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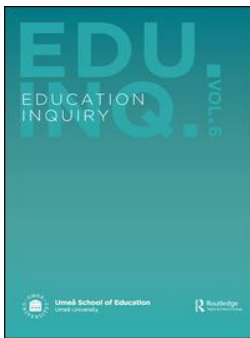
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Disciplinary contextualisation of transversal competence in Finnish local curricula: the case of multiliteracy, mathematics, and social studies

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ABSTRACT

Competence-based education is a widely implemented educational approach, but more research is needed into the relationship between transversal competences and individual disciplines. In this article, we present the results of a study focusing on how the transversal competence of multiliteracy is contextually defined in Finnish local curricula in the disciplines of mathematics and social studies. The article offers new insights into the discussion between content- and competence-based educations by introducing the concept of disciplinary contextualisation. Based on the qualitatively analysed data, four different types of disciplinary contextualisation are presented and further discussed. The study also engages with the discussion in the field of multiliteracy by offering insights into the ways in which multiliteracy is rationalised, defined, and developed in the analysed disciplines. Multiliteracy contextualisations share features, but also differences, between the disciplines, illustrating the importance of taking into account the disciplinary perspective when discussing the development of competences in basic education.

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Introduction

Competence-based education is widely promoted around the world in various educational contexts, including higher education, secondary and primary education, and vocational education (Eurydice, 2012; Pepper, 2011; Tchibozo, 2011). Competence-based education is steered by competence-based curricula, one concrete example of which is the Finnish national core curriculum for basic education (NCC) (FNBoE, 2014). The NCC contains seven areas of transversal competence inspired by various competence-based frameworks promoted by various international actors, including the Organisation for Economic Co-Operation and Development and the European Union (Uljens & Rajakaltio, 2017). As the choice of the word “inspired” suggests, no existing framework has been applied as such. Indeed, despite the commonness of competence-based approaches, there is variance in how the competences are understood, defined, and implemented in practice (Burnette, 2016; Le Deist & Winterton, 2005; van

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Griethuijsen, Kunst, van Woerkom, Wesselink, & Poell, 2019). Despite the headlines announcing the “extinction” of school subjects (e.g. Garner, 2015; Murray, 2017), a competence-based curriculum does not mean a total abandonment of subject-based curricula (Sofou & Tsafos, 2010). For instance, in the NCC, the transversal competences are to be taught and studied within all the disciplines¹ included in the curricula. Curricula can be seen as “dynamic force fields” (Luoto & Lappalainen, 2006, p. 14) in which traditions and reforms are in constant movement. Transversal competences are often studied to develop certain educational practices, such as evaluation, methods, learning environments and learning resources (e.g. Atenas, Havemann, & Priego, 2015; Gómez-Gasquet, Verdecho, Rodriguez-Rodriguez, & Alfaro-Saiz, 2018; Piispanen & Meriläinen, 2019). Overall, more comprehensive and empirically grounded knowledge is needed to further understand the contextuality of competence-based education, especially in relation to disciplines and support for its implementation.

To understand how certain concepts – in this case, educational competences – are implemented in local educational policy in a way that considers the specific local setting, Palsa and Mertala (2019) introduced the concept of “conceptual contextualisation,” which refers to “how a certain concept is defined in a way that considers the specific local educational setting” (p. 115). In this paper, conceptual contextualisation is applied to study how the transversal competence of multiliteracy – a broad and complex concept introduced in the Finnish educational system in the latest curricular reform – is contextualised within different disciplines with versatile theoretical backgrounds, specifically mathematics (natural sciences) and social studies (social sciences) in Finnish local curricula. The concept of multiliteracies is originally developed to describe an approach in literacy pedagogy that takes into account the diversity of communication methods and cultural and linguistic variance (The New London Group, 1996) and it is widely used across research fields (Kulju et al., 2018; Palsa & Ruokamo, 2015). Within the disciplines of social studies and mathematics, multiliteracy studies often focus on micro-level classroom practices (e.g. Joutsenlahti & Kulju, 2017; Lucey, Lycke, Laney, & Connelly, 2013; Takeuchi, 2015). To understand the contextualisation of multiliteracy from a broader perspective, we focus on the local curricula across Finland. The local curricula provide favourable opportunity to understand contextualisation since Finnish teachers and local education providers have high levels of autonomy and the local curriculum is not just a tool to implement the national core curriculum but is also a pedagogical tool for the development of education (Lavonen, 2017; Mølsted, 2015). The following research questions have guided the research process:

- (1) How are disciplinary contextualisations of the transversal competence of multiliteracy structured in Finnish local curricula?
- (2) How is transversal competence of multiliteracy contextualised in the disciplines of mathematics and social studies in Finnish local curricula for lower secondary education?

The article is constructed as follows. Next, we provide theoretical and contextual background information about competence-based education, multiliteracy and language-awareness, especially in the Finnish curricular framework. In the methodological

part of the article, the scope of the article and the research setting are described, as well as the methods used for searching the data and the analysis. The findings of the results are presented based on the research questions. The article is concluded by discussing the results, limitations and the future implications of the research.

Background

Competence-based education and the Finnish curricular framework

The origins of competence-based education can be traced to the USA and Canada in the 1960s and 1970s. It thereafter received interest in other parts of the world, including Europe, where the approach emerged in the 1980s (Tchibozo, 2011). According to Tchibozo (2011), one of the features of competence-based education is its purpose in providing learners with the ability to mobilise resources to master complex situations. Despite this common central characteristic, there has been confusion about the definition of the term, and competence-based education has been understood and conceptualised in different ways in different parts of the world (Le Deist & Winterton, 2005; Tchibozo, 2011). This notion highlights the importance of contextual understanding in the ways in which competence-based education is implemented in different education systems.

