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Contents

SAMMENDRAG

Matematikk i dagliglivet er kommet inn som et hovedemne i matematikkplanen i L 97, og koplingen mellom matematikk og hverdagen er et viktig poeng i læreplanen.

Denne rapporten tar for seg den historiske utviklingen av læreplaner i Norge, med særlig fokus på Normalplanene av 1922 og 1939 og Mønsterplanene av 1974 og 1987. Når det gjelder forarbeidet for dagens nasjonale læreplan, ser vi på Cockroft rapporten fra Storbritannia, NCTM standards fra USA og den nederlandske tradisjonen med Realistic Mathematics Education.

Med dette som teoretisk grunnlag, presenterer vi i rapporten en kvalitativ forskningsstudie, der vi ser på erfarne lærers oppfatninger og ideer om disse tingene. Denne studien går inn i fire skoler, og bruker som metoder: klasseromsobservasjoner, intervjuer og spørreundersøkelser.

SUMMARY

Mathematics in everyday life is one of the main themes in the contemporary Norwegian curriculum, L 97. The connection between mathematics and everyday life has become an important idea throughout this curriculum.

This report presents the historical development of national curricula in Norway, with particular focus on the plans of 1922, 1939, 1974, 1987 and of course our present curriculum of 1997. We also look at the Cockroft Report from UK, the American NCTM Standars and the Dutch tradition of Realistic Mathematics Education.

Based on this theoretical part we present a qualitative research study, a study focusing on experienced teachers' views about this subject. In this study we go into four schools, using methods of classroom observations, interviews and questionnaires.

1. Introduction

Since the middle of the 18th century we have had national curricula in Norway. School laws have been passed, and subject matter frameworks have been created to make sure that these laws were followed in the schools. In the current framework for grades 1-10, called L97, mathematics in everyday life has become a subject of it's own, side by side with numbers, geometry, algebra etc. This underlines that it is important to connect the school mathematics with the daily life experiences of the children, or as the curriculum states:

> The syllabus seeks to create close links between school mathematics and mathematics in the outside world. Day-to-day experience, play and experiments help to build up its concepts and terminology (KUF 1996, p. 165).

Our research project aims at teachers' beliefs, ideas and strategies on how this particular theme in the curriculum can be implemented. How do the teachers actually connect the school mathematics with the pupils' everyday lives? And what are their thoughts and ideas on the role of this theme?

In this paper, the focus will be on the historical development of this particular theme in Norwegian curricula (see also Mosvold 2002b), followed by an introduction to the classroom study in progress. This is a preliminary report. Further results of our research will be presented in later publications.

1.1 Curriculum development

For Norwegian teachers and textbook authors, L97 presents the guide lines on how the teaching should be. The idea of connecting school mathematics to everyday life has become an explicit theme in L97. As we will see here, following the curriculum development in Norway from 1739 till the present day, connecting mathematics with daily life, practical life, etc. (many different words are used) has been mentioned many times. We will try to find out more about how these ideas were interpreted and understood.

In 1739, the first school law was passed in Norway, or Denmark-Norway, as it was then. This law stated that all children, even the poorest, should be taught the ideas of the Christian faith, as well as "the three R's": reading, writing and reckoning, since these were all useful and necessary subjects to master. Although the first genuine national curriculum only arrived in 1922, there were several smaller and more local directives for the schools before that. One such was a plan for schools in Kristiania (now Oslo), which came in 1877. This plan stated explicitly that mathematical tasks never should contain larger numbers than required by daily life, and the tasks should be rooted in practical life.

1.1.1 The national curriculum of 1922/1925

This first national curriculum appeared in 1922, with a plan for the country schools, and in 1925 a plan for the city schools arrived. It was clearly stated as important that the knowledge of mathematics (mostly arithmetic) should be useful

for practical life. In all school years, the pupils should work with tasks dealing with ideas that the pupils were familiar with (KUD 1922, p. 22). The aim of the subject was stated like this:

> The children should learn to solve the kind of tasks that will be of use to them in life, correctly, quickly and in a practical way, and they should present the solution in writing in a correct and proper way (KUD 1925, p. 21, my translation).

Most examples on how mathematics could be connected with daily life were about money and economy. Buying, selling and exchange of money were good topics. Measuring and weighing were also important.

