Teachers’ Perspectives on the National Core Curriculum of Basic Education 2016

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Finding Leverage in Supporting Upper-Comprehensive School Teachers with Phenomenon-Based Learning and Co-Design
Abstract

Phenomenon-based learning, alongside traditional subject teaching, was included in the new National Core Curriculum and entered Finnish schools in fall 2016. Phenomenon-based learning is applied through multi-disciplinary modules and aims for transversal competence. It encourages students to connect learnings to the “real world” context and take on a phenomenon entity as a starting point. The world has become more fragmented where the consequences and chain reactions of one’s actions are often hard to calculate and the big picture is difficult to see. Skills in understanding complexity and connections are essential in overcoming challenges of climate change and building a sustainable future. A shift to more sustainable lifestyles lies in behavioural change where education has a role in.

Supporting teacher’s is the main motivation for the thesis work. Teachers’ voices and their practical experiences of the curriculum reform is still lacking from public discussions. They are in the middle of numerous challenges, and also possibilities, in transferring to the new core curriculum. The broadness of curriculum is one challenge, as is the teacher’s changing role from teaching to coaching.

By analysing the new core curriculum changes as a system, from teachers’ perspective, I found that multi-disciplinary modules and co-design posed difficulties and could have opportunities for leverage. Collaboration is essential in actualizing transversal learning in schools. However, the structure of the upper-comprehensive schools with specialized subject teachers set additional obstacles for teacher collaborations. Therefore, I chose to focus on upper-comprehensive schools’ subject teachers’, phenomenon-based learning and co-design.

My main research questions are: How does the core curriculum 2016 perceive and guide teachers’ co-design efforts on phenomenon-based learning? How do upper comprehensive school teachers interpret the curricula suggestions and guidance? How do upper comprehensive teachers practice co-design? What are the problems? What tools or working methods could help teachers in realizing the aims regarding the curriculum an also develop their own curricula? I explore these questions through a systemic design process that includes desk research, observing Hello Ruby Summer Camp and interviewing six teachers.

The weight of the thesis lies in problem-definition and finding the “right” problem. Therefore, the solution remains on a concept level for further development and iteration. The concept “Phenomenon Dimensions” aims to increase student’s learning and teachers’ motivation by lowering the effort to start collaborations and help define phenomenon themes. The concept includes guidelines, a website and a tactical boundary object tool. A boundary object can be used in co-design processes to develop and maintain coherence across intersecting social worlds (Star and Greismer, 1989, 393).
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1. Background and starting points
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The new core curriculum in Finland has started to tackle the challenge of better comprehending wholes from fall 2016, when phenomena-based learning was incorporated in teaching alongside the current, traditional subject-based teaching. Phenomenon-based learning encourages students to connect learnings to the “real world” context and learn through understanding wholes. The world has become more fragmented where the consequences and chain reactions to one’s actions are often hard to calculate and the big picture becomes hard to see. Skills in understanding complexity and connections are essential in tackling challenges brought on by climate change and building a sustainable future which is why this topic is important to me. A shift to more sustainable lifestyles lies in behavioral changes where education has a key role in.

Teachers’ practical experiences of the reform are still missing from the public discussions. Supporting teachers’ and hearing their voice is the main motivation for my thesis. The aim is to find out what would make the transition process to phenomenon-based learning easier for teachers. Where is the leverage in supporting teachers to adopt change? Transformation is never easy and especially not so when carried out in, more or less, an up-down manner to the whole Finnish educational system, at the same time. In the end, teachers are the ones who will be truly making the changes happen. The core curriculum tells what the Finnish education aims for and teachers will focus on how to educate.

The problem definition phase of design and systems thinking theories are something that have interested me and made sense during my study years. Solving the right problem is key to designing more sustainable futures, and especially in not designing more unnecessary objects. Understanding that there are similar kinds of mechanisms behind all systems across different fields, was an eye-opening realization during my studies at Creative Sustainability program and has led me to dive into this topic more. Therefore, at the core of my thesis is the systemic design process, which aims to narrow down concrete leverage points that can trigger change in systems.

