate students' understanding of content and content-specific language in other school subjects and future studies (see also Section "Crosscurricular teaching: language as a goal meets language as a means of learning" on collaborations between language-subjects on a common language pedagogy). Thus, multiliteracy and language awareness are transversal skills that carry not only across but also beyond the curriculum by answering to demands of lifelong learning.

Integrating language as a goal of learning and language as means of learning: lessons from bilingual and multilingual education programs

Alongside mainstream schools with mainly one language of schooling and designated language lessons, a multifold of bilingual and multilingual education

programs have been developed to meet a globalizing world and the needs of a growing student population whose first language is another than the medium of instruction (see, e.g., Baker & Wright, 2017). These programs serve different purposes such as the revitalization or maintenance of minority languages or transition from education in one language to another. Thus, they vary greatly in terms of length and intensity. However, what they do have in common is the use of two or more languages as languages of instruction during subject lessons, where students' comprehension of the content learnt is vital for their academic achievements. Although two or more languages as a means to teach content primarily aims to facilitate students' access to knowledge, a second aim is to develop or maintain students' bilingualism and multilingualism.

This dual focus on both content and language is reflected in universally established programs labeled as CLIL (content and language integrated learning), CBL (content-based learning), and language immersion. Early development of these programs envisioned that simply using the language-to-be-learnt in non-language subjects would be sufficient for students to learn a new language (see, e.g., Krashen, 1987). Indeed, results from empirical studies have shown that using this teaching style combined with teachers' implicit error correction generates high comprehension skills as well as fluent and confident second language speakers. However, students' grammatical accuracy and sociolinguistic sensitivity in their second language reach a developmental plateau that do not equal that of native-level speakers. To address these shortcomings, for example, Swain (1995) suggests that students need to use their second language to notice if there is a gap between what they are able to express and what they want to express, to test if they are using correct language based on feedback from others, and to reflect upon the language forms they use and the feedback they get. Swain (1988) further notes that since subject content teaching usually focuses on meaning and language teaching on producing, "typical content teaching is not necessarily good second language teaching" (p. 81). She suggests that content teachers in multilingual programs continue to use authentic and functional subject-specific language, all the while being aware of offering the students possibilities of using their second language accurately, coherently, and appropriately in an integrated content or subject-focused approach.

The lessons learnt from bilingual and multilingual programs thus show that it is possible, or in some cases even necessary, to attend to both content and language objectives, and to simultaneously use language as a goal and as a means in teaching. Though possible, the dual focus has proven to be a challenge for teachers in these programs, as they find it difficult to maintain a balanced approach and plan for both content and language objectives during lessons (see, e.g., Villabona & Cenoz, 2021). To support and assist teachers, research has addressed co-teaching and collaboration between language teachers and non-language subject teachers to maintain an equal balance of language and content objectives. There is also a growing interest in constructions of models to showcase what content knowledge teachers need to successfully

integrate content and language (see, e.g., Cammarata & Cavanagh, 2018; Tedick & Lyster, 2019).

With the previously outlined development of language as a goal and language as a means in educational contexts as our basis, we now turn our focus to suggest crosscurricular teaching to be an arena where these two aspects can meet in meaningful ways.

Crosscurricular teaching: language as a goal meets language as a means of learning

Since crosscurricular work involving languages can take different forms and serve different purposes, our attempt is not to provide an exhaustive account of possible combinations and outcomes but to reflect on enriching possibilities. We bring different practices to the fore, starting with how different language subjects can support each other and continuing with how encounters between language and content can bring different layers of promoting students' access to knowledge with the help of language support. The section ends with descriptions of practices illustrating how language education meaningfully can interplay with other areas of the curriculum, also contributing to transversal topics and skills as part of Bildung.

There are many benefits to be gained from a holistic view of language education that builds on and develops students' whole language repertoire for purposes of communication and learning. Within such a pedagogical approach, different language subjects collaborate to develop students' plurilingual competence (see Council of Europe, 2001), that is, the ability to draw on one's knowledge and skills in different languages in order to enhance learning or communicate effectively. Plurilingual competence is an important transversal skill with the help of which students can continue learning and using languages beyond the restricted time allocated for language learning in school. Collaboration can involve bringing in other languages besides the target language to contrast and compare, for example, grammatical structures, semantic differences, and vocabulary, in order to enhance students' noticing of similarities and differences and give them tools to be more sensitive and aware of how languages function, which, in turn, benefits language learning. Furthermore, in order to be able to communicate effectively in the languages they are learning at school, students need to develop strategies for coping with situations when their current knowledge of a language is insufficient. Such strategies include the use of body language, mimicry, paraphrasing or code-switching, all of which preferably can be practiced and developed across language subjects.

Seen from another angle, language as a subject in school is often dependent on other subjects in terms of content. Regardless of whether language is the goal or the means of learning, it has to be about something, and that something should be relevant to the needs and interests of the learners. In an ideal situation, the texts that students encounter, the texts they produce orally

and in writing, and the interactions they are involved in concern content that they can relate to and want to express themselves about. If, for instance, the students have been talking about wild animals in their own country in biology, the language teacher could connect to this theme. The students could learn the names of the animals in the language they study, how to describe them, and other specific features connected to the animals. They could then collaborate to make a presentation of a few animals that they subsequently present online to a group of students in another country, who would present their animals in turn. In this way, the content is reviewed, elaborated, and contrasted in different ways, which benefits learning. From a language point of view, the students learn to express themselves in another language about content they are currently learning and to an audience that is not already familiar with that content, which will make the exchange authentic and thus more engaging. Also, when knowledge of a topic is first developed in other school subjects, students are usually able to understand more challenging texts about the topic in a foreign language than they otherwise would. Thus, crosscurricular work can enable students to more efficiently develop literacy and subject-specific language also in languages other than the school's language of instruction, albeit with special attention to scaffolds for comprehension and language use depending on the students' level of proficiency.

