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DIGITAL TEXTBOOKS IN THE ACTIVITY OF INSTRUCTION

Teachers motives to use and not use digital textbooks seen from a socio-cultural perspective

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Abstract

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Purpose:	The study aims to understand the dynamics behind the teachers motive to use and not use digital textbooks in the activity instruction of mathematics. How are the motives influenced by the perceived dynamics created by the use of the textbooks? An understanding of this might serve to give perspective to the difficulties in implementing educational technology as well as being of help for policymakers, decisionmakers, producers and designers of tools.
Theory:	Activity theory is used as a guiding framework for the research design as well as for interpretation. The aim of using this theory is to get a holistic view of the motives and the use as they are situated in a specific socio-cultural activity. Tools are considered embedded by human experience and hence not neutral but carriers of norms. The activity system of instruction with the teacher as subject is the unit of analysis. Concepts of systemic contradictions, as well as of congruency, are used to interpret data.
Method:	The study is empirical and explorative. Data is collected by interviewing 13 teachers already using, or previously using, two different kinds of digital textbooks. The digital textbooks have different approaches regarding how to present and communicate procedures in mathematics. The selection of teachers was not made in a randomised way. The interviews are analysed using thematic analysis, and comparisons of findings were made for difference in tool.
Results:	With both tools, significant perceived contributions to efficiency were reported but not much sign of transition of instruction. Teachers gave account for systemic contradictions between the embedded norms of one of the textbooks, and the norms of pedagogy pre-existing in the activity system. Congruencies was also said to be prevalent when using both tools. Teacher tended to avoid contradictions with norms rather than achieving congruencies, including benefits of efficiency, when choosing to use digital textbooks. The dominating strategy was to use the digital tool as a complement to a printed textbook, augmenting the toolbox of the teacher.

Foreword

The author is an employee at the Education Administration of a Swedish municipality. In that position, he has had professional relations with all leading producers of digital textbooks in the Swedish market about a year before, but not during, the work with this thesis. Neither the author nor the department where he works, have direct commercial relations with the producers of the textbooks. However, as part of the work, actions have been taken to facilitate public schools purchase and usage of their textbooks. Those actions follow strict factual criteria. The relations with the producers have not influenced the research design nor the analysis, and there are no personal or professional interests in conflict with the research.

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1. Introduction

This study will look at some of the dynamics of the use of digital technology in instruction, trying to understand why, and why not, it is used. The reasons for this interest are several and emerges from the changes in the education sector with a global trend of increasing use of digital technology, advocated by policymakers and also under pressure from market actors (Choppin & Borys, 2017; Player-Koro, Bergviken Rensfeldt, & Selwyn, 2018; Utbildningsdepartementet, 2017). A better understanding of how this use affects the education sector, and how to implement new technology is interesting for decisionmaker on all levels, including teachers. The issue is also interesting since there is a tension between different perspectives on how technology should be developed and designed. (Choppin & Borys, 2017)

It has been difficult to prove general positive effects on learning in education systems caused by the introduction and use of digital technology. Some mention the role of the teacher for failing implementation, e.g. Haelermans (2017); Wallin and de Léon (2008) and several researchers analyse the beliefs of teachers, their pedagogical preferences and grade of change aversion. (Ertmer, 1999; Li, Garza, Keicher, & Popov, 2019) The role of teachers is interesting to look at with a different approach, avoiding analysing teachers separated from their activity. This investigation will acknowledge teachers as situated subjects in an object-oriented activity.

The augmenting supply and rapid development of digital tools make it demanding both for teachers and researchers to evaluate them and their use. Evaluations has to be done continuously since both tools and possibly also the use of the tools are changing. This study aims at contributing to the state of knowledge regarding the use of digital textbooks, facilitating decisions regarding digitalisation in the education sector.

The focus of this study is the use and non-use of a certain kind of digital tools, digital textbooks, as defined in chapter 1.2. This kind of tool is used to a lesser extent in the instruction of math, compared with instruction in other school subjects in Sweden (Skolverket, 2019; Utterberg & Lundin, 2017) making it of extra interest to study the use in instruction in mathematics.

1.1. Motivating the choice of theoretical framework

Fredriksen and Hadjerrouit (2019) argue in their study of the use of flipped classroom in higher education that research approaches only looking at the learning outcome will not give any understanding of the dynamics arising. Research approaches that take the tool as the unit of analysis might also miss the dynamics if not considering the historically and culturally specific circumstances, and assume that technology is neutral and universally useful. (Engeström, 2009) When the introduction of technology in educational settings is studied, it has been pointed out that one has to look not at any single component, as a tool or the teacher, but taking into account the whole dynamic of cultural and social elements interacting. (Ramanair, 2016). This study argues that this applies when analysing the use and non-use of digital textbooks for instruction. To understand the use of technology, one has to consider the whole activity. Not just focus on one of the components, but consider all components and their relations, including the purpose of the activity.

Several contemporary researchers use socio-cultural perspectives as a framework for analysis (Gedera & Williams, 2016; Grönlund, 2019; Hansson, 2015; Mårell-Olsson, 2012; Utterberg, Tallvid, Lundin, & Lindström, 2019). Cultural Historical Activity Theory (CHAT) (also called Activity Theory here) is a theory within this domain. Activity theory has been described as particular adequate when the interest of study is conditions of the activity. (Grönlund, 2019)

I will use CHAT as a theoretical framework in this study since the intention is to understand instruction from the perspective of the subject acting in an activity. An activity with an object and a dynamic interaction of cultural and social phenomena. In an international perspective, few studies use this framework for analysing digital technology in the instruction of mathematics. (Batiibwe, 2019) Using CHAT thus also contribute in this respect by filling a gap in the research.

1.2. Definition of digital textbook

No definition of digital textbooks is universally embraced, neither what label is most appropriate to this category of resource. (Wallin, Gulz, Jahnke, & Helenius, 2017) Different attempts to do that sometimes blur function with content (Kempe & Grönlund, 2019).

In this study, *Digital Textbook* mean the same as the kind of resources Wallin et al. (2017) define as *Curriculum software*. A curriculum software is by them defined as "extensive learning resources covering several different mathematical concepts and topics" (Wallin & de Léon, 2008, p. 17), often meant to be used during an extended length of time, e.g. an entire school year. The concept does not have any sharp boundaries towards other kinds of digital tools. Still, it serves the purpose of focusing on resources with the potential of replacing the traditional printed textbook. It excludes, e.g. more specific digital tools used for particular aims within a course, and resources not containing didactical elaborated material aimed at meeting the standards of the national curriculum. Examples of those kinds of tools not defined as digital textbooks are some educational games, plotting tools, exercise tools, specific instructional videos etc. A digital textbook might have some of those kinds of tools included as components.

A digital textbook might not alone cover all parts of the national curriculum, but the idea is that most parts are and that it has the potential of being used as a major teaching aid in the instruction.

1.3. Aim and research question

This study aims to understand the motives for use and non-use of digital textbooks in the instruction of mathematics. How are the textbooks used, and how is the impact on the instruction affecting the motives? Not only potentially problematic impacts are considered, but also perceived gains. Both perspectives build to the understanding of why the textbooks are used and not used.

Two digital textbooks, here called WS and APP[1], with different functionality, will be analysed, adding the perspective of how the difference in affordances between them affect the instruction. There is a lack of studies comparing different digital tools and how they differ in shaping teaching, learning environments, knowledge/content, agency and activities (Kempe & Grönlund, 2019). The research question of the study is:

> What are teachers motives for use and non-use of digital textbooks in the instruction of mathematics?

Exploring teacher opinion with four sub-questions will help to answer the research question:

- How are the digital textbooks used in the instruction of mathematics?

[1] WS stands for the product NOKflex who is a web-based service. APP stands for the product Matteappen, an app for digital devices with touch screens connected to an online service.

- What are the perceived impacts of the use of digital textbooks on the activity of instruction of mathematics?
- How are the perceived impacts of using digital textbooks influencing the motive to use and not use?
- How do structural differences between digital textbooks influence the motives to use and not use?

The first two questions will be given account for in the Findings section, and the last two in the Discussion and Analysis.

Instruction of mathematics refers to the instruction given in the Swedish education system for children at the age of 10 to 18.

1.4. Limitations

The study will not consider learning outcome since the focus is on how motives are influenced by perceived dynamics in the activity.

Due to the non-randomized way to choose respondents, the study will not be able to say anything about the spread of the phenomena's found, only that they occur. Also, the respondents were relatively few; 13 teachers were interviewed. The ambition of the study is not to say what is typical, instead, pointing out phenomena that might be important for the implementation and use of digital textbooks.

The products are not evaluated as such. Into consideration is only taken teachers descriptions of impacts on the activity when the products are used as tools. The products might have other characteristics of importance, for instance, usability, alignment to curriculum etc. being of importance in a regular evaluation of the products.

2. Theoretical framework

This study uses Cultural Historical Activity Theory (CHAT), sometimes referred to as Activity Theory, as a theoretical framework to guide the design of the study as well as the analysis and interpretation of the findings. Activity theory belongs to the domain of socio-cultural theories (Engeström & Miettinen, 1999). It bases on learning theory and concepts of mediation described by Vygotsky but situated in a wider social context (Hardman, 2005). In socio-cultural theory, learning is seen as situated, signifying that context is part of learning. (Grönlund, 2019)

Fundamental for CHAT is the notion that human behaviour can not only be understood as a consequence of stimuli, or by studying cognition. Behaviour is a result of the interaction between consciousness and the social and material environment, an interaction in the form of activity. This interaction does not only signify entities relating to or shaping each other but also constituting each other. A human is constituted partly by her activity, as well as she constitutes the context. The theory tries to understand the unity between consciousness and activity. (Kaptelinin, 2006) "This is essentially the view of cultural-historical activity theory: human activity makes its own context which is in constant movement, historically and interactionally." (Engeström, 2009, p. 6)

The Activity theory has been developed in three generations, according to the description by Engeström (2001). The first generation is attributed to Vygotsky, who described how tools mediate between stimuli and response (Vygotskij, 1978, pp. 39-40). The individual nor society could be understood without understanding the production and use of mediating cultural means (Engeström, 2014). The main limitation in the first generation was that "the unit of analysis remained individually focused'' (Engeström, 2001, p. 134), which was changed in the second generation based on the work of Leont'ev. A hierarchical structure was introduced, separating activity from goal-oriented actions (explained more in 2.3), showing how a division of labour was used in a collective activity. To the third generation, Engeström is considered to have contributed a lot. He elaborated further on the social dimension, adding more components, and integrating it to the model of activity. The third generation also expanded the unit of analysis, taking into account several activity systems interconnected through partially shared objects (Engeström, 2014).