1.1.2 The national curriculum of 1939

N39, as this curriculum was called, is by some viewed as the best national curriculum Norway ever had. The preliminary work on N39 lasted for about a decade, and the curriculum was used in Norwegian schools for about thirty years. The plan for each subject was supported by research. Each was followed by a book containing further elaboration of the ideas, and discussions connecting the chosen ideas, strategies and teaching methods with research results, both from the planners' own research and from research that had been done abroad.

One of the main ideas in all school subjects was to train the pupils for independent work, so they could become active participants, seeking the needed resources for themselves. The ideas of the German "Arbeitsschule", and of John Dewey and the reform pedagogy were implemented.

The aim above, from 1925, for mathematics was copied, but further emphasis was put on the connections to everyday life. The idea was to build upon the pupils' skills in areas that were useful in daily life. Practical tasks should contain material that the pupils were interested in, and that they knew from the playground, domestic work, school etc. In time, important areas of the society should provide material and ideas for practical tasks in mathematics, such as: handicraft, industry, trade, shipping, farming, woodwork and fishing. The curriculum also stated that the pupils should do a lot of independent work, and especially work with tasks that provided action, like filling out schemas and lists from daily life (KUD 1965, pp. 137-142).

Ribsskog and Aall, who were the main people behind the plan for mathematics, showed a genuine interest for the "Arbeitsschule". They were critical towards the "skills schools", and they argued that the teachers were far too bound by final exams. In the preparatory work for the syllabus of mathematics, Ribsskog built on the ideas of pedagogues of the past, like: Adam Riese (1492-1559), Chr. Pescheck (1676), Johann Pestalozzi (1746-1827), Wilhelm Harnisch (1787-1864) and others. To make a syllabus that corresponded with the skills and interests of the pupils, Ribsskog found it important to know about what the pupils at each stage are capable of, to know the subject itself (especially the difficulties therein), and what mathematics the pupils would need after school. A subchapter even had the title: "Teaching of mathematics must correspond with the demands of life". All in all, the national curriculum of 1939 is a very modern curriculum, which contains

many of the ideas and thoughts that we find in our present L97, and ideas that are still discussed in present day research.

Their discussion of curriculum development was almost prophetic, and they concluded that the changes that had been made in modern curricula, to a large extent, had not been improvements (Ribsskog & Aall 1936, p. 5).

1.1.3 The national curriculum of 1974

In the 60's and early 70's, new curricula were elaborated. The so-called "modern mathematics", or "new math", was clearly influential in the 1971 curriculum, which actually consisted of two parallel curricula. One of these was built around set theory. This was strongly criticised. Although it contained phrases directing the aims of the curriculum towards practical tasks and applications of the theory, it was much more focusing on content matter, and aimed at learning or skills drilling of mathematical terminology.

The principles of the "Arbeitsschule" disappeared, and connections to everyday life were minimal, almost exclusively limited to measurements. This curriculum was, as already mentioned, strongly criticised, and when the final version appeared in 1974, the principles of the "Arbeitsschule" returned and most of the set theory and mathematical logic had been removed.

M74 redirected the focus of attention to the connection with everyday life, which was clearly stated as one of the goals for the subject of mathematics:

> The aim of the teaching of mathematics is to exercise the pupils in the application of mathematics on problems from daily life and other subjects (KUD 1974, p. 132, my translation).

The aim of the school system was to educate pupils who were able to solve problems that often occurred in daily life, society and vocations. Still, a large amount of the mathematics, which was connected with daily life, had to do with money.

1.1.4 M 87 - the national curriculum of 1987

Even our penultimate curriculum appeared in a temporary edition a few years earlier, called M85. It was called temporary because the Government first wanted to have a report on the curriculum development. When this report was finished, a new national curriculum was presented in 1987, and it was named M87 for short.

"Modern" ideas of constructivism and activity pedagogy were also present in this curriculum, as we can see in the following phrase:

> The school shall stimulate the pupils' need for activity and give them opportunities to use their own experience in the task of learning. The teacher must try to build on this experience, allowing the pupils to formulate their own questions and look for the answers, as well as pose problems that generate a desire for further knowledge and release the energy required to seek this knowledge (MER 1990, p. 55).