Another way in which language subjects can benefit from crosscurricular collaboration is by combining language learning with aesthetic or creative subjects such as music, art, sloyd, or physical education. These subjects provide means by which language learning can be augmented, for example, through providing opportunities for embodied, holistic learning by means of combinations of cognition, emotion, and physical activity through employing different modes of expression (see, e.g., Jusslin et al., 2022) or through providing extended or additional opportunities for language use and repetition beyond actual language lessons, for instance, conducting a PE lesson in a foreign language.

As crosscurricular themes more often than not are part of other subject content than that of the language subjects involved, languages often risk being seen in an auxiliary role. However, considering the crucial role of language as a means of learning, the ability to support the development of transversal competences such as strategies for learning can rather be considered as expert knowledge. Here, crosscurricular collaborations involving language teachers as language and literacy experts can support teachers of other subjects to become aware of the language requirements in their own subjects (Fang & Coatoam, 2013). What is often needed is the realization that such language focus does not primarily involve details such as grammar and spelling, but how content knowledge is conveyed and communicated more broadly. For the most hands-on experiences, crosscurricular teaching can include co-teaching between colleagues with complementing expertise to jointly support the development of both language and content. Examining and discussing texts together with students provide opportunities for closer insights into their

structure and coherence. This can draw attention, for example, to the use of small words and phrases that are less striking than subject-related concepts, but which can be crucial to the overall argumentation and meaning of a text as they connect or otherwise relate text elements to each other in different ways. A concrete example is the crucial role played by the phrasal pair "the more, . . . the less . . ." in the following sentence in a chemistry textbook: "The more noble the metal, the less willing it is to give up its electrons."

The classroom situation described in the following aims at illustrating not only the complexity but also the opportunities afforded with language as both goal and means in crosscurricular education. The setting is a Swedish-medium school in Finland, where you can attend school in either of the two national languages, Finnish or Swedish:

> Welcome to grade 8! The theme for the ongoing crosscurricular work is "Environmental challenges and their solutions for major world cities." The task is to explore particular environmental challenges facing huge cities such as Los Angeles and Singapore and suggest creative solutions to how at least some challenges could be mitigated or solved. Students from four homerooms work on their assigned city in small groups, scattered all around their classrooms, around small tables in the corridor, and in the school library. Two chemistry teachers, a geography teacher and a language teacher move between them, scaffolding the process at its different stages.
>
> Language is central, constituting both a means and a goal of learning, as different steps of the work process involve a variety of different languages. In addition to Swedish, the school's language of instruction, the fact-finding process involves sources in students' (additional) first languages, e.g., Finnish and Arabic, foreign languages that they study as part of the school's language curriculum (English, French and German), as well as Finnish as the second national language. For all students, the gradual expansion of everyday language into more academic registers is a central learning goal, supported by the incorporation of specific literacy strategies that students gradually adopt as part of the set-up of the project. These strategies entail scaffolding of oral presentations, which require students to include a set of expertise vocabulary to be explained orally or by flashing links with definitions as part of each group's final presentation. Further strategies support the write-up of a report in Swedish.

The example shows how collaborative work around crosscurricular themes can provide important opportunities for literacy development and opportunities to develop and express content knowledge in and by means of different languages. Furthermore, crosscurricular work can offer students of foreign languages opportunities to practice and develop skills in linguistic and cultural mediation, for example, as they need to convey information from sources in

a foreign language to students who do not speak the language in question. It should also be noted that the inclusion of multilingual students' first languages in work around crosscurricular themes can contribute to important processes of identity affirmation and thus help create a sense of belonging (see, e.g., Cummins & Early, 2015).

Dialogic teaching for Bildung in the language classroom and beyond

At this point, we put forward an approach to crosscurricular teaching which enables active and authentic use of language – whether it be a first, second, or foreign language – while also allowing for different perspectives to be explored around the specific theme at hand.

Following Vygotsky and Bakhtin in particular, Dysthe (1996; Dysthe et al., 2013) proposes a dialogic approach in a multivoiced classroom. Dialogue-based teaching (see also Chapter 6) entails the use of many different sources of knowledge for learning, in a process where students are involved in written and oral communication with the teacher, each other, and with the contents of what they are to learn. Although this can be achieved in single-subject classrooms, the possibility of crosscurricular collaborations to contribute even further perspectives is of specific importance here. Regardless, consideration needs to be taken concerning how activities are set up to provide ample opportunities for interaction and engagement to allow for both content and language development (see Chapter 6 for a more in-depth discussion of implementations of dialogic teaching, including issues connected to evaluation).

Through the contribution of different perspectives and the joint construction of meaning, the participants develop their understanding of a specific theme or topic (e.g., the forming and consequences of negative social stereotypes). In accordance with the concept of Bildung, a dialogic approach entails increased possibilities for restructuring one's own thoughts and personal integration of knowledge through work processes that can activate and engage, enhancing possibilities for student empowerment and motivation (compare Chapter 3). Dialogue-based teaching also helps students to develop a more critical and reflective stance to what they read and hear, for example, in social media. To these ends, a dialogic approach includes an abundance of authentic questions, that is, questions that give students the opportunity to think and test ideas, not just (re)produce answers. According to Dysthe (1996), a multivoiced, dialogic classroom is a necessity not only for more effective content learning and for developing independent thinking, but also because it is a model of a working democratic society. In this way, students learn how to listen to the voices of others, relate to others, see their perspectives, ask questions, and look for answers together.

Another important feature of dialogue-based teaching is that students' responses and other contributions in class are taken up and expanded on: as they are invited to contribute with new ideas to the class interaction, they are ensured that the teacher is interested in what they think and know. This also

means that the students' answers will be further "evaluated" beyond simply being placed into the categories "right" or "wrong." This approach to teaching and learning also challenges teachers to reflect on their own view of learning, whether they perceive knowledge as either predominantly fixed or jointly constructed, ultimately reflecting on the purpose of education itself.

Additionally, a dialogic approach can create more common frames of reference for educational experiences. The continued interaction makes students' expanding knowledge and thinking more visible for teachers, thus enabling them to better support the learning of individual students by noticing what could be added, restructured, or afforded new perspectives. This also concerns how students use language as a means of learning.