Education systems vary, such as in the levels of centralisation or decentralisation of their curricular frameworks (UNESCO, 2005). This should be taken into account when considering the implementation of competence-based education. In some decentralised educational policies, the importance of local contexts is taken more into account, whereas in some centralised educational systems, the national curriculum has a more standardised view of curriculum implementation. According to Ball (2012), some educational policies recognise that the national level curriculum should be adapted at the local level. Combining the perspectives of centralised and decentralised educational steering, the Finnish curricular framework offers a suitable opportunity to study the ways in which central concepts are contextualised. As discussed elsewhere (Palsa & Mertala, 2019), the Finnish curriculum framework consists of three levels. As a national level regulation, the NCC (issued by the National Agency for Education) creates the basis for the organisation of education and for the preparation of local curricula and the annual plans for individual schools. The aims of the national level regulation are to support and steer the provision of education and to promote equal implementation of education (FNBoE, 2014, p. 9). On the other hand, local curricula prepared by education providers offer the option of taking into account the special characteristics of the local context. “It plays a key role in setting out and implementing both national targets and goals and tasks considered important locally” (FNBoE, 2014, p. 9). The way in which the concepts presented in the national level core curriculum are defined in the local setting is referred to as conceptual contextualisation (Palsa & Mertala, 2019) and is part of the larger phenomena of curricular contextualisation (see, for example, Fernandes, Leite, Mouraz, & Figueiredo, 2013).

One interesting aspect of competence-based education is the relationship between transversal competence and individual disciplines. In the NCC, transversal competence refers to an “entity consisting of knowledge, skills, values, attitudes, and will” (FNBoE,

2014, p. 20). The core curriculum includes seven areas of transversal competence: 1) thinking and learning to learn; 2) cultural competence, interaction, and self-expression; 3) taking care of oneself and managing daily life; 4) multiliteracy; 5) ICT competence; 6) working life competence and entrepreneurship; and 7) participation, involvement, and building a sustainable future. Transversality refers here to the nature of the competences in the sense that they should be developed in all different disciplines. Even though the definitions of the competences are shared across the disciplines, they leave room for the question of how the competences are understood and applied in different disciplines, taking into account subject-specific features and characteristics. For every discipline, the NCC in Finland specifies various educational areas, such as the tasks, objectives, and content areas, as well as the learning environments, working methods, guidance, differentiation, support, and assessment. However, the seven specified transversal competence areas are only numbered as abbreviations (T1, T2, ... T7) and are linked to specific disciplinary objectives without more specific descriptions. These are issued subject to local decisions by education providers. According to NCC (FNBoE, 2014, pp. 102, 158, 285), the education provider should make decisions about and describe the objectives of transversal competences at different grade levels (in grades 1 to 2, 3 to 6, and 7 to 9), their local emphases, and the ways in which the development of pupils' transversal competences are supported.

Even though competence-based education is a widely used approach within European educational systems, a more strategic approach is needed to support further implementation (Eurydice, 2012). Specifically, in Finland, the multifacetedness of the concepts is one of the central points highlighted as part of the evaluation of the implementation of the current Finnish core curriculum for basic education. According to the development recommendations suggested by the assessment group of the Finnish Education Evaluation Centre (Venäläinen et al., 2020, p. 13), educational providers and schools need more support and guidance for the implementation of the curriculum. In their evaluation, the group suggested that the National Agency for Education (the agency responsible for curriculum development in Finland) should clarify the concepts used in the curriculum to ensure the necessary support. This study, focusing on the conceptual and disciplinary contextualisation of a specific transversal competence, can thus help to provide evidence-based support to understand the aspects of the concepts that could be clarified or supported.

Multiliteracy and language awareness in the Finnish curricular framework

The concepts of multiliteracy and multiliteracies are discussed in various fields of research, with varying meanings (Palsa & Ruokamo, 2015). The origin of these concepts is in the New London Group (1996) article *A pedagogy of multiliteracies – Designing social futures*, in which multiliteracies are defined as a pedagogical approach that is required to meet the needs of the ever-diversifying textual and cultural landscapes of contemporary societies. In the original definition, both the “multi-” and “literacies” concepts should be read as plural, as “multi-” refers to multimodality and multiculturalism and “literacies” refer to text-related and sociocultural literacies (New London Group, 1996). The Finnish interpretation, however, is slightly different: while cultural diversity is mentioned briefly (FNBoE, 2014), the emphasis is on understanding

multiliteracy as a text-related competency, and the definition is close to how media literacy is defined in the international research literature (Palsa & Ruokamo, 2015). More precisely, the NCC (FNBoE, 2014) approaches multiliteracy through three different perspectives (Palsa & Mertala, 2019). First, it provides a rationale for why a concept/competence, such as a multiliteracy, is needed (i.e. the “why” of multiliteracy), by stating that multiliteracy provides students with a means of critical thinking and learning and helps them to interpret the world around them. Second, the NCC defines what is meant by multiliteracy (i.e. the “what” of multiliteracy), defining it as the skills to interpret, produce, and evaluate different kinds of texts in different contexts and situations through the use of various tools. Texts, in turn, are defined as information presented through various symbol systems (linguistic, visual, auditory, numerical or kinaesthetic or a combination of these), and multiliteracy is conceptualised as an umbrella concept for subsets of literacies. Third, the NCC provides guidance for multiliteracy practices (i.e. the “how” of multiliteracy), stating that developing multiliteracy requires a rich text environment and a pedagogy that utilises it (FNBoE, 2014; Palsa & Mertala, 2019).

Multiliteracy offers a favourable opportunity to study the relationship between competences and individual disciplines. Competences can be categorised as disciplinary (including competences specific to a discipline) and transversal (common across the disciplines) in their nature (Hernández-de-Menéndez & Morales-Menendez, 2016). However, multiliteracy combines both of these perspectives. In the Finnish core curriculum, as a transversal competence multiliteracy has its specifically defined contents that are promoted across the disciplines, it also covers the idea of discipline-specific textual practices, which can be understood through the lenses of language awareness or disciplinary literacies.