The connections between mathematics and daily life, life in society and vocations were also strongly present in this curriculum. In the mathematics chapter, these ideas were stated already in the introductory phrase:

> Mathematics is a necessary tool within technology and science and other areas of life in society. Knowledge of mathematics is also part of our culture. Mathematics can be used to convey precise information, and such information presupposes that the recipient has some understanding and knowledge of the subject.
>
> We need mathematical knowledge and skills in order to solve many everyday tasks, and to take care of personal interests and duties. For this reason, all pupils in the compulsory school receive instruction in mathematics (MER 1990, p. 210).

These aspects were also present in the objectives of the subject, as we see in the following:

> The teaching of mathematics is intended to
>
> - teach the pupils about fundamental topics and methods in mathematics, in accordance with their abilities
> - develop the pupils' knowledge and skills, to enable them to regard mathematics as a useful tool for solving problems in everyday life and at work
> - train the pupils' ability to think logically and to work systematically and accurately
> - make the pupils capable of working through and evaluating data for themselves, to enable them to make responsible decisions
> - preserve and develop the pupils' imagination and pleasure in creativity
> - stimulate the pupils to help and respect each other, and to co-operate in solving problems
>
> (MER 1990, p. 210)

If we look into the different topics contained in school mathematics, according to M87, we would find the connection with daily life and practical tasks all over. So, when we move into our present curriculum, L97, we should have in mind that the presumably new topic of "mathematics in everyday life" is certainly not at all new, and as we will also discuss, it was never intended to be a distinct, additional topic.

1.1.5 The L97 – our present national curriculum

According to our present curriculum, the pupils are supposed to become independent participants of the society. This aspect has been clearly visible also in earlier curricula, and it shows how the interplay between the school subjects and the daily life of the pupils is important. The close environment the pupils live in is supposed to provide the basis for teaching and learning, as we see already in the general introductory part of L97:

> Education must therefore be tied to the pupil's own observations and experiences. The ability to take action, to seek new experiences and to interpret them, must depart from the conceptual world with which pupils enter school. This includes both experiences gained from the community, their local dialect, and the common impulses gained from the mass media. Teaching must be planned with careful consideration for the interaction between concrete tasks, factual knowledge, and conceptual understanding. Not the least, it must be conducted so that the pupils gradually acquire a practical record of experiences that knowledge and skills are something they share in shaping (KUF 1996, p. 35).

The chapter concerning mathematics gives a long and thorough description of how this subject is connected to many aspects of life, and how mathematics is important in order to be able to understand and participate in the life of our society:

> Man has from the earliest times wanted to explore the world around him, in order to sort, systematise and categorise his observations, experiences and impressions in attempts to solve the riddles of existence and explain natural relationships. The development of mathematics springs from the human urge to explore, measure and grasp. The knowledge and skills which are necessary tools for these purposes develop through mathematical activities
>
> …
>
> The work with mathematics in the compulsory school is intended to arouse interest and convey insight, and to be useful and satisfying to all pupils, in their study of the discipline, their works with other subjects, and life in general
>
> …
>
> The syllabus seeks to create close links between school mathematics and mathematics in the outside world. Day-to-day experiences, play and experiments help to build up its concepts and terminology (KUF 1996, p. 165).

Underlining this important connection, the first area of the syllabus is called "mathematics in everyday life". At first sight, it might look as if "mathematics in everyday life" is a topic of it's own. Reading the text more carefully, we understand that this is more of a superior topic or aim of the whole subject of mathematics, which is supposed to establish the subject in a social and cultural context (KUF 1996, p. 168). "Mathematics in everyday life" is therefore to be understood more as an attempt to emphasise this aspect throughout school mathematics, rather than adding yet another topic to the mathematics syllabus.

L97 was not only built on earlier Norwegian curricula, but it also draws on research and more recent curricula from other countries. At least this is the case for mathematics. When developing our contemporary mathematics syllabus, the Venheim-group looked especially at the Cockroft report and the NCTM Standards of 1989, as well as the ideas of Realistic Mathematics Education from the Dutch tradition. Since these are some of the main sources of inspiration for the mathematics syllabus in L97, we will here have a closer look at them.

1.1.6 The Cockroft report

Already in the introductory part of this important British report, mathematics is labelled an important subject:

> Few subjects in the school curriculum are as important to the future of the nation as mathematics (Cockroft 1982, p. iii).

They also say that most people regard it as an essential subject, together with the mother tongue, and that it would be very difficult to live a normal life in the twentieth century (at least in the western world) without making use of any mathematics.