Teachers are in the middle of numerous challenges, and also possibilities, in transferring to the new core curriculum. The broadness of the new core curriculum is one challenge, and the changing role of teachers’. Luckily, these same challenges can also give possibilities and permission to do things differently than before. But areas that have cumulated challenges are of special interest to me, as I am looking for places to provide solution options. By analyzing the new core curriculum changes as a system, from the teacher’s perspective, I found that phenomenon-based learning and more specifically co-design posed difficulties and could have opportunities for leverage. This lead me to focus on the collaborative work of teachers. Collaboration is important in actualizing transversal learning in schools. The structure of the upper comprehensive school with specialized subject teachers set additional
challenges for teacher collaborations and therefore I chose to focus on upper comprehensive school’s subject teachers.

Also, my perspective and background as a producer in collaborative projects and my studies in co-design, effected the focus on collaboration, as I felt I might have something to give in these areas. Although, I have experience in collaborative work, I still find collaborations between different disciplines and exchanging worldviews messy and often frustrating too. I can imagine teacher collaboration is found challenging in the school environment which has structures that best support planning lessons by oneself. Collaborations bring many difficulties, especially in schedules, that weren’t planned to fit cross-disciplinary work. In some cases, all collaboration might just feel too overwhelming with also the additional challenge of familiarising with phenomenon-based learning. Nevertheless, collaborations reinforce diversity and therefore the resilience of the educational system.

My main research questions are: How does the core curriculum 2016 perceive and guide teachers’ co-design efforts on phenomenon-based learning? How do upper comprehensive school teachers interpret the curricula suggestions and guidance? How do upper comprehensive teachers practice co-design? What are the challenges? What tools or working methods could help teachers in realizing the aims regarding the curriculum and also develop their own curricula? I explore these questions through desk research, Hello Ruby Summer Camp observation and six teacher interviews.

As a designer specialized in sustainability, it is important to question design briefs and carry an ethical responsibility on what should be designed to begin with. Which is why the weight of my thesis is on the problem definition phase of the design process, attempting to narrow down the right problem with systems thinking. Although I went through many of the phases of a systemic design process, the scope of the thesis also forced me to focus on the problem definition. Therefore, the solution will remain on a concept level for further development. The concept aims to help teachers start collaboration and define the phenomenon theme with guidelines, a website and a boundary object. A boundary object can be used in co-design processes to develop and maintain coherence across intersecting social worlds (Star and Greismer, 1989, 393).

In this chapter I will go through the main themes of the new core curriculum, the challenges it brings and the criteria for phenomenon-based learning. In chapter 2 and 3, I will open the systemic design process and how a school can be seen as a system. In chapters 4 and 5 I will focus on the observation and interview learnings: how the teachers experience the core curriculum, co-design and phenomenon-based learning so far. I will introduce the solution concept and my main conclusions of the interviews in chapter 6. And finally, Chapter 7 will conclude my thoughts on the thesis process.
1.1. The new core curriculum 2016

To understand the role of the core curriculum, a short introduction on the basics of the Finnish school system and the needs for change are relevant. Children start basic education in Finland on the year they turn seven. Before this, they have participated in a one year pre-primary education. Basic education usually lasts nine years. It is most often provided by the municipality. Municipal education authorities must develop the local curriculum per the national core curriculum. There are a few private schools and they also create their own curriculum based on the same national core curriculum. So, the National Core Curriculum for Basic Education steers the arrangement of education for all children from 7 to 16 years. (Halinen, Harmainen, Mattila, 2015, 138.) Basic education is provided within a single structure, that is, there is no division into primary and lower secondary education (Ministry of Education and Culture [MEC], Finnish National Board of Education [FNBE], CIMO, 2012, 12).