Concluding remarks

In this chapter, we have explored the role of language in crosscurricular education. On the one hand, we have shown that the educational purposes of language learning go beyond the aim of simply developing communicative competence, and that language as a subject in many ways have crossed the boundaries of being an isolated subject without relevance for other areas in the curriculum. On the other hand, based upon experiences from bilingual and multilingual education programs, we have learnt that language as a goal as well as a means of learning are necessary to give students the linguistic tools they need. When teachers provide these tools, students get access to knowledge, and they can use their language skills to express their content-specific knowledge and make use of their whole language repertoire to engage and actively participate in increasingly diverse societies. We have noted how increasing diversity in student populations asks for the whole teacher community to embrace an inclusive and language-sensitive pedagogy to cater for optimized learning opportunities as well as identity affirmation. Crosscurricular teaching can contribute to these processes, with the development of literacy strategies as central in all subject teaching.

Society at large can benefit from educational opportunities where resources for encountering increased difference and diversity with more openness and respect are fostered, all in line with crucial tenets of Bildung. We suggest that crosscurricular practices involving language subjects, through reflective and dialogic approaches, can contribute to the students developing new insights and perspectives regarding both themselves, others, and the world.

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18 Computational thinking beyond computer science

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Introduction: computational thinking and Didaktik

Computational thinking is a term that was coined by Papert (1980) and later popularized by Jeannette Wing (2006) and others to increasingly great effect in many educational systems and institutions, including schools. To wit, CT was included in the 2022 PISA assessment as an aspect of mathematical reasoning and literacy (OECD, 2018). Papert did not take great care to define or otherwise describe the term, and it seems likely that he initially used it in the relatively loose manner associated with "thinking frameworks" (Moseley et al., 2005; Wegerif et al., 2015).

Originally, Papert was engaged in a critique of school systems and considered the computer as integral to novel developments in approaches to learning. It is perhaps most clearly encapsulated by his vision of using the computer to master "powerful ideas" and "influencing how people think, even when they are far removed from physical contact with a computer" (1980, p. 4). These could be related to both a subject (e.g., learning about isomorphism or variables by programming a turtle) or what he called *mathetic*: developing "knowledge about learning" (p. 63). Papert was concerned with cognitive aspects of learning, as well as affective and political ones and his notion of "samba schools for computing" suggests a drive to break down barriers between traditional schools and surrounding society.

When Wing years later reintroduced the concept in her widely cited 2006 position paper, she and others gave it an orientation toward problem-solving with a distinct computer science emphasis. This comes out in Cuny, Snyder, and Wing's definition of CT:

> The thought processes involved in formulating problems and their solutions so that the solutions are represented in a form that can be effectively carried out by an information-processing agent.
>
> (Wing, 2011, p. 20)

Wing's version of CT emphasizes a set of cognitive operations such as decomposition, pattern recognition, algorithm design, and pattern generalization.

DOI: 10.4324/9781003367260-21

The most established examples in the sciences of a computer science addition are found in STEM education. Here, the prefix "computational" designates established branches within physics, biology, and chemistry, such as "computational biology." Another influential voice, Grover, similarly sees CT as derived from computer science: "Today, CT is recognized as a set of skills and problem-solving strategies that have their roots in [computer science], as well as mathematics, design, and engineering" (Grover, 2022, p. 22), and she describes a process of having introduced computer science to K-12 education.

This suggests two approaches to computational thinking in schools. A crosscurricular, associated with Wing and Grover, primarily aimed at fostering skills, and a transcurricular, associated with Papert, and with wider motivational and learning theoretical aspects. The approaches are not mutually exclusive. Both cross- and transcurricular approaches to didactics are characterized by intertwining knowledge, skills, methods, and teaching strategies from various subject areas, and aiming at providing opportunities to learn that go beyond traditional school boundaries. Both approaches promote a pedagogical approach to teaching and learning that goes beyond isolated subjects, and toward a more open-ended process of Bildung and *Ausbildung* in relation to the world outside school.

Computational thinking, Didaktik, and Bildung

As highlighted by Mård and Klausen (Chapter 2), *Didaktik* is rooted in a European continental tradition, and its role in regard to school curriculum has been widely promoted and discussed by educational researchers and philosophers (Klafki, 2007; Uljens & Kullenberg, 2021; Benner, 2015; Krogh et al., 2021). Within the context of school, Bildung as a concept is twofold. On the one hand, it is a general (*allgemein*) Bildung, achieved by various forms of participation in activities aimed at personal development and empowering pupils to become future members of a free and democratic society. On the other hand, it is related to promoting specific subject-related literacies and educational competences to support pupils in their future lives and ongoing learning – *Fachdidaktik*. These two aspects of Bildung, *general* and *subject-related*, are achieved through the different activities the pupils engage in throughout their everyday lives at school, such as going to class in a specific subject, participating in a school play, or socializing on the playground during breaks.

A majority of approaches to introducing CT in schools seem inspired by Wing and Grover, making them particularly relevant to the second aspect of Bildung just mentioned. They are concerned with empowering the pupils through what is considered a specific literacy and modeling competence that focus on subject-related activities such as mathematical problem-solving. Although attempts are being made to broaden CT as a more general approach to Bildung through critical reflection on the implications of

technology on a societal scale (Dindler et al., 2020), as shown by Grover (2022), CT continues to be seen broadly as a twenty-first-century skill that articulates disciplinary thinking approaches found in computer science. Consequently, CT in schools is primarily a matter of *Fachdidaktik* and learning within areas of subjects and the problem spaces constituted herein. CT in a subject-related sense is not limited to the mere use of computers in classrooms, like computer literacy (Molnar, 1979; Haigh, 1985), but rather to teach basic computing concepts to encourage pupils to think in specific, computational ways (Wing, 2006). Overall, these approaches can offer new problem-solving strategies and perspectives on phenomena encountered in the world.