2.1. Activity system

The central unit for analysis in CHAT is the activity system. Through the study of the activity system, we can understand human behaviour. Activity system contains six analytical components (Figure 1), with mediating relationships, but it has to be seen as "a unified dynamic whole" (Engeström, 1992, p. 12). Single actions and dynamics must be seen and given meaning in the bigger frame of the object-oriented activity system. (Engeström, 2009)

The activity system is viewed and understood from the perspective of the *subject*, who could be an individual or a group (Ramanair, 2016). The subject is the agent.

The activity system is directed toward an *object*, and this orientation towards an object distinguishes it from other activities. The object may be "either material or ideal, either present in perception or exclusively in the imagination or in thought." (Leont′ev, 1978, p. 45) Activity emerges from a need. (Leont′ev, 1978) When a need meets (couples with) the object a motive of activity form, and the activity emerges as something meaningful in trying to produce a perceived and desired outcome. (Blin & Appel, 2011). The object thus contains the subjects motivation for acting. The object is at the same time defined as "the 'raw material' or 'problem space' at which the activity is directed and which is molded and transformed into outcomes" (Kaptelinin, 2005, p. 10) The subject has a need to transform the object into desired outcomes (Blin & Appel, 2011) and is therefore acting.

The subject always uses using some kind of *tool*, like artefacts, signs or language, to do the actions (labour). (Engeström, 2014) Thus when acting, the tools are mediators between subject and object**.** The component *community* is perceived as the individuals or groups that the subject is involved with while engaged in the activity. Mediating between subject, community, and tool is the component *division of labour*. A division of labour that may reflect the power and status of the components. Finally, there is constrains and affordances in the form of *rules and norms*, both implicit as traditions or expectations or explicit as laws or policies. (Goodnough, 2018).

Activity system is though seen as a structure that is an "object-oriented, collective, and culturally mediated human activity" (Engeström & Miettinen, 1999).

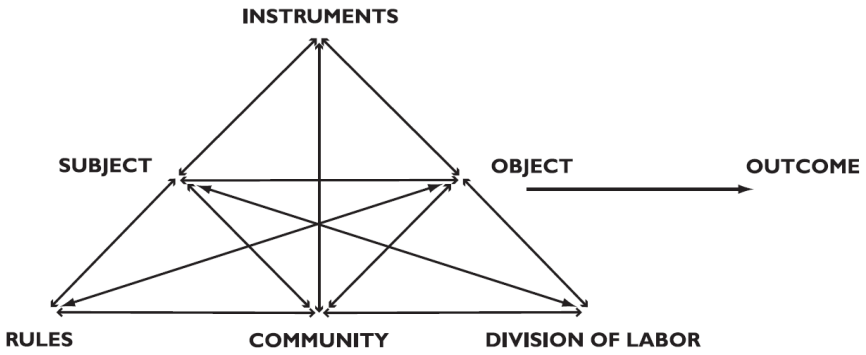

Figure 1. The mediational structure of an activity system. (Engeström, 2008, p. 26)

2.2. Tools

In this study, the focus is on the introduction of new tools, which motivate a closer look on that particular component of the activity system. Tools could be both material and psychological but are often a combination. It can comprise both the physical material aspect as well as mental constructions attached to it. Without mental constructions, a piece of matter often does not make any sense for humans. (Vygotskij, 1978) Tools play the role of mediating between humans and the social and material environment, meaning that humans are not in direct relation with their context. The way humans interact with their environment is shaped by the tools, "shaping of external activities eventually results in the shaping of internal ones" (Kaptelinin, 2006, p. 70)

Tools, including for instance both hammers, cars, language, algorithms, and signs, are products of historic culture. They have been created and used with some aims, and the experience of this is also reflected both in the structural properties of the tools (material, shape etc) and in the knowledge on how to use the tool. Tools also continue to be changed and developed through use, for instance, the mental constructions regarding their use. There is not a one-directional relation; the tools are also created and recreated in the use by the subjects.

"Tools are created and transformed during the development of the activity itself and carry with them a particular culture—the historical evidence of their development. So, the use of tools is an accumulation and transmission of social knowledge. It influences the nature of external behaviour and also the mental functioning of individuals." (Kaptelinin, 2006, p. 70)

Signifying that the interaction between humans and their context, including other humans, is not deterministically determined by biology, but mediated by tools. (Morselli, 2018) Also signifying that human thoughts also are shaped by tools that are not neutral but culturally shaped.

> "… the use of technology materially shapes who we are and become. Technologies do not exist simply as neutral "helpers" "out there" that we pick and choose from according to the demands of some task. We grow and change in intimate relation to and with technology, developing as skilled persons according to how we learn and use technology." (Kaptelinin & Nardi, 2012, p. 14)

We appropriate the accumulated experience embedded in the tools when we appropriate and integrate them into activities. (Kaptelinin & Nardi, 2012) This experience could come into conflict with other experiences.

2.3. Activity, Actions, Operation

Leont'ev introduced into the analysis three levels of acting (Table 1). (Engeström, 2009) On the first level are the *Activities* that are collective and societal in scope as well as either infinite, long-term, or cyclically. They are motivated by the need of transforming the objects into desired outcomes (Blin & Appel, 2011). At a second level, he described the *Actions*. They could be done by individuals and by groups and are what is done at a conscious level. They are finite and directed towards a goal that in its turn, is motivated by the need of the object. On the third level are the *Operations*, real-time processes including both automated and non-reflective behaviour as responses to conditions while performing the goal-oriented actions. (Leont′ev, 1978). The activity "consists of chains of actions directed at some goals, which, in turn, are made up of a series of operations (specific acts) that are afforded by the available conditions in the environment." (Tan, 2019, p. 26)

Level 1:	Activity	⟷	Object
Level 2:	Action	⟷	Goal
Level 3:	Operation	⟷	Conditions

Table 1. Structure of human activity, interpretation by author of Leont'ev (1978)

The three levels could be exemplified by instruction in math as the activity, the planning and realisation of an assessment as an action, and the actual writing (by pen or keyboard) as operations. The operation and the action are both done in relation to the object of the activity and motivated by their contribution to the achievement of the outcome.

2.4. Systemic Contradictions

In activity theory deviations from the standard scripts are called disturbances and could indicate what is called systemic contradictions. (Tay & Lim, 2016) Systemic contradictions cannot be observed directly, but their manifestations as tensions, disturbances and conflicts (Gedera & Williams, 2016). Important is to distinguish systemic contradictions from other kinds of inconsistencies. Systemic

contradictions in the activity theory "…are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems." (Engeström, 2001, p. 137) The use of a new tool might trig a systemic contradiction if, for instance, it conflicts with norms in the activity system. Systemic contradictions are resolved by changes at system level. The non-systemic issues are caused by conflicts or tensions that cannot be solved by changes at system level. They are crisis that affect short-term actions and can only be solved outside of the model, for instance by adding more resources. (Fredriksen & Hadjerrouit, 2019)

The systemic contradictions are described by Engeström (2011) as being of four kinds. Primary contradictions are latent inside any of the constituting components of the activity system. The secondary manifest between two or more components and the tertiary between "a newly established mode of activity and remnants of the previous mode of activity" (Engeström, 2011, p. 79). Quaternary contradictions appear between neighbouring activity systems.

The concept of systemic contradictions are emphasising the dynamic aspect of activity systems, their movement and self-development and "equilibrium is an exception and tensions, disturbances and local innovations are the rule and the engine of change" (Cole & Engeström, 1993, p. 8). Systemic contradictions are forces of change and have the potential of leading to development, and they are not seen as anything negative per se. (Engeström, 2001; Engeström, 2008)

2.5. Congruence

Allen, Brown, Karanasios, and Norman (2013) har proposed the concept of *Congruencies*. They point out that activity theory researchers consider systemic contradictions and their potential of being forces of change, but argue it is essential also to consider "the role of congruencies, which foster reproduction rather than change" (Allen et al., 2013, p. 849). Congruencies might then lead to temporary stabilisation in activity systems. In one empirical study, they identify a new tool being in congruence with existing elements in the activity system, and the "congruencies provided a strong stabilising influence on the activity system." (p 849). In another study, they show how contradictions triggered by the introduction of a new tool was "offset by congruencies and a process of feedback and action leading to the transformation of contradictions into congruencies." (p 849)

Eventually, the stabilised situation will turn into one of change when new systemic contradictions emerge. CHAT presumes human activities to be dynamic and continuously evolving. The stabilised situation is not to be seen as something per se positive from a historical perspective, in concordance with the view of not seeing changes caused by systemic contradictions as something negative.

As I understand the concept of congruencies, the stabilisation of the activity might lead to a consolidation of it or parts of it, potentially making the system more robust towards future forces of change. In that way, one might see an eventual consolidating effect of congruence as a kind of change, a change towards consolidation.