> The usefulness of mathematics is perceived in different ways. For many it is seen in terms of the arithmetic skills which are needed for use at home or in the office or workshop; some see mathematics as the basis of scientific development and modern technology; some emphasise the increasing use of mathematical techniques as a management tool in commerce and industry (Cockroft 1982, p. 1).

And further:

> A second important reason for teaching mathematics must be its importance and usefulness in many other fields. It is fundamental to the study of the physical sciences and of engineering of all kinds. It is increasingly being used in medicine and the biological sciences, in geography and economics, in business and management studies. It is essential to the operations of industry and commerce in both office and workshop (Cockroft 1982, p. 2).

They provide a quite thorough discussion on the usefulness of mathematics, and how much mathematics one actually needs to know in adult life. To sum up what mathematical skills we actually need in everyday life, they say:

> In the preceding chapters we have shown that, in broad terms, it is possible to sum up much of the mathematical requirement for adult life as 'a feeling for number' and much of the mathematical need for employment as 'a feeling for measurement' (Cockroft 1982, p. 66).

But they also conclude that they do not want to judge mathematical activity in school on the idea of practical use alone. This is an important view, shared by many teachers. Mathematics isn't only about what is useful and what is connected to everyday life. Mathematical puzzles, games and problem solving activities are also important aspects of the subject. They conclude that mathematics should be presented as a subject both to use and to enjoy (Cockroft 1982, p. 67).

Practical tasks and pupil activities are also highlighted, and they underline that these ideas are certainly not new, as we have also seen in the outline of the historical development of Norwegian curricula above. All children need to experience practical work related to the activities of everyday life. They clearly state that pupils cannot be expected to have the ability to make use of mathematics in everyday life situations, unless they have had the opportunity to experience these situations for themselves in school (Cockroft 1982, pp. 83-87).

When the children first come to school, the mathematics they use is about applications. When they apply the mathematical knowledge on practical situations, they build up an ownership and a sense of independence towards mathematics. The pupils therefore work with exploring and investigating mathematics, but this depends on the teacher:

> The extent to which children are enabled to work in this way will depend a great deal on the teacher's own awareness of the ways in which mathematics can be used in the classroom and in everyday life (Cockroft 1982, p. 94).

1.1.7 The NCTM Standards of 1989

The National Council of Teachers of Mathematics published the first standards for school mathematics in 1989, and the council is an important contributor to the development of the teaching of mathematics in US schools. The Standards work as an intended curriculum. Mathematical understanding is important, and they emphasise that the pupils should use mathematics to solve problems in the world surrounding them. Knowing mathematics is doing mathematics, according to these standards, and the active part of the pupils is emphasised (NCTM 1989, p. 7).

Mathematical knowledge is important to understand the world, and the need to understand and be able to use mathematics in everyday life has never been greater than now, and it will continue to increase, they believe. These ideas are connected with the idea of mathematical literacy:

> Mathematical literacy is vital to every individual's meaningful and productive life. The mathematical abilities needed for everyday life and for effective citizenship have changed dramatically over the last decade and are no longer provided by a computation-based general mathematics program (NCTM 1989, p. 130).

When summing the changes in content, they put forward (NCTM 1989, p. 126):

Algebra:	the use of real-world problems to motivate and apply theory
Geometry:	real-world applications and modeling
Trigonometry:	realistic applications and modeling
Functions:	functions that are constructed as models of real-world problems

Although these points are taken from a context of more ideas and points of attention, we see a clear connection to the realistic, real-world problems and applications in all topics. And these are points to receive increased attention in the new curriculum standards.

It is vital for the pupils to learn to understand mathematics, the Standards point out, and the pupils need to actively build the new knowledge upon their previous

knowledge. This leads us to the next tradition in focus, well known for the ideas of reinvention and realism.

1.1.8 Realistic Mathematics Education

Realistic Mathematics Education (RME) is the main educational theory behind the development work at The Freudenthal Institute. It is based on the writings of Hans Freudenthal himself, but RME has also been revised over the years.

The theory is linked to Freudenthal's notion of curriculum theory, which he claimed not to be a fixed set of theories, but a by-product of the practical enterprise of curriculum development (van Amerom 2002, p. 52). Freudenthal was very focused on the usefulness of mathematics in school.