An important aspect of the concept of general [*allgemein*] Bildung is its foundation in a depth structure where the student moves from factual knowledge regarding a phenomenon to a personal and in-depth understanding of it (cf. (i)–(iii) of the definition of Bildung in Chapter 3). This transformative process is supported through teaching that involves exemplary themes and content that, in a metaphoric sense, both opens the world to the pupils and, at the same time, opens the pupils toward the world. Klafki highlights the concept of epochal key problems (Klafki, 2007) as central historical, societal, and political problems related to the present and the presumed near future. Working with timely epochal key problems in school is a way to connect different approaches to CT across and beyond subjects and school.

As a contemporary example, the continuous digitalization and introduction of robots in society can be viewed as a timely epochal key problem that can be addressed in school in different ways and across different subjects. CT, in this perspective, becomes an entry point for, for instance, the basic understanding of what algorithms are and how automation plays a central part in our everyday lives. From a *subject-related* perspective, algorithms and automation could be approached through activities involving programming and machine learning, where a basic understanding of coding and how machines learn can be related to how algorithms and artificial intelligence work (Fischer et al., 2021). On the other hand, the impact of artificial intelligence in modern society on the basis of automation and robots would be an appropriate theme in a more *general* discussion of, for example, the nature of work and principles of just distribution related to the idea of universal basic income. Here pupils participate in activities that offer opportunities to experience, discuss, express themselves, and otherwise engage critically and constructively with the phenomenon.

As there are two different perspectives on didactics, we also propose that the two different approaches to understanding what CT is are related to cross- and transcurricular modes of teaching, respectively. As we explore in the following section, the crossing of subjects, and indeed, the prospect of ignoring subject matters altogether was integral to the inception of both modern computation and computational thinking.

Computational thinking: a brief history

> The computer can be a mathematics-speaking and an alphabetic-speaking entity.
> (Papert, 1980, p. 6)

CT as a term exhibits a significant fluidity that has likely contributed to its rapid spread. While having recently received a computer science emphasis, the concept has a background in the educational sciences, and both components ("computational" and "thinking") rely on several older traditions. CT inherits the "thinking" element from the thinking frameworks that began propagating in the 1970s as an approach to educational policy. Several remain well-known, from creative, critical, and systems thinking, to de Bono's more commercially oriented and less research-informed "six thinking hats" (Moseley et al., 2005). The "teaching thinking" approaches have seen a move away from cognitively oriented frameworks to frameworks that emphasize a more general disposition, such as a positive way of acting when given the possibility of learning a new skill (Dweck, 2012). Such dispositions are supposed to transfer more readily and cannot be seen as belonging exclusively to any subject or curriculum.

As for computing, this term also deserves attention, though we can only briefly touch on aspects of its rich history. Currently, "computer" is mostly associated with a complex piece of technology. This is a relatively recent development, and in a 1947 lecture, Turing still used the term "computer" to designate a person carrying out calculations (Hansson, 2018). Given that "calculation" is integral to the meaning of "computation," the lineage of computational thinking would seem to extend very far back in time, to artifacts such as the Lebombo-bone or the younger, 20,000-year-old Ishango bone (Huylebrouck, 2019).

While the bone constituted reliance on tools external to the human body for computation, here we follow historians of technology in pinpointing Ramon Llull (c.1232–1315) as a key figure in the history of the computer (Gardner, 1982; Uckelman, 2018). Ramon Llull's *Ars* consisted of a fixed circle of concepts that, combined with movable circles with concepts, allowed for the mechanical manipulation of the relation between symbols. Llull's idea of reducing different forms of reasoning to a form of calculation stuck with both Hobbes, Bruno, and, most importantly, Leibniz and his idea of a universal language for science and philosophy (Uckelman, 2018).

While this captures something important about computation, it also raises two key points of immediate relevance to this chapter. First, Ramon Llulls proto-computer was quickly put to cross-subject purposes with great ambition. Second and relatedly, it suggests how computation will readily extend beyond STEM subjects, in so far as concepts, and not just numbers, can be subject to computation in the sense of a mechanical exploration of relations between symbols. Rather than mere tool use, the importance lies in pinpointing the mechanical externalization of the mental act of computation as being

of key importance in understanding what a computer is, and, inter alia, what is key to understanding CT.

As with Llulls prototype of a computer, we see computation as something that concerns the relation between, and operation on, symbols or "computing with concepts." This generality was also suggested by Ada Lovelace. She reflected on an analytical engine proposed by Babbage. This engine was based on four arithmetic functions, but Lovelace emphasized the universal reach of such a machine.: "[I]t would be a mistake to suppose that because its *results* are given in the *notation* of a more restricted science, its *processes* are therefore restricted to that science" (Lovelace, cited in Hansson (2018, p. 193)).

A case of this extension could be the "alphabet-speaking" entity that Papert spoke of. Papert developed Piaget's constructivism into his own brand of learning theory, constructionism. He emphasized the importance of learning to have "objects to think with" (1980, p. 11), taking his own love of physical gears as a paradigmatic example of coming to concretize and thereby understand "powerful ideas," such as relative motion. Thus, the idea was not so much the acquisition of relatively generic, computational techniques and skills with a view to finding a way into other subjects, but more fundamentally using the computer – such as the LOGO programming language – as a flexible, concrete construction material and toolbox for making the abstract concrete in ways that are meaningful for the student.

Concerning the more recent, computer science–based approach to CT, Wing (2006) introduced terms closely related to computer science, such as efficiency. Chongtay (2018) expresses consensus between Google (n.d.), The International Society for Technology in Education and the Computer Science Teachers Association (CSTA & ISTE, 2011) when she points to the centrality of the cognitive operations of decomposition, pattern recognition, algorithm design, and pattern generalization. These operations are unlikely to very clearly demarcate any particular kind of thinking, as some of them enjoy near universal usage. Further, nothing is said of their joint or distributed necessity or sufficiency for constituting CT. Conversely, however, the universal reach of these concepts and their embodiment in our increasingly ubiquitous information technologies lend credibility to the claims that CT could form an integral part of a fourth, fundamental form of literacy, alongside writing, reading, and arithmetic (Wing, 2006).