2.6. Network of systems

The third generation of CHAT added the perspective of interacting activity systems. The systems are open and interact, for instance, through a partially shared object, and it could be useful to study several independent activity systems together as the unit of analysis. (Engeström, 2009) Through the interconnections between different activity system, a change in one can lead to a systemic contradiction and change in another. The same physical person can take different roles in different activity systems. Engeström (2009) show this with an example from instruction in school where students and teachers

might deal with the same curriculum, tools etc., but have partly overlapping but partly different objectives. For the students, the object is a unity between diplomas/grades and potentially useful knowledge about the world. For the teachers, it could be the unity of learning of students as well as students interacting with the world. “The construction of a shared object and a common motive between activity systems with such colliding perspectives is a challenge, never completely achieved and never completely impossible.” (Engeström, 2009, p. 7)

2.7. Implementation of the model

In this study, the activity system is *the instruction of mathematics in schools in Sweden*, seen as a general collective activity. The object is defined as *students learning math* with the desired outcome of *mathematical knowledge with the potential to transform society*. The subject is the *teacher*, who has several tools to use, digital, non-digital, mental, signs etc. and among them, the two *digital textbooks* selected for analysis. In the community are *students, other staff* at the schools, including other teachers and school leaders, *parents,* and *policymakers*. The division of labour gives the teacher the role of planning and leading the instruction as well as the assessment, while the students have another role as active learners. Several rules and norms are present, some scripted in the form of laws, regulations, and policy documents, while others are expectations, teacher opinions about pedagogy etc.

What to set as the object for the activity is not obvious. Sometimes, and falsely according to Engeström, the tool, the computer or the program, is treated as the object (Engeström, 2009). Fleer (2016) argue that in the context of education “the goal of the learning activity is to produce citizens who have knowledge and skills to be part of society. … For schools then, the object of the “learning activity must be the learning subject” as they develop through education (Engeström, Hakkarainen, & Hedgaard, 1984, p. 160)” (Fleer, 2016, p. 13).

3. Literature review

3.1. Benefits of digital tools

Digital tools are often seen as having a potential of transforming education or improving outcome. (Wallin et al., 2017) Their contributions could be of very different kinds, for instance supporting collaboration and expanded learning activities (Tannert & Berthelsen, 2020), offsetting motoric limitations (Genlott & Grönlund, 2013) or act as digital tutors (Gärdenfors, 2010; Sjödén, 2015). Narrowing down to the kind of tool called digital textbooks they can be beneficial to teachers due to at least three features: the possibility for teachers to adapt and redesign them for lessons, possibilities to adapt to students' individual needs and also for "the many assessment features that allow "easy" access to different aspects of pupil learning." (Pepin, Choppin, Ruthven, & Sinclair, 2017, p. 655). However, has it been possible to show positive results on any larger scale from the use of the promising technology?

Several studies investigating specific tools or use of technology conclude that there is a real potential of augmenting the outcome in specific circumstances (Haelermans, 2017). Still, it has been difficult to measure any general increase in learning at a bigger scale or on longer-term caused by the introduction of technology in education, see for instance the report by OECD (2015). In a review, Haelermans (2017) found a positive but very small relation between computer-supported learning in general, and learning outcome. Wallin et al. (2017) made a review of 75 empirical studies and found evidence of some improvement of outcome in learning mathematics when using some tools. Still, they could not conclude that the same improvement could not be achieved without digital tools. In many of the studies, the change in outcome is relatively small, and studies on the use of digital textbooks find almost no improvement. Similar results, but regarding instruction in language, is presented in the review by Tannert and Berthelsen (2020). Effects on learning outcome by use of digital tools are challenging to measure, but so far, not more than small positive results have been shown. This is not to say that benefits of use are not there, but they have been difficult to measure in terms of learning outcome. Apart from all methodological difficulties, how do researchers' reason about the absence of an increase in the outcome?

3.2. Implementation and teachers as candidates for an explanation of bad results

Implementing new technology in education systems is often complex and challenging and not only depending on technological factors (Ramanair, 2016; Tondeur, Braak, Ertmer, & Ottenbreit-Leftwich, 2017) is one aspect proposed for lack of result. Wallin et al. (2017) mention the possibility of digital textbooks not used as intended by producers as one explanation to the lack of increased learning outcome, implying a correct use might have given another result. Others do reason more implicit about teachers as barriers:

> "… the question could be asked as to why ICT [information and communications technology] in education is not, in general, used that extensively, or at least not very efficiently, while CAI [computer-assisted instruction] shows positive effects over traditional classroom learning and adaptive digital learning tools are proven to be effective for mathematics. The literature shows that there are many barriers to technological change for teachers, which might explain why technology adoption in schools has not, to date, lived up to expectations. The literature shows that teachers are either resisting the technological change in general, due to, for instance, their internal beliefs, or do not know how to apply the technology effectively in class, due to factors such as a lack of time, knowledge or training." (Haelermans, 2017, p. 47)

Ertmer (1999) describe the barriers to integration of technology and change in the education sector as being of two orders; Extrinsic to teachers such as time, training, equipment etc. or intrinsic related to teachers and "include beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change." (Ertmer, 1999, p. 48). In empirical studies teachers differing instructional approach and openness towards technology have also been identified as important factors influencing the use of digital technology and to a lesser extent also technology self-efficacy (Li et al., 2019). During an intervention of 1,5 years in a Swedish school, a digital textbook was introduced together with activities of training and process support for teachers (Grönlund, Wiklund, & Böö, 2018). The intervention did not lead to the use of the more advanced functions of the tool, neither to any transformation of the instruction. The researchers ended up with the conclusion that there was a need for "inspired teachers", and that "pushing tools at teachers" might not work for reaching more than "basic level use"(Grönlund et al., 2018, p. 1373).

Some studies using activity theory also find lack of teacher competence regarding how to use the tools in relation to the objective of the instruction as an important issue (Ramanair, 2016; Tay & Lim, 2016). In the study of Ramanair (2016) the teachers did not reflect on the difference in giving instructions via an introduced digital platform and in a physical classroom, replicating the way they used to work despite the change of medium. Kaptelinin (2006) identifies three levels of competence needed for making and using functional organs out of educational technology: "Tool-related competencies include knowledge about the functionality of a tool, as well as skills necessary to operate it. Task-related competencies include knowledge about the higher-level goals attainable with the use of a tool, and skills of translating these goals into the tool's functionality." (Kaptelinin, 2006, pp. 64-65)

The very complex and situated nature of the knowledge required by teachers using technology is approached by some utilising the framework Technological Pedagogical Content Knowledge (TPACK) presented by Koehler and Mishra (2009). TPACK emphasise the importance of the teachers having not only content and technological knowledge but also having pedagogical knowledge and combining them for ability (Li et al., 2019), including how to incorporate the technology for the benefit of pedagogy.

3.3. Looking for explanations with the help of activity theory

"The problem with technologies is that we would like them to be universal, useful in a wide variety of settings. This tends to blind the technology-driven researcher to the historical and cultural specificity of the particular activity systems in which the technology is supposed to be used. Implementation then typically becomes a problem." (Engeström, 2009, p. 7)

CHAT propose another approach when analysing the use of tools and studies using the framework usually do not evaluate the learning of students per se; neither treat the tool as something neutral. Instead, they look at the situating of the tool in an activity system and explore the evolving interrelations with the object and other components. The teachers are in focus as the subject of the activity system, rather than objects of change. A common approach when using activity theory is to study systemic contradictions that might arise (Fredriksen & Hadjerrouit, 2019; Gedera, 2016; Gedera & Williams, 2016; Grönlund, 2019; Tay & Lim, 2016; Utterberg & Lundin, 2017). Dilemmas, tensions and conflicts found are not only seen as minor disruptions, but "contradictions stemming from misalignment between curricular goals, instructional resources, conceptualisations of technology, and technology planning decisions." (Anthony & Clark, 2011, p. 1301).

Studies using activity theory has also identified beliefs of teachers not aligned with technology, but they do not take the tool as neutral but embedded with human experience. Experience that might come into tension with pedagogical norms in the activity system. For instance, the use of a learning management system (LMS) for giving feedback has been shown to create a tension of systemic character

between the different kinds of feedbacks given (summative and formative) and affecting the possibility to separate between them. (Grönlund, 2019) The use of digital textbooks can also weaken the demarcation between summative and formative feedback. (Pepin, Choppin, et al., 2017) Use of adaptive digital textbooks can also create other contradictions with teachers beliefs: what to emphasise in instruction, conceptual or procedural understanding, what approach to use when adapting to divergent needs of students: and an impedimental effect of the adaptive functionality towards collective activities and collaboration. (Utterberg et al., 2019)

The tension between the pedagogy of the tool and the previously existing norms in the activity system could also lead to the non-implementation of technology. Interviews with teachers working in schools with access to technology and also engaged in increasing the quality of instruction in mathematics but choosing not to use digital technology in the instruction of math revealed this. (Utterberg & Lundin, 2017) The tools did not support the use of verbal or written communication of mathematics, neither representation with several senses, and hence interfering with the goals of the teacher action.

The use of activity theory can also reveal systemic contradictions caused by the adoption of technology as a rule, e.g. by a policy. The introduction of laptops in the instruction of mathematics lead to dilemmas and confusion regarding motives for use in one study. (Anthony & Clark, 2011) The contradictions found could be interpreted as systemic contradiction between the object of the activity of digitalising and the object of the activity of instruction. The need to use digital tools to fulfil the policy can also be described as in conflict with the lack of need using the tools for the learning activity. (Utterberg & Lundin, 2017)

Another finding in the research using activity theory is loss of teachers insight into the learning process when using digital textbooks. The process becomes opaquer from their point of view, caused both by a shift in norms of pedagogy (focus on answers instead of process gives less information for the teacher to analyse), by the design of tool (not being able to have an overview of the work done by students), and by a shift in the division of labour (functionality of automatic adaptivity in the digital textbook make teacher loose insight and control of upcoming tasks). (Utterberg et al., 2019) The adaptivity in digital textbooks shifts part of the assessment work to the tool, and the border between pedagogy and assessment is blurred. (Pepin, Choppin, et al., 2017)

Studies using CHAT often make the same observations as other studies, e.g. teachers sometimes hesitating or reluctant or to use technology, but tend to explain it with systemic contradictions. Not seldom contradictions between embedded norms in tools and other components of the activity, or between objectives of introducing the tool and of instruction.