The task of the basic education is to offer a general education. On the other hand, it gives society a tool to develop the civilizational capital and enhance equality. The basic education should give the possibility for diverse growth, learning and the development of a healthy self-esteem, so that students can take in the knowledge and skills needed in life, receive competence for post-graduate studies and as a participating citizen develop the democratic society. Basic education should also awaken the motivation for life-long learning. (Opetushallitus, 2016, 14.)

Instruction is usually given by the same class teacher in most subjects in the first six year-classes and by subject specialists in the last three years (MEC, FNBE, CIMO, 2012, 15). My thesis will focus on the core curriculum’s challenges posed on subject specialists during the last three years of basic education from grades 7 to 9.

In a nutshell, the building blocks of the Finnish educational system are equity, trust and responsibility, life-long learning and highly educated teachers:

**Equity in education**
- Education is free at all levels
- Every pupil and student has the right to educational support
- Special needs education is generally provided in conjunction with mainstream education
- Efforts to support language minorities and migrants
- Life-long learning is in focus

**Education system based on trust and responsibility**
- Most education is publicly funded
- Local administration and educational institutions play a key role
• Educational autonomy is high at all levels
• Quality assurance is based on steering instead of controlling

**Early childhood and basic education as part of life-long learning**
• Early childhood education supports children’s development and learning
• Basic education is provided within a single structure
• School year is the same everywhere but timetables are local
• National Core Curriculum leaves room for local variations
• Assessment is part of daily schoolwork

**Highly educated teaching personnel**
• The most common pre-service requirement is a Master’s degree
• Educational leaders are required a teacher qualification
• Continuing teacher education is encouraged (MEC, FNBE, CIMO, 2012, 12.)

The national core curriculum for basic education is determined by the Finnish National Board of Education (FNBE). It includes the objectives and core contents of different subjects, as well as the principles of pupil assessment, special needs education, pupil welfare and educational guidance. The principles of a good learning environment, working approaches and the concept of learning are also addressed in the Core Curriculum which is renewed every ten years. (MEC, FNBE, CIMO, 2012, 15.)

FNBE accepted the new national core curriculum on December 22nd 2014. Local curriculums that have been made accordingly have been implemented in grades 1-6 from August 1st 2016. Grades 7-9 will start to implement the new curriculum gradually. Seventh grade will start in autumn 2017, 8th grade in 2018 and 9th grade in 2019. However, all grades can start in 2016 with a local curriculum that is already based on the values, school culture and multidisciplinary modules of the new curriculum. But the new precise aims per subject, multidisciplinary modules and optional studies will start gradually for the 7-9 graders. (FNBE, 2014, 3).

According to FNBE, the core curriculum is 1) norm-based through acts and degrees, 2) knowledge-based through research and every day school experiences and development projects, and 3) future-oriented in listening to the needs of the future society. For the planning process, FNBE had the aim of creating a shared vision through these three elements. The collaborative planning process included several working groups with more than 300 people working together with FNBE. Drafts of the curriculum were published three times to get feedback for improvements. (FNBE, 2014, June 13).
“The common dream behind the core curriculum is that joy of learning could be born from our students own wonder and their own comprehension. It should help our kids’ know-how to make meaning and sense over what they are learning, so they can see who they are”, says Irmeli Halinen, Head of Curriculum Development at FNBE. (FNBE, 2014, June 13). FNBE describes that when they looked at the challenges brought by the surrounding world at the beginning of the core curriculum design process, they understood that the root question is in the students’ experience (Soini, T., 2014, Sep 29.) FNBE sees a child’s happiness is formed from a coherence of understanding the world, managing daily life and feeling they are meaningful in the communities they live in. The reform process started from thinking about the child’s happiness in school, learning results and what effects these have. How could a learning process embed the joy of learning? (FNBE, 2014, June 13).