Concepts like abstraction, generalization, and pattern recognition are the subject of intense discussion in the philosophy of logic and science (Dennett, 1991; Ladyman & Ross, 2007), and they are used widely. Logic is closely related to computer science, and when understanding these concepts in relation to computer science, we should point to paradigmatic achievements of computer science. For example, Turing offered an extremely *simplified representation* of the steps taken – the *algorithm* – when a *calculation* is carried out by human computers, so simple that a *machine*, in principle, could carry it out. Turing's groundbreaking paper (Turing, 1936) explored computing not for its own sake but was an attempt to solve a problem in the foundations of

mathematics (the *Entscheidungsproblem*). Thus, also in the computer science–based approach do we find modes of thought – heuristics for problem-solving – that are universal and conceivable as the basis for transcurricular learning activities.

CT in crosscurricular teaching

The approach to CT as a general thinking skill that can be applied across and beyond different school subjects aligns with the taxonomy proposed by Mård and Klausen (Chapter 2) by holding the potential of both being a crosscurricular and transcurricular approach to teaching. CT can draw on crosscurricular teaching approaches, acting as a problem-solving method by correlating or integrating different subject-related disciplines toward a specific theme or challenge. CT will, in this sense, become a tool for formulating, modeling, and solving problems and challenges involving literacies and skills from different subjects. Likewise, CT can be used in a transcurricular way when understood as a set of methods and strategies that are not constrained by a particular subject but is a general problem-solving procedure. These two approaches will be outlined in the following.

We have suggested that a brand of CT informed by Papert's ideas will more readily lend itself to transcurricular applications. The same point can be made by utilizing the taxonomy of thinking frameworks proposed by Moseley et al. (2005). While an approach *à la* Wing or Grover configures CT as a framework "dealing with the cognitive structure and/or development," Papert's framework should be seen more as a framework for "productive thinking" or an "all-embracing framework" (Moseley et al., 2005). Papert's book uses examples of "powerful ideas" found in physics, probability, and mathematics. But nothing in his approach to using computers in learning points to such a restriction to STEM subjects. Papert's construal of CT was less directly influenced by the discipline of computer science and more by an approach that was critical of prevailing schooling systems and methods of teaching.

This more general approach notwithstanding, according to Papert, a vital aspect of engaging with "powerful ideas" was performing "procedural thinking" – "thinking like a computer" as he phrased it (Papert, 1980, p. 155). That is, the computer-science skills, later highlighted by Wing, were seen by Papert as essential elements – but not essential for their own sake, but for what they contribute in the pursuit of grasping "powerful ideas." In our example of a crosscurricular approach, Twine in Danish L1, we focus on this aspect from Papert – the highlighting of procedural thinking. We show how skills and literacies from Danish L1 can be integrated with computer science's procedural thinking, because the computer allows manipulation of symbols other than numerals, as pointed out by Papert.

Briefly explained, Twine is a tool where one can extend traditional stories through HTML coding, using variables, conditional logic, images, and much more. As author, you create passages that are hyperlinked and intertwined and

hereby becoming clickable stories. The reader plays a main role in determining the specific plot by making decisions on how the story is to move forward. Following a discussion of Twine, we then present a more general, transcurricular use of CT in the learning activity, the Cyber Weapon.

CT as a crosscurricular Twine in language 1

Children's use of software as objects-to-think-with was Papert's way of addressing the shortcomings of the schooling system. That is to say, to Papert, affective aspects and situated aspects of learning (Kafai et al., 2020) were as important as technical know-how. Papert's approach was reminiscent of the Bildung approach in more respects. In particular, the fourth aspect of Bildung – that "materials must be individually appropriated and modified" (Chapter 3) – was key to Papert's brand of learning constructivism – constructionism. This is central to the use of Twine, explored in the following. Papert's aim was also to introduce computing "into everyday life," making it a meaningful experience for the child using the computer, rather than the computer using the child.

Papert might have called Twine a way of using a computer to grasp the powerful idea of a narrative, offering tools that concretize the building of a story. In the same way, using a computer and programming software to assist in building a narrative and producing alternative text formats in L1 education is a way to enhance a "self-constructed" grasp of the idea of storytelling, in a crosscurricular manner, drawing on different disciplines and their literacies.

Writing interactive stories in Twine involves literacies and methods both concerned with programming, writing, and composing stories, well-known within language arts. Here pupils are trained and taught different techniques on how stories are composed and how to use different aspects of the written language. However, writing stories in Twine is somewhat different from more traditional writing practices in schools. It is a specific communicative situation in that it involves hypertexting and symbol manipulation, drawing on HTML coding. This way the Twine story is crosscurricular in that it becomes not only a L1 genre text (fiction), but also a subject-specific text (graphical presentation of the structure of the html code) for computer science involving a somewhat different literacy.

The text the pupils compose will become a mixture of natural language and formal computer language. For instance, creating a hypertext link requires the pupils to use double square brackets, [[and]]. In traditional writing practices, square brackets are mostly used to alter or provide additional context to quotes. However, in HTML coding, they are often used as an array of values that can be called by the program. In Twine, the double square brackets form a hyperlink representing a hook between different passages in the story. Mixing different text genres is not an easy feat and it requires the pupils to recognize that the symbolic representation in the written text means different things when shifting between computer science (to code in Twine) and L1 to write a good narrative.

Another difference between traditional writing and writing in Twine is that it requires modeling from a consecutively way of composing a text, often written in first or third person, to a step-by-step sequenced way (i.e., design of an algorithm), where the reader is positioned as the main character (second person/You) which the plot develops around. There is a change in text genre requiring the pupils to decompose, recognize patterns, and decide how the different details and elements of the story align and progress in accordance with each other, thereby enabling the reader to make choices based on the content of each connected text block (abstraction).