3.4. Teachers as designers – some comments in the literature

Some research has identified a trend of teachers becoming more of designers. One cause is the access to a growing multitude of different kinds of learning resources, prevalent at least since the ’60s but with a dramatical increase with the introduction of digital resources (Kempe & Grönlund, 2019). This growing access to resources gives teachers more possibilities of choosing both representation, ways to communicate and learning activities, and the teachers get a more active role as designers of the interaction in the learning environment. (Kempe & Grönlund, 2019). Another cause of the trend pointed out are the characteristics of digital tools. Digital tools are more flexible, interactive and sometimes constructed with the intention of users as designers, blurring the border between use and design. (Pepin, Gueudet, & Trouche, 2017) This trend changes the conditions for teachers work and the skills needed (Holmberg, 2019; Pepin, Choppin, et al., 2017; Pepin, Gueudet, et al., 2017). “Whilst previously teachers were typically seen as the ‘implementers’ of curriculum materials, which had been developed by professional curriculum designers and mathematicians, now mathematics

teachers have become ‘designers’, or act as ‘partners’ in the design of curriculum materials” (Pepin, Gueudet, et al., 2017, p. 799).

3.5. Different approaches to meet the divergent needs of students

Digital tools have been advocated for their ability to strengthen the capacity to meet de differentiated needs of the students (Haelermans, 2017; Pepin, Choppin, et al., 2017; Utterberg et al., 2019). There are several ways to meet those needs, according to Confrey (2016). *Differentiation* is a general concept covering various strategies of adapting the instruction to meet the divergent needs of students. Differentiation could be achieved through individual as well as collective instruction. Examples of collective instruction are collaborative tasks where all can take part, contribute and learn regardless of abilities. *Personalisation* or *customisation* means adapting the tool in accordance with the personal preferences of the student. A specific approach is through *individualisation*, meaning that the students proceed through the material in their own pace following individual trajectories. Individualisation might imply that the learner interacts almost exclusively with the digital tool, removing features of learning environment fostering collaboration and reflective conversations (Pepin, Choppin, et al., 2017). Loss of features in learning environment revealed when the use of a digital textbook supporting individualisation was studied. (Utterberg et al., 2019) The use of the tool came into conflict with the teacher’s belief of how instruction should be organised and how math should be learned. Due to the increased differentiation of trajectories and levels between students in the same classroom, it became difficult for teachers to assist students, impeding mathematical discussions.

4. Method

In a systematic review of studies using CHAT Batiibwe (2019) find that there is no agreed methodology among researchers on how to use CHAT; however, they all used some kind of qualitative analysis.

This study is empirical and explorative, not having the ambition of being representative, but to find phenomena that could be a ground for further analysis regarding implementation, use and design of digital textbooks. The study does not manipulate or intervene in the activity of instruction but collect data from previous use. The study did not introduce digital textbooks. They had already been used by the teachers for at least one semester when the collection of data took place, and the decisions to use them was taken independently of the study. Therefore the study could be described as a study *ex post facto* (Cohen, 2011), a retrospective collection of data. The analytical tool in the study is thematic analysis, and the method to collect data is interviews.

Interviews is a suitable method for studying why and how things change, or not change as expected (Rubin, 2004; Utterberg & Lundin, 2017). Teachers were chosen as respondents since they are subjects in the activity system. Since "…the object represents the motive for the existence of the activity, and as it is the subject's motivation that drives this, interviews can be useful tools for unpacking motives." (Hardman, 2005, p. 4)

One weakness with using interviews in a study ex post facto is the difficulty to know if motives and effects are the ones presented by the respondents. There might e.g. also be other conscious and unconscious motives, as well as other impacts not observed or just not reported by the respondents. The account of motives and impacts given might also be biased.

Observations could have been used as a complement to the interviews to overcome some of those weaknesses. It could add more understanding by giving other insights into the actual instruction, use of tools and behaviour of students. Motives are nevertheless nothing possible to observe, but observed phenomena could be used to challenge, nuance, or confirm the data given by the teachers. Nevertheless, making observations several times in every class should have been required to give more than only snapshot insights into the activity of instruction and be of higher value for the study. Due to practical reasons, the short time of the study and the geographic distribution of the teachers, it would have been challenging to realise valuable observations and it would have given far less scope for doing interviews.

An interview guide approach was used to conduct semi-structured interviews with open-ended questions. This ensured that the topics of interest would be covered, but also permitted spontaneous adaption to the respondent narrative during the interview. Weaknesses with this approach are that different topics might be covered differently depending on the respondent way of answering, or the same issue might be described very differently, sometimes obstructing comparison. (Cohen, 2011)

The choice of doing semi-structured interviews was also based on the view that knowledge is generated between humans, something constructed between participants in a conversation and neither exclusively objective nor subjective, but intersubjective (Cohen, 2011). The respondent is given the possibility to be spontaneous, at the same time as the interviewer can press for reflection and complete and in-depth answers. The interview is an activity in itself, whose dynamics influence the data generated.

The choice of interview-questions reflected issues indicated as relevant in previous research using CHAT; motives to use and not to use digital textbooks; how, when and for what they were used and not; issues, conflicts, tensions and problems they faced; benefits and disadvantages of using and not using; change in roles and division of labour; opinions and change in behaviour of others in the community. See *Appendix 1*. Some background information regarding the experience of using digital tools

in general etc. was also collected. A few final more deliberative questions were also asked at the end of the interview if there was time; Why do they think it is rarer that mathematic teachers use digital textbooks compared to other teachers?; What more would be needed for using the full potential of the tool?; What would you like to be solved or supported in the instruction of math by a hypothetic dream-tool?

Contact with the 13 teachers interviewed was taken through different channels: private contacts (4), producers of digital textbooks (4), groups on Facebook (2) and tip from other respondents (3). The criteria for accepting a respondent was that they had used the digital textbook for at least a semester, no matter if they still used the tool or not.

The respondents came from different schools, except four teachers that came from the same two schools. Having respondents from different schools was a way of not letting the organisational culture from a specific school influence the result. The respondents used the textbooks with students from ages 10 to 18, see Table 2. They came from schools scattered geographically in Sweden situated both in the countryside, in small towns and a big city. Data regarding the socioeconomic status of the students was not collected. However, there were schools in very well-situated areas with students getting very high grades, schools with a high proportion of relatively newly arrived immigrants and at least one school with a high proportion of students not getting grades in math.

APP had been used by the respondents for at least 1.5 semesters, at most 7 semesters and with a median of use of 2 semesters within the group of ten teachers. The three users of WS had used it for 1.5, 2 and 7 semesters.

Before the interviews, every respondent got a letter (Appendix 1) describing the context and aim of the interview as well as an overview of the issues that would be covered. The letter stated that the researcher did not take a stand on which tools or methods that are better in the instruction of mathematics.

In the analysis seven of the twenty interviews was never used, due to either difficulties in understanding how they used the digital textbook, not using any tool defined as a digital textbook by the study or, in one case, a close professional relationship between respondent and one of the suppliers. Of the 13 interviews finally used five was made through a videoconference service, but in three cases only the interviewer transmitted the video signal. Telephone was used in six interviews, one was done through mail and two face-to-face. The interviews lasted on average for 1 hour.

All interviews were recorded and transcribed and then analysed using a theoretical thematic approach (Braun & Clarke, 2006). The data were coded, categorised and then organised in themes, using the model and concepts of CHAT. Coding was done considering the model of CHAT: the different components, the relations between components, systemic contradictions and congruence. Special attention was given to signs of changes of any kind, e.g. in relation with students, the role of teacher etc. Also, the aspect of motives received careful attention, for instance, motives for acting, motives for use and non-use. The coding followed those main perspectives:

- how the tools were used
- when the tool was used and not used
- for what the tools were used, and not used
- motives to use and not to use
- perceived pros and cons of the usage
- effects of the use
- descriptions of components in the activity system and changes of them (e.g. students, pedagogical norms,

- descriptions of relations between components in the activity system and changes of the relations (e.g. division of labour)
- other changes in instruction

The codes were then categorised according to those main perspectives, but with several subcategories depending on the perceived need to differentiate. The work was done with the use of the software Nvivo, but also exported for further analysis to Excel. Comparisons of the occurrences of different codes were made in relation to the different textbooks used as well as to student age, looking for patterns.

Digital textbook	Schools	Student age			Sum of respondents
		10-12 years	13-15 years	16-18 years	
APP	8	7	3		10
WS	3		2	1	3
Sum of respondents		7	5	1	13

Table 2. Respondents according to use of digital textbook and age of students instructed

4.1. Ethical aspects

The research follows the Research ethical principles of the Swedish Research Council. The respondents participated voluntarily and were previous of interview informed of the context and aim of the interview, what ethical standards that applied including non-proliferation of personal data nor school name and also about their right to withdraw at any point and get all their data deleted (Appendix 1).

At the beginning of every interview, the respondent gave verbal permission to record and use the data in accordance with the letter and the ethical principles. The consent was recorded. In the case of using a system for videoconference, the respondent also accepted the recording by in forehand clicking on an acceptance-button on the screen.

4.2. The digital textbooks

Earlier studies have pointed out the use of digital textbooks conflicting with perceived god practice of pedagogy regarding presentation and communication of procedures. This conflict obstructed teachers insight into the learning processes. (Utterberg & Lundin, 2017; Utterberg et al., 2019) It is interesting to see how those findings depend on the pedagogy of the tool by investigating tools with other characteristics, to see if those differences imply other impacts. Therefore, this became one of the criteria for the choice of textbook to study. One textbook was chosen for having a different structural approach to present and communicate procedures. The other textbook was chosen since it has a structure more similar to the one studied in the research mentioned above. That makes it possible to compare tools both within the study, as well as between studies. Other criteria for choosing textbooks was that they

should be used at a national level by many schools in Sweden and thereby being popular products in the market segment. This ensured that the textbooks were not products in early stages of development but tested and to some extent adapted to the demands of the market. No strict objective criteria for evaluating "used at a national level by many schools" or "being popular products in the market segment" was used, but relied on the judgement of the researcher after six years of professional experience in the field, with extensive contacts with many schools and also with all major producers of digital textbooks in Sweden.