Language awareness refers to the idea that teachers need to be aware that every discipline has its own ways of using language and text to represent and construct reality (Harmanen, 2013). In addition, disciplinary literacy captures discipline-specific ways of knowing, cultures and the tools of knowledge production and critique (Moje, 2015). Therefore, as argued by Luukka (2013), each teacher

has a responsibility to guide [students] towards the language and textual practices of their discipline. Thus, every teacher needs to think about how the goals related to the accumulation of multiliteracy are reflected in everyday teaching. Studying the textual practices of biology, history, visual arts and mathematics is the most natural link to the study of the contents of each discipline. (n.p.)

Luukka’s (2013) notion about the textual practices of the different disciplines suggests that the same texts and symbols are approached differently in different disciplines. Take numbers, for example. To draw on Green’s (1988) 3D model of literacy, mathematics education traditionally operates on the operational dimension of number-related literacies²: in its most basic form, the operational dimension here is about the ability to identify number symbols and to understand their connection to numerals and amounts. More precisely, the number nine (9) equates to nine apples and the numeral “nine”. That said, besides numbers, the mathematically symbolic language (Joutsenlahti & Kulju, 2017) contains various non-alphabetical symbols (e.g. +; -;/; *; =). Additionally, in algebra the variables are marked with alphabets, which requires

contextual literacy as to what the alphabet stands for. Furthermore, from the viewpoint of social studies, numbers are not straightforward information about the physical world, but rather representations of societal phenomena. Whether information about societal issues is presented in absolute numbers or percentages plays a notable role in shaping one's interpretation of the issue (Bell, Hartman, Piekut, Rae, & Taylor, 2020, pp. 9–12). For example, in 2015, The Centre Party received 56.9% of the votes from the town of Savukoski in the Finnish parliament elections. While the percentage is rather notable, in actual numbers it equates to 418 votes, which is roughly 0.014% of all recorded votes. Understanding the tensions between numbers and social reality is one key competence in agentic citizenship – an explicit objective mentioned within social studies in the NCC (FNBoE, 2014, p. 419) – and a cautious stance towards numbers is aligned with what Green (1988) refers to as a critical dimension of literacy.

Materials and methods

Choice of subjects and grades

To understand the ways in which multiliteracy is contextualised in different disciplines, we focus on two subjects with differing disciplinary backgrounds – mathematics (natural sciences) and social studies (social sciences) – as they were thought to offer more versatile perspectives on the disciplinary contextualisation than drawing from one disciplinary tradition only. For example, according to the NCC (FNBoE, 2014, p. 418), one of the main tasks of social studies is to support pupils' growth into active, responsible, and enterprising citizens and to guide them to act in a pluralistic society that understands diversity and respects human rights and equality in accordance with the values and principles of democracy. The task of mathematics, in turn, is to support the development of the pupils' logical, precise, and creative mathematical thinking (FNBoE, 2014, p. 374). Additionally, we reasoned that a comparison between two academic disciplines would provide a stage for more nuanced analysis than a comparison between academic discipline and arts and crafts.

The contents of the different disciplines are described in a systematic manner in the Finnish NCC, as outlined in [Table 1](#). For both disciplines, the objectives are explicitly related to specific key content areas (seven in mathematics, four in social studies) and transversal competences (common across the disciplines). Discipline-specific objectives and the key content areas are described in the NCC, but the transversal competences are not explicitly described.

In addition, it was decided to concentrate on lower secondary school (grades 7 to 9). This age range was chosen because – in contrast to grades one to six – multiliteracy is defined in grades seven to nine as being deepened by expanding the range of different texts in all the different subjects (FNBoE, 2014). The participation of the pupils in their own surroundings, the media, and society is emphasised. Various specific literacies are highlighted as part of multiliteracy development for the specific grades, including analytical, critical, cultural, ethical, environmental, media, and visual literacies, and the grade-specific emphasis of the transversal competence of multiliteracy is presented in [Appendix A](#). On these bases, it was reasoned that the curricular texts would be richer and more detailed in grades seven to nine than in lower grades. Additionally, since research on multiliteracies

Table 1. Structure of the disciplinary descriptions in the Finnish core curriculum for basic education.

Task of the subject	
Objectives of instruction	
Mathematics: 20 objectives are presented under the following three themes: 1) significance, value, and attitudes; 2) working skills; and 3) conceptual objectives and objectives specific to the field of knowledge.	Social studies: Nine objectives are presented under the following three themes: 1) significance, values, and attitudes; 2) adopting knowledge and skills needed in society and societal understanding; and 3) using and applying societal knowledge.
Key content areas (abbreviation C) related to the objectives of the discipline	
Mathematics: C1 Thinking skills and methods C2 Numbers and operations C3 Algebra C4 Functions C5 Geometry C6 Data, processing, statistics, and probability	Social studies: C1 Daily life and personal life management C2 Democratic society C3 Active citizenship and involvement C4 Economic activity
Objectives related to the learning environments and working methods	
Guidance, differentiation, and support	
Assessment of the pupils' learning	

has mainly concentrated on education practices, with the emphasis on observations and ethnographic methods (e.g. Kulju et al., 2018; Palsa & Ruokamo, 2015), putting the focus on curriculum level – especially in the disciplinary contexts of social studies and mathematics – would broaden the contextual palette of the research.

Search for the data

In the first phase, the local curricula were searched using online search engines and the curriculum web-portal (e-Perusteet) hosted by the National Agency for Education. In Finland, there are a total of 311 municipalities (Statistics Finland, 2020); from these municipalities, the local Finnish curriculum³ was found in 276 (covering 88.7% of the municipalities). Of these, 208 were prepared individually in the municipalities, while, in 68 municipalities, regional curricula were created through cooperation (creating 12 regional curricula). Thus, in this study, 220 distinct local (including regional) curricula were scrutinised.

First, the chapters describing the disciplines of mathematics and social studies were reviewed from the local curricula, as illustrated in Figure 1. From this phase, disciplinary contextualisation was identified in 43 local curricula (19.5% of the analysed curricula). As mentioned above, transversal competence areas in the disciplinary settings are only numbered as abbreviations (T1, T2, ... T7) in the NCC without more specific descriptions. Thus, every description of the multiliteracy in the analysed curricula (illustrating the disciplinary contextualisation) was included in the further analysis. These local curricula were coded with consecutive numbers from 1 to 43. In 26 local curricula (11.8% of the analysed curricula), disciplinary contextualisation was found for both disciplines, while in 17 local curricula, contextualisation was present for only one.