> If mathematics education is intended for the majority of students, its main objective should be developing a mathematical attitude towards problems in the learner's every-day life. This can be achieved when mathematics is taught as an activity, a human activity, instead of transmitting mathematics as a pre-determined system constructed by others (van Amerom 2002, p. 52).

One of Freudenthal's main expressions, was the notion of "mathematizing", which meant the process of organising the subject matter, normally taken from practical, real-life situations. This includes activity, which has been a paradigm for RME. The emphasis in teaching mathematics should be the activity itself and its effect. This process of mathematization is the very manner in which the student reinvents or re-creates the mathematical theories. The concept of mathematization has later been extended by Treffers, who made a distinction between horizontal and vertical mathematization:

> Horizontal mathematization concerns the conversion from a contextual problem into a mathematical one, whereas vertical mathematization refers to the act of taking mathematical matter to a higher level (van Amerom 2002, p. 53).

The base of the horizontal mathematization should be the real life. But the main object of the theory is activity.

> Gravemeijer & Doorman (1999) elaborate further on the concept of mathematizing. They say that it may involve both everyday life subject matter and mathematical subject matter, in the terms of horizontal and vertical mathematization. When both these components are comprised, they call it "progressive mathematization". Mathematizing is the core activity for Freudenthal, and he sees this activity of the students as a way to reinvent mathematics (Gravemeijer & Doorman, 1999, p. 116).

The principle of guided reinvention is one of the main principles of Freudenthal's theory. van Amerom quotes Freudenthal's own definition of this principle:

> Urging that ideas are taught genetically does not mean that they should be presented in the order in which they arose, not even with all the deadlocks closed and all the detours cut out.

> What the blind invented and discovered, the sighted afterwards can tell how it should have been discovered if there had been teachers who had known what we know now. (...) It is not the historical footprints of the inventor we should follow but an improved and better guided course of history (van Amerom 2002, p. 36).

This has a close relationship with the genetic approach to teaching (see Mosvold 2002a and Mosvold 2001), especially according to the notions of Toeplitz and Edwards, and states that:

> ...students should have the opportunity to experience the development of a mathematical matter similar to its original development (van Amerom 2002, p. 53).

Applying this principle in teaching, the history of mathematics can be used as a source of inspiration, or as an indicator of possible learning obstacles - epistemological obstacles.

Freudenthal explains that a genetic approach does not necessarily imply teaching the concepts in the order in which they arose. We also see these thoughts in the works of Felix Klein, one of the "founders" of the genetic principle in mathematics education. Teaching should rather follow an improved and better guided course of history, like an 'ideal' version of the history. These thoughts were also shared by Toeplitz (see Mosvold 2002a, p. 17).

These ideas are also implemented in the work of Streefland (1991). He shows how teaching should be arranged in order to do justice to the historical learning process.

> It does not mean that the student must literally retrace the historical learning process but, rather, that he proceeds according to its spirit. The point, in other words, is to outline the path taken by learning by rationally reconstructing the historical learning process. This can prevent starting the learning process at too high a level of abstraction and, at the same time, can help implement a gradual progression in mathematization according to an historical example (Streefland 1991, p. 19).

When the teacher is guiding the pupils through a process of reinventing the mathematical concepts and ideas, as in RME, context problems are of great importance. Gravemeijer & Doorman (1999) states that context problems are the basis for progressive mathematization in RME, and that:

> The instructional designer tries to construe a set of context problems that can lead to a series of processes of horizontal and vertical mathematization that together result in the reinvention of the mathematics that one is aiming for (Gravemeijer & Doorman 1999, p. 117).

Concept problems are defined in RME as problem situations that are experientially real to the student. A glorious aim for the teaching of mathematics according to these principles can be stated as follows:

> If the students experience the process of reinventing mathematics as expanding common sense, then they will experience no dichotomy between everyday life experience and mathematics. Both will be part of the same reality (Gravemeijer & Doorman 1999, p. 127).

We can find some of these ideas in L97:

> Learners construct their own mathematical concepts. In that connection it is important to emphasise discussion and reflection. The starting point should be a meaningful situation, and tasks and problems should be realistic in order to motivate the pupils (KUF 1996, p. 167).