The description and comparison of the features of the digital textbooks follow the way Pepin, Choppin, et al. (2017) categorise the features: *instruction*, *assessment and reporting*, *management*. In this study, the features for instruction and assessment will be considered. The instruction category as a learning space is conceptualised as four spaces. *Presentation space* is "the range of tools and media available to present topics to students". The *problem space* "refers to the types of problems and the range of possible solution paths or responses". Tools to work with form the *work space* and are thought about "in terms of tool availability, flexibility, and connectedness" and finally the *navigation space* "refers to the potentially non-linear way that learners may progress through mathematical topics." (Pepin, Choppin, et al., 2017, p. 649) The description of the features of the digital textbooks will not go into detail, focusing more on structural characteristics. It base on the study of limited parts of the content, randomly chosen and on the descriptions by the teachers.

Both digital textbooks are available as online-based resources, meaning that the access is not bound to any particular artefact, but can be used from any supported device connected to the Internet. APP is more restricted when it comes to hardware requirements since it demands a screen with touch functionality, and at today's date is developed for three specific operative systems. WS is entirely web-based and can run on any digital device with a web browser.

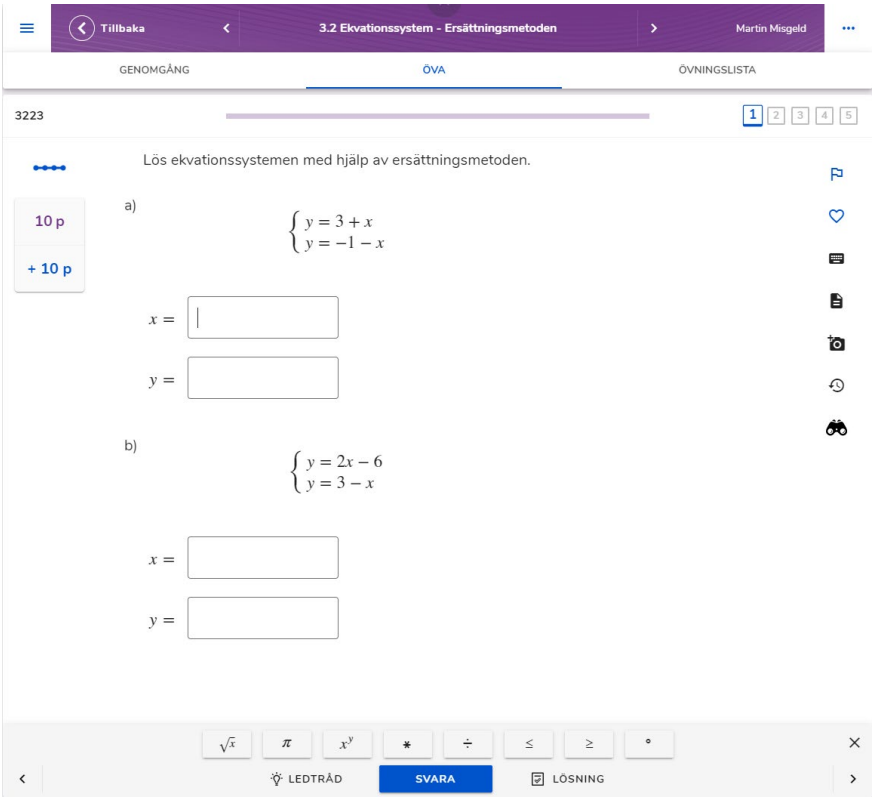

Figure 2. Digital textbook WS. Example of task with the possibility to enter an answer and get access to clues and solution as well as other tools.

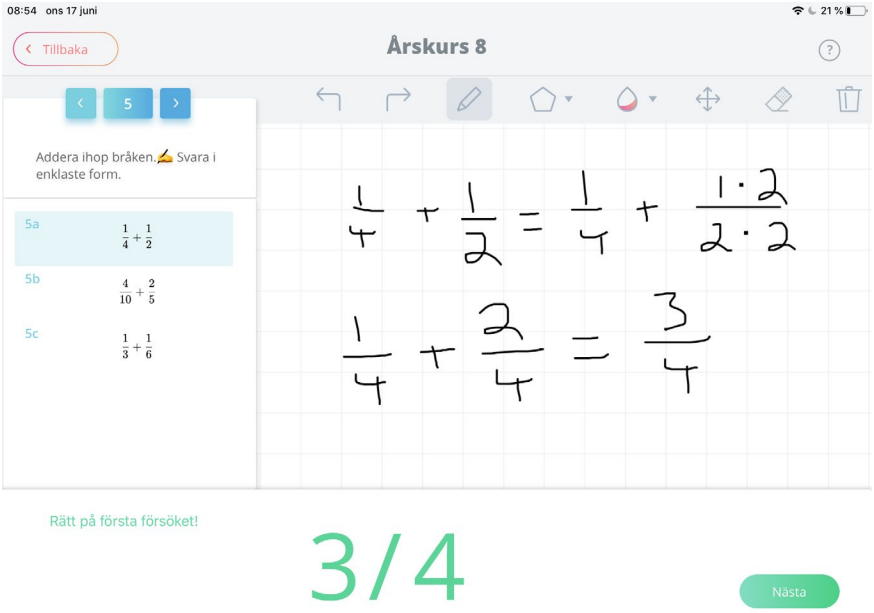

Figure 3. Digital Textbook APP. Example of task with the possibility to communicate a solution and enter an answer. Solutions and answer are entered by handwriting. Tools for entering figures and using different colours are available when presenting solution.

4.2.1. Instruction

4.2.1.1. Presentations space

The presentation of topics is in both tools given in connection with task presentation but differ in the order of presentation, content and to some extent in choice of media. In APP the student must make an active choice, after having opened a task, to see the presentation. In WS it is always presented before task when entering a new module. In WS the presentations are longer and always includes both text, video, and images, while in APP images and video occur sometimes.

4.2.1.2. Problem space

The problem space has not been analysed thoroughly independently but relies to a great extent on the descriptions and judgements by the respondents. Regarding the "ordinary" tasks, there was no indication from teachers about any significant structural difference nor from the printed books they previously used nor between the tools. There where tasks both for skills training and problem-solving. There where contradictory comments from different teachers regarding the level of difficulty in APP. Several also mentioned it to be too few tasks in APP, as well as a peculiar ordering of tasks. In both tools, students can choose their strategies, but all problems had predefined right answers, what Pepin, Choppin, et al. (2017) define as a *narrow* problem space.

WS also had tasks in an *expansive* problem space, tasks with different solutions and solution paths (Pepin, Choppin, et al., 2017). In those assignments, students were encouraged to find different solutions, paths or approaches, and there was often not only one single right answer. They were

teacher-led activities supporting collective and collaborative work, often digital and non-digital in combination, and they addressed both mathematical concepts and problem-solving strategies, encouraging the use of different strategies.

4.2.1.3. Work space

Within the work space there is a difference between the textbooks regarding the possibilities to elaborate and communicate solutions. In APP, the students can sketch and present solutions using a finger or touch-pen on a touch screen. In WS there is an option to submit text descriptions of solutions (written by keyboard) or photos of handwritten solutions on paper.

When working on tasks, there is a broader palette of tools in WS. Students have access to a sheet with formulas in mathematics and can also choose to get clues or see the solution, not just the answer, to tasks.

There is no inbuilt support neither for sharing between students nor collective development. Teacher-led collective development was supported by the possibility to anonymise the solutions handed in. The anonymisation facilitated teacher using the student solutions for presentation and collective reflections.

4.2.1.4. Navigation space

In both tools, the teacher can choose which learning modules to expose for students, but not in which order the student solve problems, neither within nor between exposed modules. In APP, the teacher can choose exposition on individual or group level, in WS only on the level of classes. In WS, there is a possibility for a teacher to flag tasks, signalling it as a task chosen by the teacher to solve.

WS has an element of limited adaptivity, signifying that within a subchapter, tasks are skipped if a student has solved several of a similar kind correctly. Students can sidestep the adaptivity by making their own choices, and teachers by using the flag-function.

4.2.2. Assessment and reporting

Both tools correct the answers given automatically with instant feedback to the students. The feedback is with texts in different colours depending on success and if the student tried several times.

Neither of the two tools corrects the presentations of solutions. The solutions are available to teachers for manual assessment, but feedback is not possible to give in connection to them within the tools.

In WS, students get points when solving tasks according to the difficulty of the task and if clues and solutions were consulted before answering or not. The points aggregate on class level and charts of the best classes in Sweden is shown for all. The teacher can turn off the comparison with other classes. Students also receive medals after solving a certain number of tasks according to different criteria, for instance, x tasks in a row without failure. Those features add an element of competition to the problem space.

Apart for the instant feedback to solved tasks the users of APP have access to an overview of their performance in each subchapter, with presentations showing the share of wrong answers, right answers and right answers on the first attempt in different colours.

In both tools, the teacher can adapt and present tests to students.

Several views accessible for teachers present data regarding student behaviour and performance. Data is collected both while students solve tasks during classes and during homework as well as when doing tests. Teachers have the possibility to follow the work of individuals and groups live, but also afterwards get information about the performance of individual students as well as about groups.

5. Findings

The analysis of the interviews revealed how the digital textbooks where used, as well as several themes regarding dynamics in the activity. After the presentation of the general use and function of the digital textbooks in the instruction, the most emergent themes identified using CHAT will be presented; changes in teacher allocation of time due to changes in division of labour, contradictions and congruence with norms (with subthemes), perceived needs of the community and facilitation of teacher insight in learning.

5.1. Motives to start using and general use

Regarding general motive to start using the textbook three out of the ten teachers in the researched group said they had not made their own voluntary choice to do it. Two made it because of school policy, and both used WS as a replacement for the printed book. Both would like to switch to printed books entirely or to a greater extent. The third of the teachers not having chosen to use the digital textbook voluntarily made it because of a pressure to digitalise the instruction. She used APP, found it useful as a complement to the printed book and would like to continue using it. Among the ones that chose to use the tool voluntarily all but two would like to continue using it—of the two not wanting to continue one used APP and the other WS.

Seen from the perspective of kind of textbook, all using WS would like to switch to printed books entirely or to a great extent. Teachers using APP wanted to continue with that, in all cases but one.