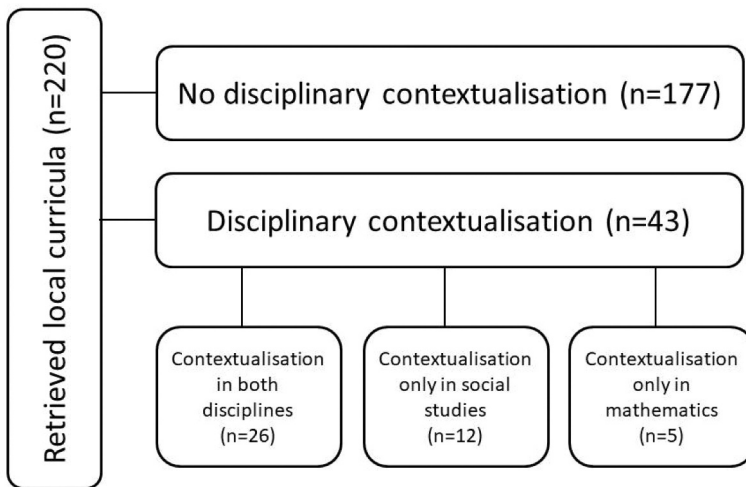


Figure 1. Disciplinary contextualisations in the Finnish local curricula

Thus, the data further analysed in this study consists of 69 individual multiliteracy contextualisations (38 in social studies and 31 in mathematics).

Analysis

Two different analytical perspectives were used. To answer the first research question concerning the ways in which the contextualisations of the transversal competence were made, the data was analysed using inductive analysis (Thomas, 2006). This perspective was chosen based on the nature of the data. Even though contextualisation of the transversal competences in the Finnish local curricula are encouraged in the NCC, the process is not explicitly guided; instead, the creators of local curricula have relatively broad freedom to organise and decide how the contextualisation is performed (see, for example, Tikkanen, Pyhältö, Pietarinen, & Soini, 2019; Venäläinen et al., 2020). To conduct the analysis, the textual data consisting of individual contextualisations was organised in a data matrix based on the curricula and the separate disciplines. The data was read through several times to find commonalities in relation to the structures of the curriculum in order to form common types, compare the data extracts to the found types, and form a final framework consisting of categories of types of contextualisation.

To answer the second research question, the data was analysed using deductive content analysis (Kyngäs & Kaakinen, 2020). First, individual contextualisation texts were addressed from three theory-guided perspectives (rationale, definition, and practice; Palsa & Mertala, 2019). The data focusing on the rationale of the transversal competence (Why?), the definition of the transversal competence (What?), and the ways in which the transversal competence is planned to be developed in the context of the specific subject (How?) were extracted from their specific columns in the data matrix. The data was then further addressed by combining all the data focusing on specific levels of contextualisation (rationale, definition, and practice) in individual discipline-specific data sheets ($n = 6$) to enable more nuanced analysis. These

collections of data were then read again thoroughly, and the data was thematically grouped based on the reciprocal similarities and differences.

Findings

The findings of the present study are presented in two main sections. The first answers the research question “How are disciplinary contextualisations of the transversal competence of multiliteracy structured in the Finnish local curricula?” The second, in turn, answers the question “How is transversal competence of multiliteracy contextualised in the disciplines of mathematics and social studies in the Finnish local curricula for lower secondary education?”

How are disciplinary contextualisations of the transversal competence of multiliteracy structured in the Finnish local curricula?

Four different types of partially overlapping⁴ disciplinary contextualisation were found (Table 2). Next, each type is illustrated with data extracts from both of the analysed disciplines.

The *general disciplinary contextualisation* (72.5%, n = 50) illustrates how the transversal competence is broadly taken into account across the scope of the whole discipline. The following data extracts illustrate how the contextualisations cover the scope of whole disciplines and highlight their central features to the transversal competence. Good multiliteracy is required in the discipline of social studies (Curriculum 18), whereas the ability to perceive and question the world is highlighted in mathematics (Curriculum 17).

Social studies:

Social studies lives in the media. Multiliteracy is a central part of civics, because the topic of social studies is addressed constantly in the media. Communication tools and media have a great social meaning and are scrutinised critically. Versatile media contents and texts are utilised in the studies. Pupils use, produce, and interpret different texts by

Table 2. Types of disciplinary contextualisation.

Type of disciplinary contextualisation	Frequency (% of all contextualisations)	Description
<i>General disciplinary contextualisation</i>	72,5% (n = 50)	General disciplinary contextualisation describes how transversal competence is taken into account in the scope of the whole discipline
<i>Objective-specific disciplinary contextualisation</i>	18,8% (n = 13)	Objective-specific disciplinary contextualisation describes how the transversal competence relates to the specific disciplinary objectives
<i>Grade-based contextualisation</i>	8,7% (n = 6)	Grade-based disciplinary contextualisation describes how transversal competence is taken into account in different grades within the specific disciplines
<i>Content-based contextualisation</i>	7,2% (n = 5)	Content-based disciplinary contextualisation describes how the transversal competence is related to the specifically defined disciplinary contents

themselves and in groups. An essential part of social studies is guiding pupils to develop good study skills; for example, essay answers are an important skill in social studies. Discipline requires good multiliteracy. Multiliteracy is developed, for example, with diverse resources and materials. (Curriculum 18)⁵

Mathematics:

Multiliteracy means the skills to acquire, combine, edit, produce, present, and evaluate in different forms, in different environments and situations, and with the help of different equipment. In mathematics, pupils' multiliteracy is developed towards the mastering of mathematical language and ways of presentation. Pictures and texts are interpreted and produced, for example, with the help of numeric symbol systems, geometrical forms, and digitally. Pupils are instructed to use, for example, different units of measure and quality conversions or to create and interpret tables in explaining different phenomena. In multiliteracy, the ability to perceive and question the world around is a central feature: is the information provided true, possible, unlikely, or not true? (Curriculum 17)