CT as a transcurricular approach: the Cyber Weapon

As a contemporary example of a transcurricular approach, a group of pupils who are solving the escape puzzle *The Cyber Weapon* can be used (for a more detailed explanation, see Hachmann (2022)). In brief, the escape puzzle plays out as a narrative where the pupils are initiated as "hackers" who are required to decode a series of wooden boxes. The five boxes contain a microcomputer, a Micro:bit, set with five different sensor capabilities, respectively. For instance, the photoresistor senses light, the accelerometer detects movement, and the hall sensor detects the presence of magnetic impulses. In decoding the boxes successfully within the time limit of 60 minutes, the pupils are able to obtain a hidden code that will stop a computer virus from spreading on the internet. Failing to do so will erase all their online data, hence their digital identities. From a CT perspective, the pupils are meant to engage in the activity of problem-solving through related CT strategies such as decomposing, pattern recognition, and algorithmic thinking.

Decomposition involves dividing the problem space into smaller pieces and isolating each wooden box as a problem to be solved. This requires the pupils to identify, categorize, and evaluate their discoveries as they physically manipulate the boxes by holding, shaking, or turning them. These discoveries, however, become anchoring points for the pupils' problem decomposition, and the process of parallel combining and relating objects to label them with the appropriate characteristics and relationships becomes crucial (Hachmann, 2022, p. 7). Discovering that the boxes contain a Micro:bit with specific (sensor) properties and relating their role to one another and the clues given in the puzzle involves pattern recognition and algorithmic thinking.

Concluding remarks: delimiting CT approaches

As we have highlighted through this chapter, CT as a thinking framework has at least two sources: one that started out with seeking to address wider aspects of learning, such as affective aspects and its institutional setting, and one that focused more narrowly on the integration of subject-specific skills and literacies. For both approaches, however, procedural thinking in the form of step-by-step problem-solving procedures is essential. This is clear in the examples,

where following the steps of decomposition, pattern recognition, algorithm design, and abstraction are necessary to solve both the transcurricular and the crosscurricular tasks. As indicated earlier, Papert also explicitly highlighted such procedural thinking as vital in utilizing the computer to engage with "powerful ideas."

For Papert, procedural thinking precisely had a role to play *in the context of* "powerful ideas." As a final reflection, we wish to pursue this thought and ask the question: *When does CT have a role to play?* Or put differently: *Under what conditions is CT meaningful*? In the crosscurricular example, we highlighted that Twine was used to grasp the powerful idea of a narrative. This statement bypasses the point that all students, of course, already have an initial overall understanding of narrative: they all have had stories read or told to them many times before; they watch movies and play computer games; they themselves enact and tell stories as a significant part of play-time activities. This overall understanding of narrative is what makes the Twine activity meaningful to them in the first place. It provides significance to the steps of decomposing the task, recognizing patterns, and coding in Twine: all these steps are part of writing what they already know to be a narrative. A similar point applies to the transcurricular example: it is the overall meaning of identifying and delimiting a problem and approaching it in a systematic, solution-oriented way that provides significance to the CT steps of decomposing the task, recognizing patterns, and thinking algorithmically. This is what CT is *for* in that task.

These considerations indicate a more general feature of learning with CT: CT fundamentally consists in analyzing and acting on the parts of a whole. What significance these parts have is accorded to them by an overall meaning that is *not* – initially – provided by CT. Instead, this overall meaning is provided by the understanding that the student will always already have of the situation before embarking on the task – by the pupil's *pre*-understanding, as Gadamer (1990) called it. This pre-understanding projects an overall meaning to the task as well as to the different parts of it. However, as the pupil engages with the task, fully in line with the aim of Bildung, the overall meaning is extended, nuanced, and potentially even contradicted by the details revealed by following the CT steps. Thus, in the crosscurriculary case, through the CT activities, the pupils' initial understanding of what a narrative is, is developed to a much more multifaceted and detailed understanding of narrative structure and path, coherence and consistency across a story, and significance of prior choices to actions possible in the now. Similarly, in the transcurricular case, the CT activities allow the pupils to develop their understanding of the nature of problem identification and solving.

What these considerations amount to is the delimitation of CT in learning as the "parts" aspect of a hermeneutic circle: the pre-understanding (whole) – of task and of subject matter – provides the initial sense to the CT procedures involving various parts. This initial sense is then developed through the CT analyses to a more nuanced whole, which then again can inform more nuanced

CT analyses. The answer to our concluding reflective question – when CT has a role to play and under what conditions CT is meaningful – is therefore that CT has a role to play and is meaningful when treated as not providing "the truth, the whole truth and nothing but the truth," but instead as providing – literally – *parts* of the truth, that can enlighten "the whole truth" with details and nuances.

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19 Conclusion

Søren Harnow Klausen and Nina Mård

The preceding chapters have made a case for cross- and transcurricular teaching and contributed to developing a didactic framework for it. In conclusion, we would like to stress the following key points and lessons that have emerged:

1. The ideas, cases, and findings presented in the chapters almost invariably support the notion that Bildung can serve as a foundation for such a framework and help to unify different approaches, as we argued in Chapter 3. This shows both the relevance and strength of a Bildung-oriented approach and the need for subject teaching educators and subject didactics researchers to further familiarize themselves with, and apply, this approach. Chapters 4 and 5 illustrate how Bildung already functions as a guideline or model for crosscurricular didactics and (in Chapter 4) how crosscurricular teaching can support Bildung-oriented goals by being non-affirmative, problem-based, and empowering, and integrate an emphasis on innovation with a concern for ethics. Chapter 6 describes how attempts to promote a truly dialogic classroom and teaching style can foster personal qualities central to Bildung, like personal engagement, reflection, and self-expression. It also illustrates how a concern for transcurricular learning goals like these is compatible with teaching subject-specific content. Further in line with the inclusive Bildung approach laid out in Chapter 3, Schaffalitzky points out in Chapter 6 that dialogic teaching can support both instrumental and noninstrumental goals.
2. We made clear from the outset that the framework outlined in the book should not be seen as fixed, but as subject to further development. Several chapters argue for a need to either emphasize certain elements of Bildung more strongly or expand or revise the very notion of Bildung. Chapters 7 and 8 attempt to correct the widespread notion that Bildung and crosscurricular teaching are mainly about "bookish" learning, arguing that physical activity and fostering student wellbeing are central to Bildung, which is concerned with the whole person and all human powers. In Chapter 7, Kuokkanen, Gutierrez, Enkvist Snellman, and Romar also show how physical movement can be integrated in teaching in gradually more comprehensive and