The research development towards engaging students, enthusiasm in learning and collaboration can be seen in how the objectives of the new curriculum are built. The professor educational psychology in the University of Helsinki, Kirsti Lonka, summarizes the main trends of educational research in an article analyzing what is new in the curriculum. The reputation of Finland as a good educational country began in 1978, when teacher training transferred into the universities. It was not until the 1980’s that cognitive psychology was born and for a moment it seemed that learning was only a phenomenon inside the students’ head. This overreaction dimmed down shortly, and the interaction research of the classroom began to thrive. At the end of the 1990’s the social nature of learning was emphasized. Explorative, problem and phenomenon-based learning and interaction training started to come forth. Only in the 2000’s emotions, motivation and the interest towards learning became research topics more widely. Now in the 2010’s the meaning of socioemotional skills and enthusiasm in school are being emphasized. There is a concern on the school satisfaction of the student. The teachers’, students’ and parents’ activity, participation and constructive interaction are underlined in current research. (Korkeavuori, R., 2015).

During the curriculum design process and asking what are the key competences needed for the future, it became clear to FNBE that subject competence is not enough anymore on its own and it needs transversal competence by its side. Irmeli Halinen clarifies that It is often thought that a civilized person is someone who can handle an enormous amount of information and remember a lot of things. But in the current world, which is full of information, this perception of civilization is becoming impossible. With the perception of knowledge changing, the school must change towards an instance that supports interaction and creating new knowledge together. Therefore, the future civilization and competences needed are transversal, not handling single information or information masses, but an ability to connect things and see the connections between things. (FNBE, 2014, June 13).

The core curriculum 2016 is based on a conception of learning where learning is an individual and communal construction process of
The core curriculum 2016 states that learning happens individually, under the guidance of the teacher and in interaction with teacher and peers as goal-directed studying in different situations. (Opetushallitus, 2016, 15.)

FNBE had often been asked why does the Finnish school system, which is ranked as one of the top quality systems in the world, have to change? The answer of Irmeli Halinen, is simple: the world is changing around the school, therefore we must think and rethink everything connected to the school. (FNBE, 2014, June 13). There are two dimensions that are attached to education: firstly, ethical questions and secondly, the concern of a sustainable future and lifestyle. Within these dimensions, FNBE sees teaching should be developed. (Soini, T. 2014, Sep 29.)

In the following sub-chapters, I will continue to describe the main themes and changes brought by the new Core Curriculum, comparing it to the previous one implemented from 2006. I will refer to the previous core curriculum in basic education as core curriculum 2006 and the current one as core curriculum 2016. Comparing the different curriculums would be a topic for its own thesis as the current curriculum is a 473-page, and the previous one over 300-page, long book. Therefore I will focus more on comparing the main sections common to all levels of basic education rather than the grade and subject specific sections. First, I will go through the main themes of the core curriculum 2016 as they appear in the curriculum, then gradually adding my critical voice analysing changes and challenges accompanying it.

The core curriculum 2006 has many similarities with the current one. The most significant changes are in the addition of transversal competence as an objective and multidisciplinary modules as well as the emphasis on the student-based view of teaching.
1.1.1. Values reflect the surrounding world

The core curriculum 2016 does not explicitly explain why the chosen values are important, although both curricula hold similar values. The values in the 2006 version are described only in a few words. In the current curriculum, the world’s constant changes, unpredictability, connectivity and incoherent nature is brought to the forefront and learning needs are connected to the context. In the new curriculum, values and school culture are defined and the reasoning behind them opened. The significance of value education is highlighted in a world where multimedia, global networks and social media mould the values of children and young people. Students need to develop a skill to analyse knowledge critically based on their values. (Opetushallitus, 2016, 15.) The focus in the new curriculum is on students and teachers as active, adaptive learners exploring the world as a whole.

Below you can see the core values of each curriculum with similar values side by side to compare more easily. The students’ uniqueness and right for good teaching is not mentioned separately as a value in the 2006 curriculum and has been added to the new one.