In *objective-specific disciplinary contextualisation* (18.8%, n = 13) the contextualisation was done with respect to the outlined objectives of the discipline in question. The following data extracts illustrate how transversal competence is contextualised in relation to specific disciplinary objectives (objective 6 in social studies, objective 16 in mathematics).⁶

Social studies:

Objective 6:

- To support the pupil in understanding that different values, perspectives, and motives are related to the social information produced by different actors.
- Multiliteracy and the critical analysis of media require versatile use of information and communication technology. The conceptual nature of the discipline is taken into account in the working methods, for example by highlighting the description of pictures, graphs, and statistics. (Curriculum 3)

Mathematics:

Objective 16

Multiliteracy: The construction of visually presented information towards more abstract geometrical ideas is supported. (Curriculum 22)

Grade-based contextualisations (8.7%, n = 6) illustrates how transversal competence is taken into account separately in different grades within a specific discipline. The following data extract focusing on social studies illustrates the overlapping of two types of disciplinary contextualisations. Multiliteracy is contextualised not only based on the disciplinary objects (objective 1) but also within the specific grade level (grade 8). The latter data extract concerning mathematics provides an example of how multiliteracy is contextualised in several grade levels (grades 7 to 9).

Social studies:

Grade 8. Objective 1. Multiliteracy: As diverse educational materials and as versatile working methods as possible are used so that interest in society and social issues is maintained. For example, internet, magazines, films, television, and social media are utilised. Critical evaluation of the information provided by the previously mentioned media is practised. (Curriculum 29)

Mathematics:

Grade 7. Multiliteracy: To support the pupil in becoming competent in exact mathematical expression, verbally and in writing.

Grade 8. Multiliteracy: To guide the pupil in detecting and understanding the relationships between the things learned and to support the pupils in solving mathematical tasks that require logical and creative thinking and developing the skills needed in these tasks.

Grade 9. Multiliteracy: to guide the pupil in developing information management and analysis skills and to guide the critical consideration of information. (Curriculum 23)

Last, the *content-based contextualisations* (7.2%, $n = 5$) draw connecting lines between multiliteracy and the core content areas of the specific discipline. The first data extract illustrate how certain aspects of multiliteracy are emphasised in social studies. Next, the latter extract also illustrates the overlapping of different types of contextualisation, as multiliteracy was contextualised within it in relation to both a specific grade and specific content areas.

Social studies:

C[ontent area]1: T4 Criticality towards advertisements, rights and duties of citizens, understanding the diagrams of statistics.

C[ontent area]2: T4 Running errands with the judicial system, recognition of efforts of political influence.

C[ontent area]3: T4 Media literacy: consideration of electoral results and support of political parties.

C[ontent area]4: T4 Criticality and the interpretation of references. (Curriculum 25)

Mathematics:

9th grade: Multiliteracy (T[ransversal competence]4): Content areas: C1: Special features; C3: 2nd degree equation pairs, equation pairs, 1st degree inequalities; C4: parabolas, functions; C5: trigonometry, circle, space geometry; C6:-. (Curriculum 16)

How is the transversal competence of multiliteracy contextualised in the disciplines of mathematics and social studies in the Finnish local curricula for lower secondary education?

Disciplinary contextualisation at the level of rationale

Rationale-level contextualisation refers to the way in which the need for multiliteracy is expressed in curricula (Palsa & Mertala, 2019). In social studies, rationale-level contextualisation appeared in 7.9% ($n = 3$) of the curricula. Here, multiliteracy was reasoned from a participatory perspective in such a way that it supports the pupils' perceptions of themselves as part of the global world in order to understand and participate in the surrounding society; promote interest in society and societal issues; promote active citizenship of the pupils; and support them in having their voices heard. Multiliteracy was also reasoned from a social cohesion perspective to promote tolerance and the ability to dialogue with different kinds of people and to understand different communities and minorities. From an economic perspective, multiliteracy was reasoned to help with the understanding of economics, to support personal finances, and to evaluate the environmental effects of economics. From a disciplinary perspective, multiliteracy was seen as

a requirement for social studies and to promote interest in the discipline. The following data extract illustrates the participatory perspective of multiliteracy:

This helps the pupil to understand open dialogue and the principles of societal decision-making, which are the basis of democracy. The pupil learns how to influence the surrounding environment and how decisions made far away can have an impact on common well-being and one's personal life. The pupil is encouraged to influence the environment in a versatile manner and to find suitable types of text among diverse genres for self-expression and societal participation. (Curriculum 16)

In mathematics, rationale-level contextualisation was found in 6.5% ($n = 2$) of the curricula. Here, the need for multiliteracy was reasoned mainly from a disciplinary perspective, by highlighting that multiliteracy supports not only the development of general learning skills, but also the learning of mathematics. In the following data extract, multiliteracy illustrates the disciplinary reasoning of the transversal competence of multiliteracy:

Multiliteracy in mathematics is both content and a tool. The aim of mathematics is to develop pupils' multiliteracy. Multiliteracy promotes the learning of mathematics. The aim is that pupils

- familiarise themselves with multiliteracy;
- know the mathematically relevant areas from the broad field of multiliteracy, such as the numeric, symbolic, and pictorial areas;
- learn to produce, interpret, and evaluate text and be critical towards it;
- maintain a mathematical interest in phenomena;
- pursue clear mathematical expression; and
- be responsible for their own studying and the results thereof. (Curriculum 19)

Disciplinary contextualisation at the level of definition

At the level of definition, disciplinary contextualisation illustrates how transversal competence is understood in the context of a specific discipline. In social studies, the disciplinary contextualisation focused on the definition in 84.2% ($n = 32$) of curricula, whereas in mathematics, the figure was 83.9% ($n = 26$). Disciplinary contextualisation concerning definitions was made in both disciplines using common elements, but they also had distinct features.