2. Research methodology

Our ongoing research is an ethnographic study. We have chosen some experienced teachers at four different schools, whose classes we will follow for 3-4 weeks each. During this period the researcher will follow the lessons as a non-participant observer. We have made a questionnaire, which we want all the mathematics teachers at these schools to answer. This questionnaire explores the ideas and key topics included in our study. In the last part or after the school visits, we will conduct interviews with the teachers we have followed, but there will also be several more or less structured research dialogues during the period we visit the schools.

The data material, which is collected using field notes and transcriptions of audio tape recordings of lessons and interviews, in addition to the questionnaires, will be analysed in order to find out more about how these experienced teachers connect the school mathematics with the everyday life. To further specify, we will focus mainly on geometry, stating the following questions:

- How do the teachers' ideas concerning the link between school mathematics and mathematics in the outside world have an effect on their teaching of geometry?
- What kinds of teaching strategies do they chose in order to achieve these aims?

The work consists of a theoretical study and a classroom study. In the theoretical study, we have studied the curriculum. The contemporary national curriculum, L 97, will of course be most important to us, but we will also study the previous curricula in Norway, from the very first one in 1739 up till our days. This analysis will serve as a background for our further studies.

2.1.1 Research plan

The classroom study has been divided into two phases. The first phase of our project will be in the first year of upper secondary education, with students at the age of 16-17. The second part will be in 8-10th grade. When it comes to mathematics and the pupils' understanding and motivation for mathematics, there seems to be a crux between primary and secondary education. We wish to see how the teachers think and teach on both sides of this crux.

Each of these two phases will broadly spoken consist of three steps:

- Step 1: Planning meeting. We have a meeting with the teachers, where we discuss the aims and details of the classroom observations.
- Step 2: Classroom observations. Collecting data, which might contain audio-recordings, various kinds of field-notes, teachers' logs etc. The teachers answer a questionnaire during the first week of the classroom observa-

tions. The results of these will not be analysed before the classroom observations are finished, and will then form a base for the interviews.

- Step 3: Feedback discussions/Teacher interviews. We will here confront the teachers with their questionnaire-answers, and ask them to reflect upon how their views and opinions come to show in their actions in the classroom. We will also ask them to give us their ideas on how it can be done in different ways, and perhaps also better ways.

As described above, we have chosen to use a three-step approach to our classroom observations. These steps provide the basis of both phases of our classroom study, and can be summarised as planning meeting, classroom observations and feedback discussions. This is of course a simplified overview. Before the planning meeting for instance, there were several meetings. First, we had an introductory meeting with teachers and/or representatives from the potential schools. Then we had pre-meetings with the teachers we had decided to co-operate with, in order to plan the time location of the study, which was introduced with a planning meeting.

3. Building bridges

We have seen some of the ideas behind our Norwegian curricula, and we have been given a certain idea about the intended curriculum for mathematics. The ongoing study, which is described above, intends to explore the implemented curriculum and teachers' understanding of the curriculum ideas that we have discussed.

The everydayness of mathematics and the connection between mathematics and everyday life have been discussed in several articles and books over the last couple of years. Arcavi 2002 examines three major concepts when trying to build bridges between everyday mathematical practices and school mathematics, namely: everydayness, mathematization and context familiarity. He claims that everydayness is a very complex concept, and he proposes different "everydays" according to different practices. Word problems are common ways of connecting school mathematics with everyday life situations. Arcavi believes that many of these problems are very artificial disguises, and he says that in many word problems the mathematical issues comes first, the concrete problems come later.

This debate has also been present in Sweden, a main study of which was led Inger Wistedt, who states:

> School mathematics, they say, should become connected to the children's everyday life experiences, and collect material from the environment that surrounds the pupils (Wistedt 1990, p. 2).

Wistedt claims that there is a widespread agreement that the teaching of mathematics should be based upon the mathematical activities of everyday life. There doesn't seem to be an equally strong agreement about what everyday life knowledge is, or what this term might consist of. Partly, it describes the kind of knowledge children and grown ups attain in their daily activities, but it also contains the competence needed to cope with the challenges of everyday life activities and work. The report of Wistedt deals with the kind of everyday knowledge that is attained in everyday life (Wistedt 1990, p. 3).

In our present study, we wish to elaborate further on these concepts and ideas, and we will learn how experienced teachers think about and act upon them in their teaching of mathematics. We hope that our findings will uncover additional elements of discussion, and that this will contribute to the further development of curricula and teaching in our country.

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