DOI: 10.4324/9781003367260-22

sophisticated ways, thus demonstrating that crosscurricular teaching must not be very demanding or revolutionary. A more gradual, steadily expanding and merely complementary approach is also possible (compare the notion of a "double focus" on subject teaching and more general Bildung aims introduced in Chapter 3). The potential of physical activity is further highlighted in Chapters 11 and 12, on drawing and craft. Both chapters demonstrate how movement and sensory experience is integral to personal development and aesthetic expression, again confirming ideas that are central to the classic notion of Bildung.

a. Several authors attempt to correct typical narrow understandings of crosscurricular teaching and Bildung as intellectualist or "bookish" by calling for a heightened awareness of non-human nature and materiality. This is very pronounced in Chapters 13 and 14 on sustainability and climate change; in Chapter 13, Laugesen and Elf contend that the Bildung-oriented didactics of Klafki and others have suffered from an anthropocentric bias that must now be overcome in light of the climate crisis. The significance of supporting students' experience of materiality is also highlighted in Chapter 12 on craft. The plea for embracing unpredictability made by Höglund and Jusslin in Chapter 10 on arts-integrated poetry teaching can likewise be seen as an attempt to understand Bildung as a more open, experimental, and deliberately risk-taking process than it is usually taken to be. Although it can be argued that both the concern for non-human nature and an acknowledgment of the unpredictability of learning processes were already central to the classic notion of Bildung, such accentuations may be needed to correct recent more one-sided understandings of Bildung, which have tended to overemphasize intellectual skills and focused more on culture and society than on nature. It remains an issue for further discussion whether the climate crisis requires a more radical break with the humanistic orientation of the Bildung approach. It seems likely, however, that teaching must maintain a particular focus on human beings, particularly students, in their capacity as learners and potential agents of climate change.
b. The extent to which crosscurricular teaching should have a critical orientation is also discussed throughout the book. Hobel's emphasis on the nonaffirmative and deliberative aspects of Bildung in Chapter 4 is a typical attempt to correct what may seem like a more conformist tendency in the classical notion of Bildung, by giving more weight to empowerment and critical attitudes of students. Hobel's proposal remains squarely within the Bildung tradition, however, he makes clear that student empowerment must be fostered through engagement with content and epochal key problems. His and many other chapters exemplify the need for a permanent search and adjustment process aimed at finding an appropriate balance between freedom and criticism, on the one hand, and socialization, enculturation, and qualification, on the other hand: a

balance that must be continuously readjusted in response to the specific circumstances.

3. Several chapters likewise demonstrate that it can be advantageous or even necessary to broaden the understanding of existing concepts, to support genuinely crosscurricular teaching and the aims of Bildung. For example, a relational view of mathematics as socially embedded may be preferable to an instrumental view, as Röj-Lindberg, Braskén, and Berts argue in Chapter 9. Similarly, Rautiainen, Hiljanen and Tallavaara urge in Chapter 15 that democracy should be understood as a general form of life rather than merely a process of political decision-making. Laugesen and Elf point out in Chapter 13 how sustainability teaching has been dominated by the natural and social sciences. In Chapter 16, Mård and Wägar identify a narrow, commercially oriented, and a broader, life skills–oriented and creativity-oriented views of entrepreneurship education. The latter more naturally supports and can be supported by crosscurricular teaching, just as it conforms more closely to the Bildung approach. Similarly, in Chapter 18, Hansen, Hachmann, and Dohn distinguish between an understanding of computational thinking that focuses narrowly on the integration of subject-specific skills and one that addresses wider aspects of learning, including affect and institutional setting. They suggest that computational thinking should be understood as a framework that enables students to develop a both general and detailed understanding of narrative and argumentative structures and processes of problem identification and solving, thus highlighting its relationship to both hermeneutics and critical thinking. These examples all show how existing concepts, methods, and courses can be appropriated and modified to facilitate crosscurricular teaching.
4. Many argue that Bildung-oriented crosscurricular teaching should be driven not only by a concern for the personal development of individual students, but also for the ongoing development of the teachers themselves, of teacher collaboration, the teacher–student relationship, and classroom and whole school culture. Nor is crosscurricular teaching mainly about "curriculum integration," in the narrow sense of combining subjects and contents; it is just as much about shaping collective practices and learning environments. Höglund and Jusslin describe in Chapter 10 how working with arts integration, and the experience of letting students work in unpredictable ways, can bring teachers to reflect on and change their teaching habits and professional self-understanding. In Chapter 5, Mård and Hilli characterize teacher collaboration as a process in which individual freedom is negotiated while developing shared ideas and responsibilities – in other words, as a process that exemplifies key elements of Bildung. Rautiainen, Hiljanen, and Tallavaara likewise argue in Chapter 15 that teaching for democracy entails developing a more democratic school culture, and that this includes challenging established teacher self-understandings and fostering a more collaborative mindset. Hence all these authors illustrate, in various ways,

how crosscurricular teaching also contributes to the transformation and development of teachers and school culture.

   a. The collective and mutual nature of the Bildung processes fostered by crosscurricular teaching is also highlighted in Chapter 8 on wellbeing, which suggests that the ability to maintain and improve wellbeing should be seen as a collective competence. Teaching for wellbeing involves a concern for the emotional climate in the classroom, class group dynamics, and even parental involvement; and the teacher's own wellbeing also needs tending to.