The definition of *multiliteracy as information management skills* was included in both disciplines. Information management skills refer here to the ability to acquire, mix, edit, produce, present, share, interpret, and evaluate information. The ability to interpret and produce graphical presentations and to read pictures, statistics, and diagrams were also aspects of multiliteracy shared by both disciplines.

Social studies:

Skills to produce, interpret, and communicate information are practised. (Curriculum 32)

Mathematics:

O[bjective] 4. Multiliteracy. O[bjective]4 T[ransversal competence]4. Accurate verbal and written forms of expression are practised in information production. (Curriculum 22)

Additionally, the feature of *multiliteracy as an umbrella concept* was highlighted in both disciplines. This means that multiliteracy included various different literacies; for both social studies and mathematics, these literacies were defined as media literacy, analytical literacy, picture literacy, and numerical literacy.

Social studies:

O[bjective]2 Multiliteracy T[ransversal competence]4

- Information production and presentation.
- Picture literacy is strengthened in the media.
- Environmental literacy is strengthened. (Curriculum 35)

Mathematics:

Grade 8. O[bjective]3 T[ransversal competence]4. Numerical literacy is utilised in a versatile manner. (Curriculum 29)

When it comes to the differences, the distinct elements of multiliteracy in social studies included critical agency in relation to media, self-expression and participation and specific knowledge related to multiliteracy. In terms of *critical agency in relation to media*, multiliteracy was defined as ensuring that “the pupil knows how to take a critical attitude to media” (Curriculum 24) and to use and utilise media in responsible manner. The critical stance was described as including the abilities to critically evaluate the role and meaning of media; have inner and outer source criticism; critically interpret information and information sources, such as internet, newspaper, film, television, and social media; and differentiate fact from opinion. Media criticism in relation to multiliteracy was also defined as the ability to read, understand, and critically evaluate societal meanings in a versatile manner from different modes of text (written, auditory, visual, numeric, and video) and to differentiate different types of text. As put in Curriculum 11, “Different text types are gone through, for example by comparing news and official bulletins.” The media use of related definitions included, for example, the use of different communication tools and the ability to protect privacy.

From the perspective of *self-expression and participation*, multiliteracy was defined in social studies as the ability to express views and oneself by versatile means of communication and participation: “In addition to self-expression and information management, the pupils are encouraged to make an impact and to participate” (Curriculum 14). At a more concrete level, self-expression and participation referred to the ability to produce different outputs, to know how to form and argue a justified opinion, and to take into account different perspectives. From a participatory perspective, multiliteracy was defined as consisting of media skills related to participation and knowing how to use multiliteracy to influence and participate in one’s own environment, in media, and in society.

The topics defined as being included in the *knowledge related to multiliteracy* in social studies were information about society in general, economics, consumption, and private housekeeping. Multiliteracy was also related to understanding the effects of politics on common well-being and one’s personal life, the societal meaning of media and communication, operating with the justice system, and the open dialogue and

principles of social decision-making, “which are the basis of democracy” (Curriculum 16).

In mathematics, the first specific feature of the disciplinary contextualisation was *criticism*. In contrast to social studies, in which the criticality was related specifically to the media, in mathematics, the criticality was explained in a more general manner as critical thinking and the ability to understand and question the surrounding world. This idea is well illustrated in the following extract: “the contents of mathematics are considered to be phenomena that are explained, interpreted, produced, and evaluated in a versatile manner and critically” (Curriculum 27).

Multiliteracy in mathematics was also specifically defined in relation to the notion of *mathematical language*. As stated in Curriculum 19, “from the broad field of multiliteracy, [the pupil] knows especially the numeric, symbolistic, and pictorial areas that are essential to mathematics.” Beyond the ideas in the extract above, mathematical language also includes the verbal, auditory, and kinaesthetic symbol systems. Mathematical multiliteracy was defined as the ability to read, make, prepare, and interpret different graphical presentations, pictures, graphs, statistics, tables, and diagrams and to express oneself mathematically. Another aspect mentioned relates to the abilities to translate common language into mathematics and vice versa, to use mathematical language to solve mathematical problems, and to analytically and critically scrutinise mathematical solutions. The analytical, logical, and creative thinking required to solve mathematical problems was also defined as part of multiliteracy in mathematics.

Disciplinary contextualisation at the level of practice

The level of practice – the “how” of multiliteracy (Palsa & Mertala, 2019) – was evident in 78.9% ($n = 30$) of the disciplinary contextualisations in social studies. In mathematics, the figure was 74.2% ($n = 23$). For both disciplines, multiliteracy was defined as being developed in various ways. In this study, these ways are divided into three different categories: 1) educational content, 2) teaching equipment and texts, and 3) educational methods and practices.

At the level of content, only issues related to consumption (such as consumer protection and the ethics of consumption) and economy (such as economic concepts, basic principles, and the local economy) were shared topics across both disciplines. In social studies, multiliteracy could be developed by focusing on the ways in which social questions, such as human rights, minorities, politics, laws, and ethics, are addressed in the media (both traditional and social). For example, Curriculum 11 states that “it is to be followed how human rights are presented in the media and how different justice cases and laws are discussed.” Other issues mentioned in the analysed data include the role of media (the “watchdog of power,” areas for political discussion, ways to make an impact); the meaning of freedom of speech; the evaluation of trustworthiness; criticality; equality; the principles of a constitutional state; the principles of local decision-making; the rights and duties of citizens; global, European, and local ways of making an impact; the roles of employees and entrepreneurs (for individuals and in society); occupations and professions; and the backgrounds to stereotypes and preconceptions. In mathematics, specifically mathematical content (such as numbers, measurement units,

equations, and functions) and mental calculation were mentioned as content related to multiliteracy.