The function of the digital textbooks was as complements to printed textbooks by all except one of the teachers using APP. In all expect one of those cases of complementary use APP was used a minor part of the time spent in class. However, at the same time in six out of the nine cases, there was a positive expectation of abandoning the printed book in the future when the digital had developed more. Teachers using WS had all replaced the printed textbook, making the digital the primary resource.

Nevertheless, all teachers, regardless of kind of textbook or if they used the digital as complement or replacement, had one or a few students using printed books almost always or to a greater extent than the others. Teachers explained this with students needs or preferences.

To summarise, the initiative to start using digital textbooks was mostly taken voluntarily by the teachers themselves, and generally, they were used to complement the printed book. There was a significant difference regarding the will of continuing using the digital when it came to the kind of textbook. All users of WS wanted to abandon the digital entirely or to a great extent, and all but one users of APP wanted to continue using it. To a lower extent, this difference in the general attitude towards the tools was also in correlation with the cause of starting to use. Two out of three teachers not starting to use the digital book voluntarily would like to abandon it, compared to two out of ten in the group of teachers starting by their own will.

Frequency of teachers according to kind of textbook, reason to start to use the textbook, will to continue to use the textbook and how the textbook was used in relation to printed textbook

Textbook		Reason to start to use		Want to continue to use		Used as complement	Used as replacement
APP	10	Own will	9	Yes	8	7	1
				No	1	1	
		Not own will	1	Yes	1	1	
				No	-		
WS	3	Own will	1	Yes	-		
				No	1	-	1
		Not own will	2	Yes	-		
				No or as complement	2	-	2

Table 3

5.1.1. For what actions where the textbooks used?

The following picture emerged from the accounts given by the teachers regarding what they used the digital textbooks for in the instruction.

Everyone used the digital textbook to present tasks for the students, as well as letting them submitting solutions and answers.

The majority of the respondents, all except four, said they used the digital textbook for tests of various kinds, mainly weekly checks or diagnostic tests. APP that permits solutions to be written directly digitally in the tool was also used by half of the teachers for more comprehensive assessments, due to easy administration and help in correcting. The others preferred paper-based assessments for various reasons. Some were not content with assessment tasks in the tool, and some found it easier for the teacher to assess when solutions are communicated on paper. In the case of WS, some also discarded the tool for those tests to avoid students focusing more on answer than working with the presentation of their solutions.

Data from those tests, as well as data on student behaviour and performance while training, was said to be used for getting an insight into the learning process of individuals as well as of the groups. They used the data both for assessment and for the planning of upcoming actions.

The live functionality was used by a little more than half of the group to monitor the behaviour of their students during class. The frequency of this, as well as exact behaviour in the monitoring (e.g. studying data from a few chosen students or all), differed both between teachers and between lessons for the same teachers. The reason given for not using the live functionality on all lessons was lack of time. Still, it was emphasised as a useful tool to track and react on individual students' efforts as well as getting information about difficulties that many had in common, and being able to react on them.

About half of the teachers said they often referred their students upon questions to the presentation space in the digital textbook. Whether the students of the other teachers consulted that material on their initiative is not clear.

The tasks supporting collaborative learning in WS was said to be used occasionally to enhance collective learning regarding strategies, problem-solving and concepts. Teachers using both tools used the possibility to show anonymised student solutions via the projector as a ground for discussion regarding, for instance, choice of strategies.

No respondent substituted teacher lead expositions or introductions to new themes by the instructions embedded in the digital textbooks.

5.2. Impact on instruction – themes identified

5.2.1. Change in teacher's allocation of time

All teachers reported a change in the division of labour between teacher and tool, deliberating them from some tasks and allowing them to allocate their time differently, and, according to them, in better ways. No negative consequences were reported in connection to this.

This change was due to the functionality of automatic correction of answers and embedded presentations that teachers could refer students to. During lessons, some students were said to become more self-reliant, and teachers could spend more of their time on students with more urgent need of their presence. Usually, this meant supporting those with the greatest difficulties but also finding new challenges to high-performance students. Between lessons, they had to spend less time correcting student tasks and could dedicate more time on planning instruction.

5.2.2. Contradictions and congruence with norms

The use of digital textbooks supports some of the norm's teachers see as desirable and, in some cases, also create tension with others. Except for the themes reported for here, the respondents also gave accounts on other support or tensions with norms of pedagogy. They are not reported in this study since they either were not considered to affect the motive to use or not use, was not at a systemic level, or only mentioned by single teachers.

5.2.2.1. Adapting to different needs

All but three teachers used and expressed satisfaction about the possibility to use the textbooks to adapt to the divergent needs of the students. The approach to meet the different needs was mainly an individualisation approach through the adaption of the quantity and difficulty of tasks. They used three different methods to achieve that. One was to tell students to choose themselves among the tasks depending on what they felt appropriate for their learning. Another method was to decide what tasks to expose, a possibility given only with APP. All but two teachers using APP made adapted presentations of tasks to individuals or groups. The third method was the inbuilt automatic adaptivity in WS, which was used by two out of three teachers. The tool adapts what tasks to present depending on performance, but always tasks within the same module.

Teachers emphasised the advantage of being able to individualise in a way relatively opaque for the other students, diminishing the risk of stigmatisation. When using printed books, it was more explicit for other students on what level they were working. This transparency was said to be the case both when using different books as well as when using the same book but working on different pages. The use of the individualisation approach with digital textbooks differed in comparison to the use with printed books in the aspect of opacity but also in being easier to administrate for the teachers.

Apart from the individualisation approach teachers using WS to some extent also meet the different needs of students by collaborative assignments, with digital support. Those assignments seemed to be used only occasionally.

In essence, the tools supported the norm of individualising to meet the divergent needs of students. This finding is in line with the findings of other research (Pepin, Choppin, et al., 2017; Utterberg et al., 2019) even though no tension regarding this was found here. Teachers in this study where quite satisfied with the support of the individualisation strategy. Differences in tool features might partly explain the absence of tension found in other studies. Neither of the tools in this study did lead to the learning process of students in the same class becoming very scattered.

5.2.2.2. Feedback

The immediate feedback given by the tools to students was seen by teachers using both digital textbooks as a good support of making the students aware of their learning. When using printed books, several students were said often neglecting to correct themselves or correcting very late. Teachers found it being of great advantage when feedback was received in close connection to the performance, supposedly giving more effect on learning. Several mentioned that students with low self-confidence in math often were encouraged when getting positive feedback. They also expressed an advantage in students with difficulties getting feedback as early as possible, instead of at the end of a learning module when it was more demanding to correct wrong behaviour.

The tools supported norms regarding feedback, norms perceived by teachers as good practice.

5.2.2.3. Focus on answer

Some teachers found that the tool changed the focus of the student's efforts. The tool, according to those teachers, had the effect of making students overlooking the importance of the procedure and instead emphasising giving the correct answer. Students became keen on getting positive feedback from the tool and therefore prioritising that, sometimes even answering by chance when not knowing how to solve. In those cases, the students presented fewer, or less elaborated, presentations of the steps in their solutions. This scarcity of presentations created tension with the way mathematics should be learned according to the teachers. Teachers rather emphasised working with the procedure and communication. Before when using printed books, students were said to put more effort and time in the elaboration of solutions and the testing of different strategies. This change in behaviour was even mentioned as a reason for two teachers to abandon, or plan to abandon, the digital textbook, and by two others as a reason to possibly switch to more use of printed textbooks if possible in future. The tension was highlighted in the choice of a teacher at an upper secondary school to use books more often for students supposedly going to study advanced mathematics at university, but letting the others use the digital textbook:

> ”For those who are going to attend mathematic education after upper secondary level, they need very good knowledge and ability to work in such a way where you have a book and a problem and sit for an extended period and think about it and write and so. I have to be sure that they are prepared for that.” (Teacher using WS)

Another teacher answer to a question about differences in student presentation of solution using printed or digital textbook:

> ”One can lose some of the reasoning, stepwise, digitally. I think they learn how to read the tasks, and in the end, there is only answering alternatives that you type in.

> Especially those getting smart at it, they skip “how do I think”. And that’s important.” (Teacher using APP)

When comparing the different digital tools from this aspect, there was a striking difference between them. Within the group using WS, this was a significant issue for all, but in the group using APP this tension was only present in three cases out of ten, and in two of them this was not seen as a significant issue. The absence of expressed tension when using APP might not only be related to differences in the tools, but also to the fact that those users continued to use the printed book in parallel.

5.2.3. Perceived needs of the community

Digital textbooks, together with the physical unit they are used with, often has a motivating effect on the community of students according to the teachers. This phenomenon was a general opinion by all respondents except one. Teachers mention students perceiving it as more fun using a digital tool and the instant feedback and sometimes also the element of competition was mentioned as increasing motivation. In some cases, students are said to be more focused and able to work more independently with less help from the teacher.

There were several cases reported of students with difficulties in understanding, motivation or concentration that changed behaviour dramatically after the introduction of the digital textbook. Several previously not showing interest in making any greater effort became more motivated and showed a growing will of working with mathematic. Teachers point out that those are specific cases, and this effect cannot be observed within all students having difficulties. Several students with difficulties, on the contrary, find it even more difficult using the digital textbook and continue using printed books instead.

The teachers explain the improved focus for the majority of the students with the motivating factors mentioned above, but also with the design of the presentation of topics and tasks. The digital textbooks are scarcer in presenting information, for instance, only showing one or a few tasks at the same time, which gives fewer visual distractions. Usually, the presentation of theory and examples are also said to be more adapted to the present task. However, the more limited display of tasks and explanations can to a smaller number of students be a disadvantage; they miss the overview and a sense of how much is left, how much they have done and what will come next. Some teachers mention this is a reason for some students to choose a paper book instead.

Another aspect when using APP that contributed to greater focus for students with difficulties to concentrate was the need to interact with fewer artefacts. If they use a printed book, they mostly have two books, one with tasks and one for writing solutions. With a digital textbook, they just have one unit to interact with, which for some made it easier not losing focus.

To some, the motoric demands of presenting the solutions are reduced while using a digital device, but for others, the opposite applies.

The digital tool also functions as a distractor of focus for some students. Especially those with difficulties of concentration or understanding tend to use the possibilities of the digital unit for other purposes than learning math. This distraction was especially prevalent among users of WS.