5. The chapters also show how crosscurricular teaching remains challenging and so the need for still further didactic development, in some cases for caution and adjusted ambitions. For example, Forsman, Bendtsen, Björklund, and Pörn point out in Chapter 17 that the theoretically attractive idea of teaching simultaneously for both content and language objectives has proven to be difficult to carry out in practice. They do not argue that it should therefore be abandoned, but that it shows a need for strengthening teachers' competences in this field and for enhanced cooperation between language teachers and non-language subject teachers. They suggest that content teachers offer students the use of second language as a possibility rather than forcing it upon them, giving priority to the use of authentic and functional subject-specific language. This is an instructive example of the realism and concern for balance and the diverse goals and aims of teaching characteristic of the inclusive Bildung approach.
6. Nevertheless, most of the findings reported in the book indicate that crosscurricular teaching does not make it more difficult to attain the subject-specific learning goals or maintain a sufficiently high level of student achievement. Nor must it be particularly demanding or resource-intensive. Most of the recommendations are for ways of modifying existing teaching rather than something that requires additional activities.

What is still missing?

We have emphasized repeatedly that the development of a didactics for crosscurricular teaching is a permanent task. This book has presented a general framework and some more specific guidelines and points of attention, but further work is needed to complement and expand them, especially regarding the following:

1. *Adaptation to specific contexts.* Most ideas and suggestions in this book should be applicable to a variety of settings, as they do not require any radical changes in framework conditions. However, local conditions, for example, larger or more limited degrees of teacher autonomy or stricter curriculum guidelines may influence their implementation. Here, models like that of Mård and Hilli (Chapter 5) or more domain-specific models like

those of Kuokkanen, Gutierrez, Enkvist Snellman, and Romar (Chapter 7) or Hartvik and Porko-Hudd (Chapter 12) can assist the planners and teachers in figuring out what can be done under the given circumstances. It must also be noted that while the selection of topics and cases presented in the book supports the overall orientation toward Bildung and crosscurricular teaching, it is itself based on particular interests and experiences; the cases should be seen as examples among others that may be just as pertinent, or even more.

2. *Application to different types and levels of education.* Just as the research literature on interdisciplinarity has focused one-sidedly on higher education (see Chapter 2), most research on crosscurricular teaching, including most chapters in this book, have focused mainly on secondary education (but see Dolan, 2021, which complements Chapters 13 and 14). This leaves primary education as an important field for future studies. While many of the findings in this book may also be applicable to primary education, at least with modifications, there will likely be important differences. The lesser degree of specialization and sophistication may make it relatively easy to teach across and beyond the curriculum, whereas students' more limited knowledge and need to acquire basic skills may make it more difficult in other respects. Similarly, *progression* is an issue only marginally dealt with in the book: How can it be avoided that crosscurricular teaching revolves around the same recurring topics, and how can it support increasingly demanding curricular goals, while retaining its inclusive character?
3. *Evaluation*. The attempt to teach across and beyond the curriculum and foster Bildung can make evaluation particularly difficult. It ought to target the educational aims that call for crosscurricular teaching in the first place, like transversal competences and personal development. Yet in the absence of specific tools and criteria, it is likely to rather target subject-specific skills, perhaps merely aggregating the results of evaluations done by teachers with different subjects. While evaluation challenges are pointed out at several places in the book, only Chapter 6 on dialogic teaching considers it in depth. Schaffalitzky warns against creating high-stake situations, since these can hamper students' willingness to engage in an authentic dialogue, but suggests that the teacher can gauge the success and progress in dialogic activities based on a number of observational criteria. She also suggests that dialogue can itself be used as an evaluation tool, as it, for example, enables a more reliable assessment of students' linguistic competence than formal tests.
4. *Taking up new and unpredictable themes.* Though the importance of an open, experimental, and risk-taking approach has been emphasized throughout the book, many of the topics and cases discussed may seem familiar and predictable. For crosscurricular teaching to remain relevant, it must remain sensitive to new possibilities and take up new themes. Sjöblom, Wolff, and Sundman address this challenge in Chapter 14 by pointing out that teacher education must be further developed to enable teachers to cope

with extremely complex or "wicked" problems that they will increasingly have to deal with in the future. Further research is needed to determine which skills and competences are needed for this, and how teachers can be prepared to adjust their teaching to new historical situations and surprising events, or finding new, particularly relevant and motivating aspects of more permanent issues. Much crosscurricular teaching during the last decade has been related to new trends and events, for example, the Arab spring, the election of Donald Trump as US president, the Brexit referendum and populism, have spurred an interest in teaching democracy. But there may also be a tendency to treat events merely as further examples of more or less perennial themes. This again illustrates not only the need for teachers to engage in a Bildung process themselves, but also for further research and teacher education development.

5. *Creating and disseminating a common language for talking about crosscurricular teaching*. The chapters show that a fairly simple and uniform terminology, tailored specifically to the field of school teaching (see Chapter 2), can be used to describe most of the central findings and concerns. They also show, however, that different fields and topics are still discussed in different academic languages and with reference to sometimes widely different theoretical frameworks. Substantially similar ideas and observations are conceptualized and expressed in ways that are often not far apart but may still make mutual understanding and adoption of the approaches to other subjects difficult. This is unsurprising, and a certain degree of terminological variety is probably inevitable. The use of different theoretical frameworks to conceptualize teaching of different subjects and topics is as such positive, as it ensures new and diverse inputs to the ongoing development of crosscurricular didactics. But there is a need for further tools for communicating and coordinating across school subjects – a language that can establish what Galison (1997) has termed "trading zones" between different disciplines. The terminological recommendations and translation for concepts (Chapter 2) and the generic Bildung framework and taxonomy of basic goals and competences (Chapter 3) developed in this book should help meet this need. However, more work has to be done in subject didactics in order to integrate this approach and find ways to express specific ideas and observations that make them more immediately useful for colleagues working with other subjects. A general lesson that has emerged from the discussion in the book is that crosscurricular teaching should not be approached one-sidedly from the perspective of the different subjects involved. A common, more general perspective is always needed – hence the need for a general framework and ongoing mutual discussions.

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