The second aspect of the level of practice in disciplinary contextualisation is related to teaching equipment and texts. This category can be divided into two separate, but interlinked, subcategories: i) (media) equipment and ii) (media) texts. For both disciplines, books – printed and digital – were mentioned as media that can be used as a way to develop multiliteracy. Text-wise educational videos, pictures, tables, simulations, diagrams, drawings, and plans were mentioned within both disciplines. Disciplinary differences related to equipment and materials followed roughly the logic of the level of content; for instance, media was named as key content in social studies, and the suggested materials included various forms of traditional media (e.g. newspapers, magazines, and television) and digital media (e.g. information and communication technology, computer games, websites, blogs, and social media). Popular culture was also mentioned for use in developing multiliteracy in social studies. Texts in social studies included videos concerning the local environment and culture, graphs, statistics, opinion polls “texts that can be used in different situations and settings” (Curriculum 32), “diverse media content and different texts” (Curriculum 18), research, and knowledge produced by different actors (public authorities, commercial stakeholders, communities, private persons). In mathematics, specific texts included charts, models, visual tasks, interactive tools, symbols and numeric symbol systems, geometrical forms, digital ways of expression, different measurement units, and quality transformations.

The third aspect at the level of practice in disciplinary contextualisation is educational methods and practices. Shared practices for both disciplines included cooperation (for example, working in pairs or in groups) and the production of different materials and information. In social studies, the methods and practices included various general educational methods (such as project work, discussions, essays, presentations, and using and interpreting different texts) as well as more discipline-specific methods. In one curriculum, it was explained that, in teaching social studies, many opportunities should be offered to pupils to learn how “to use multiliteracy to participate in their own surroundings, media, and society” (Curriculum 32). Multiliteracy in social studies was described as being developed by studying different human, social, and economic issues and social events and phenomena (such as the means and basics that secure sustainable development, consumption habits, and the state of people) from different perspectives (individuals, communities, and society) and at different levels (local, national, and international).

In mathematics, it was planned that multiliteracy would be developed by practising problem-solving and by offering special support for verbal assignments, producing mathematical text, and understanding measurement units. Other educational methods and practices mentioned in the data included the production and interpretation of graphical presentations, presenting visual information as geometric ideas, making observations, utilising visual interpretation methods, using mathematical thinking, and “scrutinising mathematical content as phenomena that can be explained, interpreted, produced, and evaluated critically and in a versatile manner” (Curriculum 27). The mentioned methods relating mathematics to out-of-school contexts included comparisons of product prices, following the use of money,

solving problems from everyday life, and assignments related to working life. Cooperation between disciplines was also mentioned within the mathematics curriculum.

Discussion and conclusions

In this study, 220 Finnish local curricula for basic education were analysed in order to understand how the transversal competence of multiliteracy is contextualised within different disciplines, specifically mathematics and social studies. It was found that only 19.5% of the local curricula were contextualised in any manner. This is consistent with Palsa and Mertala's (2019) finding that the general definition of multiliteracy was contextualised in only 28% of Finnish local curricula. While the data fails to provide an explanation for the lack of contextualisation, it most likely reflects the uncertainty surrounding the concept: multiliteracy is a novel concept in the Finnish educational context that is defined in an inconsistent manner in different core curricula and by different Finnish scholars (Mertala, 2018; Palsa, 2020), and it is weakly conceptualised by Finnish teachers (Hankala, Kauppinen, & Kulju, 2018; Ojaranta, 2019). Another explanation can be related to the resources available for the development of local curricula. As education providers have a high level of autonomy, they also have different resources. In smaller rural municipalities this can mean that individual teachers can have a bigger role in contextualisation (see, for example, Autti & Bæck, 2019) compared with larger municipalities in which the same work can be divided. The lack of sufficient resources can lead to partial contextualisation of the local curriculum while neglecting certain parts, for example the newly introduced contents, such as transversal competences.

In the contextualised curricula, both similarities and differences existed regarding the ways in which multiliteracy was contextualised within social studies and mathematics. Both disciplines defined multiliteracy as an information management skill and approached it as an umbrella concept to include various (sub-)literacies. The main differences between the disciplines were that, in social studies, students' agency and societal participation were emphasised, whereas the mathematics curricula highlighted abstract critical thinking and mastering the discipline-related language. These differences can be interpreted as a reflection of the differences in the objectives and key content of the disciplines. For instance, in social studies, active citizenship is named as a general objective, whereas thinking skills are emphasised in mathematics (FNBoE, 2014). Mathematical language also contains distinguishing symbols and syntax and, thus, the highly discipline-based contextualisation is understandable.

Disciplinary contextualisation can provide a conceptual tool to clarify the relationship between competences and individual disciplines. Such tools, we argue, are needed to tackle the often inflated and biased assumptions about the effects of a competence-based curriculum (see Garner, 2015; Murray, 2017). As a transversal competence, multiliteracy has a special feature combining the specifically defined educational outcomes common to the disciplines and the textual practices specific to each discipline. In multiliteracy, this is especially important from the perspectives of language awareness and disciplinary literacies. For example, Takeuchi has noted that metalanguage interactions can be limited in mathematics classrooms (Takeuchi, 2015). From the

perspective of supporting language-aware teaching practices and the promotion of disciplinary literacies, disciplinary contextualisations can support explicating the different literacy practices essential to the disciplines, thus providing the opportunity for teachers to reflect and build a shared understanding between the disciplines.

From the perspective of language-awareness, the findings suggest broadening the possibilities of language within the discipline of mathematics. In the data, mathematical language – referring, for example, to the numeric, symbolic and pictorial areas essential to the discipline – was emphasised in the disciplinary contextualisations of multiliteracy. However, empirical studies indicate that the use of language and textual practices can be more diverse in mathematics classrooms (Joutsenlahti & Kulju, 2017; e.g. Takeuchi, 2015). In their study Joutsenlahti and Kulju went beyond actual mathematical language by highlighting the importance of different ways of expressing thinking. In addition to mathematically symbolic language, meaning-making in mathematics presentations can be through natural and pictorial languages (Joutsenlahti & Kulju, 2017). This notion can support more nuanced understandings and curriculum development in relation to language awareness.