The dominant effect of the use of digital textbooks in this aspect is said to be that it is meeting the need for motivation and focus better than a printed book, but with important exceptions among some students having difficulties of different kinds. When using WS, the negative effect of the distraction seems to be more present than when using APP.

5.2.4. Facilitating teacher insight into learning

All but one teacher, but to different extents, say they get valuable aid from the learning analytics data presented by the tools. It helps them understand how the students, individually and as groups, approach the desired outcome of the activity; what they have learned and what difficulties they have. They also say that the data is of valuable help in directing their planning of coming instruction. The teachers benefit from the data compiled and presented by the textbooks after students solving tasks during lessons, but also from the exit-tickets and weekly tests and checks. The possibility given by the automatic correction to have more frequent follow-ups is stressed by many. When discovering difficulties, actions can be taken earlier in the process. Some students whose behaviour otherwise are difficult to observe is highlighted for the teachers. This aspect of getting more insight into the learning process is perceived as a big help for the teachers when acting towards the object of the activity.

Almost all teachers use the digital textbook to make weekly follow-ups and emphasise the significant gains of getting much insight into the learning with a small effort and not having to spend much time on it. Insights used both for the planning of instruction for the group as well as for actions regarding individual students. Quotes from two interviews illustrate that:

> ”… we check for the goal of the week every Friday. It is for my part to know if my teaching has reached. If I can find anything on the group level or individual level. If on the group level, then there is something wrong with my teaching, then I can’t move on, but might have to repeat it next week. If it is on the individual level then we have support, we call it ‘studio’. One can go there and work with stuff you have difficulties with.” (Teacher using APP)

> “I have to spend less time on individual follow-ups if I haven’t seen during class what I want to see, and they neither have performed during tests so that I can see what I have missed. If they have done what they should have done in the app and I can find enough substance there, then I don’t have to spend so much time on follow-up on the individual level.” (Teacher using APP)

Although this is a general opinion, some teachers also express a disappointment since they expected the tool to give a more in-depth insight into the learning process. They perceive the data presented as useful but relatively shallow.

Those using WS also found contradictory effects on the possibilities for teachers to get insight into the learning process. They got beneficial support from the data presented by the tool. However, since the students generally performed fewer and inferior communication of solutions, it became more challenging to gain a deeper understanding of their learning. One teacher said:

> ”I can enter and check how it looks for a student, and they can have everything green, but again I don’t know how it has become green.” (Teacher using WS)

Teachers using WS also found it more difficult to observe the work done during class; students could easier “hide behind the screen” and pretend to work by answering questions in the tool. With a printed textbook it was said to be more difficult to hide this kind of behaviour, just answering without working with solutions. It was easier to observe what kind of work that actually was taking place with printed textbooks.

Two comments from teachers using WS regarding the lack of insight into the work process of students during class:

> ”… you can actually sit and look at the screen and not understand anything, but still half-answer and look like you are working because you work digitally. That is something you can do in all school subjects when working against a screen. Are you

> without a screen and I see that the pen doesn't move, and hasn't been moving for a long time, then I understand they have some problem. I have some that have hidden some, …" (Teacher using WS)
>
> "Because somehow to some extent you hide, … if they calculate with a book in an exercise book, you can see who is writing. But with a lot of screens everywhere, it's much more difficult to see who is actually doing what, I think." (Teacher using WS)

This phenomenon correlated with the type of digital device used, being present when students used computers, but not so much when using tablets.

6. Discussion and Analysis

This study aims to investigate the use of digital textbooks in the instruction of mathematics. A phenomenon exposed to policy as well as market forces but practised in an activity system where teachers are the subjects. How can one understand the dynamics from a system perspective?

6.1. Limitations and weaknesses

There are several limitations to be considered when analysing and drawing conclusions from the findings in this study. As pointed out in the introduction, the selection of informants was not made in a randomised way, making it impossible to know the general prevalence of the findings outside of the studied group. A high proportion of the informants was using digital textbooks, which is supposed not to be very typical for teachers of mathematics in general. Also, one of the producers of a digital textbook proposed some of the respondents, and they could have a bias in favour of that tool. Still, they are users and subjects in the activity system, making their data valuable in an exploratory study, but maybe not representative.

The used methods relied on the opinions and judgements expressed by teachers. Other facts and motives could have been discovered if other kinds of data also had been collected. The respondents are part of the activity system of instruction, but in the interview, they play another role in another activity. This might influence the accounts given. The accounts of the respondents are also the result of their subjective choice of data and interpretation of them. There might have been other causes not mentioned influencing the motives to use and not use digital textbooks. Therefore, the analysis of this study suffers from the weakness of having data collected only through interviews.

A limitation in the research design is the use of one activity system as analytical unit. As pointed out by Engeström (2009), it is often useful to take two interacting activity systems as unit of analysis, especially when it comes to education (Engeström, 2014, p. 81 f.). Also considering activity system(s) with students as the subject might have contributed to the understanding. The choice of choosing the activity system with teachers as subjects could be justified by them being important decisionmakers when it comes to how to use the available learning resources practically.

6.2. Strengths

A strength of the study is the system perspective of CHAT, making it possible to analyse data from the perspective of the subject situated in the socio-cultural setting.

The study has a robust ecological validity; all respondents used or had been using, the digital tools in genuine activities of instruction. They had started to use the digital textbooks by reasons not influenced by the study. The study neither influenced how or to what extent the tools were used. All respondents had used the tool for at least one and a half semester; most of them had at least one year of experience using the digital textbook. Data came from use under realistic conditions, and there had been some time for teachers to understand, test and adapt to the tools.

Another strength is the approach of also looking at congruencies; a concept seldom used while analysing technology in the instruction of schools. Incorporating that concept into the analysis also shows “the other side of the coin”, which internal system-factors are favouring the use.

6.3. Summary of findings

The study revealed that the use of digital textbooks could both support and create tensions with pre-existing norms of good practice. Textbooks creating a strong tension made teachers preferring not to use them or to use them as a complementary resource, while tools not creating this tension was perceived much more positive. It was also shown that there were several benefits of efficiency in terms of the work of teachers as well as in learning activities. If able to choose, teachers preferred to use digital textbooks as complements to the printed books. The benefits perceived by the teachers goes well in line with the findings of Pepin, Choppin, et al. (2017), digital textbooks having advantages in giving possibilities for flexible and personal planning of instruction, individualisation and increased visibility of students learning.

6.4. Analysis

6.4.1. Use and motives to use

The digital textbooks in this study are, in general, used as complements to printed books. Most of the teachers say they switch between the two types depending on the need of students and the motive of the learning activity. Even the few teachers using the digital book as the main resource made several exceptions and used printed books for students with special needs, or others with a preference for it. Apart from creating new demands from students having preferences regarding kind of textbook, this more abundant toolbox increases the requirements on teachers having skills in the evaluation of resources and the design of learning activities. This change in requirements is in line with the literature, identifying a changing role of teachers towards more of a designer (Holmberg, 2019; Kempe & Grönlund, 2019; Pepin, Choppin, et al., 2017; Pepin, Gueudet, et al., 2017).

The long-term consequences of this are something not covered in this study but could be interesting to explore. Is the augmented access to and greater use of complementary tools in itself something that transforms instruction in a diversifying way?

The main motives mentioned for using digital textbooks was to make instruction more efficient, rather than to transform education with changed or new methods of instruction or learning activities. Efficiency is augmented by saving time for teachers and students, and teachers can allocate their time differently. Teachers also get easier access to and more information about the learning process of the students. Digital textbooks are also said to affect students by raising motivation and in some cases also facilitating focus on the tasks, although the data is contradictory on this point. The learning outcome of tasks are thought to be improved by instant feedback, and tasks can be adapted to individual needs without giving negative feelings to students.

This no-change, generally seen, of structural aspects of instructions is confirmed when asking teachers about how they perceive that teaching has changed. No-one can point out any significant change in the way mathematics is learnt. Other studies also conclude that in general, the usage of digital tools can only be related to minor changes in instruction (Grönlund et al., 2018; Tannert & Berthelsen, 2020).

6.4.2. Systemic contradictions

The aspect of supporting teachers insight into the learning process is to some extent in contradiction with other research, finding that teacher get less insight. (Utterberg et al., 2019) The functionality of APP supporting handwritten digital communication of solutions, and giving the teacher access to rich

information about student behaviour and performance can explain this difference. The access to this information is said to be even easier accessible than with printed textbooks. Teachers using WS mention the same tension between their need for transparent learning processes and the use of the tool as found by Utterberg et al. (2019).

Especially the use of WS comes into conflict with what is regarded as good pedagogy needed to transform the object into outcome. This conflict is in line with the description of the second type of systemic contradiction as being between components of the activity system (Engeström, 2014).

> "When an activity system adopts a new element from the outside (for example, a new technology or a new object), it often leads to an aggravated secondary contradiction where some old element (for example, the rules or the division of labor) collides with the new one." (Engeström, 2001, p. 137)

The contradiction is systemic in the sense that to be changed it implies a change at the system level. According to Engeström "Such contradictions generate disturbances and conflicts, but also innovative attempts to change the activity." (Engeström, 2001, p. 137) In this study, no data are indicating this kind of innovative transforming changes, so far. The actions taken to handle this contradiction was either to change tool completely, continue to use printed textbooks complementarily or to resign.

The policy of some schools to use digital tools for instruction, even when not aligned with good practice of pedagogy, might be seen in the light of the findings by Choppin and Borys (2017). School administrators and instructional leaders have a different perspective compared to teachers regarding gains and design of digital tools. Administrators and leaders often stress the possibilities to meet the divergent needs of students, especially those of struggling students, and features to track and present student progress. In contrast, teachers stressed tool alignment with curriculum and the ease of using tools, since time spent on them is seen as "lost time", not benefiting the activity.

6.4.3. Congruencies

The use of the tools has a congruency impact on the activity system through interaction with several different components, in accordance with the findings of Allen et al. (2013).