One more finding worth discussing further is the notable number of references to media in social studies. Two different, but not mutually exclusive, explanations can be offered. First, it reflects the way in which the Finnish perspective on multiliteracy is almost identical with how media literacy is defined in the international research literature (Palsa & Ruokamo, 2015). Second, the emphasis on (digital) media in social studies illustrates how mediatisation and digitalisation are among the defining phenomena of our contemporary world (Couldry & Hepp, 2017; Hepp, 2020) and are thus crucial in terms of agentic citizenship and societal participation. Mediatisation is something to which it would be beneficial to pay attention in mathematics education as well; as noted by Bell et al. (2020), “statistics are everywhere in the news media. And yet they are widely misunderstood, poorly reported and often downright false” (p. 1).

Limitations and implications for future research and curriculum development

While this study has provided novel and useful knowledge, it is not without its limitations. It is important to acknowledge that research on curricular texts cannot reveal the implemented, actualised contents of teaching, nor what has been learned. In the Finnish context, teachers have high levels of autonomy, and, while the national core curriculum provides general objectives, teachers can choose their own teaching methods and materials quite freely (Paronen & Lappi, 2018), and these materials – especially textbooks – often steer teachers’ decisions more than curricular alignments (Heinonen, 2005). Thus, it could be useful to study how the concept of multiliteracy is contextualised in the textbooks of different disciplines. Secondly, as the Finnish curricular framework is a rather unique combination of centralised and de-centralised approaches (Creese, Gonzalez, & Isaacs, 2016, p. 8–9), findings made in this study cannot be straightforwardly generalised to contexts that use different curricular frameworks. Thirdly, this study focused especially on the transversal competence of multiliteracy within the disciplinary settings of mathematics and social sciences. A more versatile perspective could be achieved by expanding the focus to other disciplines, such as music, handcrafts or visual arts.

Research-wise, the lack of contextualisation at the level of local curricula naturally steers the gaze towards school-level curricula, which could be studied, for example, by selecting and comparing schools from both pools: those with and those without local-level contextualisation. Furthermore, it would be important to study the processes that have led to such varying results in local-level curricular contextualisation.

Lastly, according to the results of the evaluation by the Finnish Education Evaluation Centre (Venäläinen et al., 2020) of the implementation of the Finnish curriculum, sufficient discussion must be conducted at the municipal level on the key concepts of the curricula. Thus, in terms of curriculum development, this study supports the future implementation of competence-based education by offering a set of key points to guide how transversal competences can be contextualised at the discipline level. At the national level these findings can support the development of the future core curriculum and help in designing the needed support further. On a local level this research can support the implementation of competence-based education, especially in municipalities in which the contextualisation was not evident. This can be done from two perspectives: a) a disciplinary and content perspective, by focusing on the reasoning (the level of rationale), meaning (the level of definition), and development (the level of practice) of the competence, and b) a structural perspective, by contextualising the transversal competence in the disciplinary descriptions at the levels of the discipline, grade, objectives, or content.

Notes

1. Disciplines in grades 7 to 9 in the NCC: biology, chemistry, crafts, ethics, foreign languages, geography, guidance counselling, health education, history, home economics, mathematics, mother tongue and literature, music, physical education, physics, religion, second national language, social studies, and visual arts.
2. This concept is used here as an umbrella term for the various concepts, such as numeracy, mathematical literacy, and quantitative literacy, that are used to describe being literate with numbers.
3. In Finland, local curricula are adopted separately for education in different languages, such as Finnish, Swedish, and Sámi (FNBoE, 2014, p. 17). In many municipalities in which a Finnish curriculum was not found, a Swedish curriculum would have been available. In 2019, there were 16 official Swedish-language municipalities in Finland and 15 bi-language municipalities in which a major language was Swedish (Statistics Finland, 2020). From reasons of validity, this study focuses only on the Finnish curricula to avoid any translational confusion.
4. In five analysed disciplinary descriptions (7.2%), the contextualisation was made by combining two different types of contextualisation, illustrating that the categories are not mutually exclusive. For example, the contextualisation could be done specifically for every grade level and for every specific disciplinary objective in a given grade (for example, Curriculum 29). By combining different types of contextualisation, the accuracy of the contextualisation can be increased. In this study, the data combining different types of contextualisation was quantitatively classified in all the used categories, resulting in the cumulative percentage exceeding 100% (107.2%).
5. Data extracts were translated to English from Finnish by Author 1.
6. In NCC, the objective number 6 in social studies is “to guide the pupil to examine societal activity as well as different communities and minority groups diversely and with an open mind”, whereas the objective number 16 in mathematics is “to support the pupil to understand geometric concepts and connections between them”.

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Appendix A. Multiliteracy (T4)

The pupils are guided to deepen their multiliteracy by expanding the range of texts in the teaching and learning of all subjects. In this context, texts means information expressed by systems of verbal, visual, auditive, numeric, and kinaesthetic symbols and their combinations. The emphasis is on practising the pupils' analytical, critical, and cultural literacy. The pupils practise using all of their sensory faculties and utilising different ways of knowing diversely in their learning. Producing, interpreting, and communicating information are practised in ways characteristic of different subjects and in cooperation between subjects. The pupils are also encouraged to use their multiliteracy when participating and being involved in their own surroundings, the media, and the society. School work offers plenty of opportunities for practising these skills in a cooperative setting.

The emphasis in multiliteracy development increasingly shifts to context and situation-specific texts. The pupils' multiliteracy is advanced by introducing them to narrative, descriptive, instructive, argumentative and reflective text genres. Cultural, ethical, and environmental literacy are supported in teaching and learning. Texts related to working life are also analysed and interpreted. The pupils develop their consumer and financial skills by familiarising themselves with texts that treat the topics in a versatile manner and by learning about the contexts in which they are used. Numeracy is advanced for example when assessing the reliability of opinion poll results or the cost-effectiveness of a commercial offer. The pupils are guided in developing their visual literacy by using different modes of image interpretation and presentation. Media literacy is developed by being involved in and working with various media. The pupils are encouraged to express their views using different means of communication and involvement.