The change in the division of labour through automated correction and other phenomena, making some students more independent of teachers, allowed the teachers to allocate their time and resources in a more useful and qualitative way. This effect worked in combination with the augmented possibilities of getting insights into the learning process, giving teacher both more time but also more information to base their planning. The tools supported hence the orientation of the activity towards the object through changes at the action level, making the system more efficient and stable.

Other congruency interactions occurred with existing norms. Norms regarding feedback were supported as well as the approach of individualisation to adapt to divergent needs within the group of students. The automated feedback was perceived as both increasing motivation and the learning of students. The use of the textbooks for individualisation diminished negative side-effects on student feelings regarding the adaption. Thus, the tools in those respects also contributed to a more stable system.

The literature stresses that there are different ways of meeting the divergent needs of students, individualisation is only one, and not always the most appropriate. (Confrey, 2016; Pepin, Choppin, et al., 2017) In this respect, the embedded norms in the digital tools do not seem to be very different from the ones in printed textbooks, who also are cultural tools. The difference is in the ease of implementing the individualisation strategy for the teacher, as well as the diminishing of negative side-effects when using a digital textbook, which might make this a relatively more prevalent strategy, consolidating the

use of it in the activity. This could be seen as a more opaque variant of systemic contradiction, not being in direct tension with any component in the system, but changing the usability of certain practices and hence in a historic perspective be a cause of a change in the frequencies of which norms guides the practise. In a longer-term, this might be interpreted as a systemic contradiction between the tool and the norms not practised to the same extent as before. However, the opaque way of creating changes within one component through *supporting* an existing element might motivate it to be analysed as a congruency rather than as a contradiction. A congruency supporting a current element is an opaque change.

"Contradictions are historically accumulating structural tensions within and between activity systems." (Engeström, 2001, p. 137) In analogy with that, congruencies might be seen as historically accumulating structural *consolidations* or *enhancement*. Congruencies understood as "historically accumulating structural consolidations or enhancement" is not a view proposed by Allen et al. (2013) but a reflection made due to the structure of data analysed in this study.

6.4.4. Contradiction with norms decisive

The systemic contradictions between the embedded pedagogy of the digital textbooks and the preferred norms of the teachers seemed to be of more importance for teachers motives, then congruent effects on efficiency and learning.

The existence of strong congruencies was general for all respondents. The experience of contradictions between the use of tool and norms of pedagogy was very much related to teacher opinion about the general adequacy of the tool. This relation makes it plausible to conclude that the aspect of perceived bad pedagogy was of greater importance than the sum of the benefits of higher efficiency, more insight into learning, increasing motivation of students and better feedback. The aspect of not conflicting with good practice might be of more importance when teachers choose to integrate technology in education than issues as efficiency and facilitation. If so, this is in line with the findings in the review by Tondeur et al. (2017), stating that what teachers perceived as good pedagogy is important for integration of technology. Also, when comparing different users preferences regarding design of digital tools for instruction, teachers are found to prioritise the tool being aligned with the curriculum. (Choppin & Borys, 2017)

7. Recommendations, Conclusions, and Implications

This study is limited in considering only one activity system, and it could be recommended for further research to take several activity systems as unit of analysis. That could give a fuller understanding of the dynamics.

Different kind of forces of change was identified in the study, systemic contradictions as well as systemic congruency. The latter considered to create temporary stability but here argued also being able to drive change, even though in an opaquer way. The issue of congruencies, when introducing and using tools is a perspective I have not encountered in the literature analysing the use of educational technology in instruction. The scope for investigating this concept empirically but also to elaborate on it theoretically might thus be great and could add a lot to the knowledge regarding school systems and technology.

Using the framework of CHAT gave a possibility to understand the dynamics on system level of the use of digital textbooks in an educational setting, highlighting motives for use and non-use. It helped in focusing on the teachers as parts of an object-oriented activity mediated by tools and driven by a need, instead of analysing individuals separated from their context. The perspective seeks for motives beyond the individual teacher opinion and preferences.

The study highlights the notion of tools as mediators with embedded norms, and the importance of this when choosing tool to use. Eventual contradictions between prevalent norms of good practice and norms embedded in tool seemed to be determining factors for teachers, rather than aspects of efficiency.

For decisionmakers, the issue of non-neutrality of tools as conflicting with or supporting norms are essential. It gives other perspectives on teacher hesitance to and use of digital tools then change-resistance and lack of knowledge and thus take into consideration more aspects affecting the implementation of technology in education.

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9. Appendices

9.1. Appendix 1

Letter sent to respondents before the interview.

INSTITUTIONEN FÖR PEDAGOGIK, KOMMUNIKATION OCH LÄRANDE

Hej

Tack för att du vill ställa upp på en intervju kring digitala läromedel i matematikundervisningen. Intervjun görs som en del av mitt arbete med en masteruppsats inom ramen för utbildningen *IT och lärande* på Göteborgs universitet. Utbildningen presenteras på https://ipkl.gu.se/utbildning/itlgu. Syftet med uppsatsen är att undersöka hur/om användande av digitala läromedel påverkar matematikundervisningen.

I arbetet utgår jag från Vetenskapsrådets forskningsetiska principer som finns på: https://www.gu.se/digitalAssets/1268/1268494_forskningsetiska_principer_2002.pdf Ditt deltagande är självklart helt frivilligt, och du kan när som helst avbryta det. Önskar du det raderar jag då all information jag fått från dig. Jag kommer att spela in intervjun så att jag i efterhand kan gå igenom och dokumentera och vad som sagts. Ingen annan kommer att få ta del av inspelningarna eller de personuppgifter jag får tillgång till i samband med uppsatsarbetet och intervjun. I uppsatsen kommer informationen från intervjuerna att presenteras utan någon koppling till personer eller enskilda skolor.

Frågorna i intervjun ställs för att få en förståelse, jag tar själv inte ställning till vilka metoder, verktyg eller förhållningssätt som eventuellt är bättre eller sämre, utan jag vill förstå om och i så fall hur undervisningen påverkas av digitala läromedel, samt hur du ser på de frågeställningar jag listar nedan. Jag är själv inte utbildad mattelärare.

Jag är även anställd vid Stockholms stads utbildningsförvaltning, där jag arbetar med att stödja skolors användande av digitala lärresurser. Ämnet för uppsatsen ligger nära det jag arbetar med, men uppsatsen är helt fristående och görs inte på uppdrag av min arbetsgivare. Min arbetsgivare kommer inte heller att få ta del av inspelningarna eller personuppgifter. Tidigare har jag arbetat som it-pedagog på en grundskola, samt undervisat vuxna på folkhögskola inom IT, matematik mm.

Har du frågor, funderingar eller åsikter kring detta kontakta mig gärna via e-post, martin.misgeld@gmail.com, eller på telefon 070-338 37 56. Min handledare heter Marie Utterberg Modén, är doktorand vid Göteborgs universitet och kan nås via marie.utterberg@ait.gu.se.

Martin Misgeld

Intervjufrågor på nästa sida.

Intervjun är en så kallad semistrukturerad intervju. Jag har vissa frågor som jag utgår från men anpassar dem och ställer följdfrågor utifrån vad du säger. Nedan listar jag huvudfrågorna och några av de aspekter på dem som jag är intresserad av.

1. Bakgrundsfakta som antal år som lärare, erfarenhet av digitala lärresurser etc

2. Hur används läromedlet?
    a. I vilka sammanhang
    b. Vilka delar
    c. Elevgrupper
    d. Ersätter det något annat, eller kompletterar det

3. Vilka syften har du med användandet?
    a. Varför och hur valde du läromedlet?

4. Vad har användandet av det digitala läromedlet lett till?
    a. För- och nackdelar
    b. Elevernas lärande och beteende
    c. Ändrade roller och samarbeten
    d. Arbetsbelastning
    e. Bedömningsarbetet

5. Vad krävs för att kunna dra nytta av läromedlet som resurs i undervisningen?

9.2. Appendix 2

Quotes from interviews with teachers in original language.

Quotes in 5.2.2.3

”För de som ska gå utbildningar med matematik efter gymnasiet, de måste ha väldigt goda kunskaper och kunna arbeta på ett sånt sätt, där man har en bok och ett problem och sitter och tänker på det länge, och de skriver och så. Jag måste vara säker på att de är förberedda på det.”

”Man kan tappa lite av resonemanget stegvis digitalt. För jag tror ju att de lär sig hur man ska läsa av, och till slut blir det bara svarsalternativ som man skriver i. Speciellt de som blir duktiga på det, att de hoppar över det här ”hur tänker jag”. Den är ju viktig.”

Quotes in 5.2.4.

”…kontrollerar vi veckans mål varje fredag. Det är för att för min del veta att min undervisning nått fram. Om det är något jag kan se på gruppnivå eller individnivå. På gruppnivå då är det något som är fel på min undervisning, då kan jag inte gå vidare, utan måste dra det igen kanske nästa vecka också. Om det är på individnivå då har vi hjälp, vi kallar det studio. Att man får gå och jobba med sånt man har det lite klurigt med.”

”Jag behöver lägga mindre tid på att göra enskilda uppföljningar om jag inte har sett vad jag har velat på lektionstid, och de inte har presterat så att jag kan se det jag har saknat när de har skrivit prov. Har de då gjort det de ska i appen och jag kan se att det finns tillräckligt mycket substans på det, så behöver jag inte lägga så mycket tid på att följa upp på enskild nivå.”

”Jag kan gå in och kolla hur det ser ut för en elev, den kan ha allting grönt, men återigen vet jag inte på vilket sätt det har blivit grönt.”

”… du kan ju egentligen sitta och titta på skärmen och inte förstå något, men ändå halvsvara och se ut som om du jobbar för att du då jobbar digitalt. Det kan du göra i alla ämnen där du jobbar mot en skärm. Sitter du utan skärm och jag ser att pennan inte rör sig, och inte rört sig på väldigt länge förstår jag att de har kört fast. Jag har några som har mörkat lite, …”

”För på något sätt gömmer man ju sig lite, … sitter de och räknar med en bok i ett räknehäfte kan man ju se vilka som skriver. Men har man massa skärmar överallt är det mycket svårare att se vem som verkligen gör vad, tycker jag.”