2006/2016

- • The student’s uniqueness and right for good teaching
- • Human rights, equality, democracy / Human rights, equality, democracy
- • Tolerating diversity / Cultural diversity as a richness
- • Nature’s diversity and preserving environments viability / Sustainable lifestyle as a necessity

(Opetushallitus 2004, 12.) (FNBE, 2014, 15.)

In the current world situation of the refugee crisis, something that also stands out in the 2006 curriculum values are: “In teaching it is considered that Finnish culture is becoming more diverse also through immigrants coming from other cultures. The students forming of one’s own culture identity and his/her participation in the Finnish society and the world that is becoming global”. So, if in the 2006 curriculum the world is only just becoming global, in the 2016 curriculum, we are already there and diversity can be seen as a strength and richness, not just tolerating it.

I find, the core curriculum 2016 takes better in account the connectivity to the surrounding world bringing the students own experiences and surrounding community into learning. The 2016 curriculum is further defined in its aims and justifying their importance. In a way, it has taken some freedom away from education providers in further articulating the aims, though the focuses can and should be defined locally. The methods however give a lot of freedom to the teacher and student too. The methods can for instance also be based on the student’s interests, which is not mentioned at all in the 2006
core curriculum. The multidisciplinary modules give a lot of freedom for exploration, which is why the aims, values and principles behind these may have to be more defined, to give support and direction for teachers. For instance, the multidisciplinary modules themes should be based on the school culture aims (FNBE, 2014, 33).

1.1.2. Student participation at the base of school culture

The school culture is a big part of teachers and their work methods, which effects student work and learning. School culture is described in depth as one of its own chapters in the core curriculum 2016 and its driving principles are at the core of transversal competence development and multidisciplinary modules. The meaning of the school culture is based in the context of creating unity. According the curriculum it is an entity whose components are

- Interpretation of the norms that direct the work and the goals of the activities
- Leadership and the organisation, planning, implementation and evaluation of work
- Competence and development of the community
- Pedagogy and professionalism
- Interaction, atmosphere, everyday practices and learning environments (FNBE 2014, 2.)

Guidelines for developing the school culture are included in the core curriculum. A continuous analysis of what the school culture consists of and how it could be influenced is encouraged: “The school culture is shaped by both conscious and unconscious factors. The school culture affects those who are within its sphere, regardless of whether its significance and impacts are recognized or not.” The adults way of working is transmitted to the pupils, who adopt values, attitudes and customs, that appear in their school community (FNBE 2014, 27).

In the previous curriculum, although it is acknowledged that also unofficial rules of the school are a part of the school culture, the approach to school culture is more pragmatic: “The aim is that all the school’s practicalities are built systematically to support the achievement of the aims set for education and teaching.” The school culture is described as a short sub-chapter as a part of implementing the teaching (Opetushallitus, 2004, 15) whereas in the new curriculum (FNBE, 2014, 27-35) the operating culture is described as its own lengthy chapter which consist of “Significance of school culture and its development”, “Principles that guide the development of the school culture”, “Learning environments and working methods” and “Integrative instruction and multidisciplinary learning modules”.

The adults way of working is transmitted to the pupils, who adopt values, attitudes and customs, that appear in their school community (FNBE 2014, 27).
The core curriculum 2016 suggests the school culture emerges clearly from the community’s practical actions, for instance a conversation that is respectful, open, interactive, builds trust and encourages all the community’s members to participate (Opetushallitus, 2016, 26). It introduces seven principles that should guide the development of school culture:

- A learning community at the heart of the school culture
- Well-being and safety in daily life
- Interaction and versatile working approach
- Cultural diversity and language awareness
- Participation and democratic action
- Equity and equality

The core curriculum 2016 sees that the school should operate as a learning community with all its members learning through dialogue and co-design. This is reached by “reflecting on the goals, regular evaluation of one’s own work and peaceful atmosphere” as well as feedback from homes and other partners. The significance of pedagogical and shared leadership is emphasized, and ensuring a favorable setting for learning is a particular focal point of leadership.” (FNBE, 2014, 28.)

The curriculum sees that adult cooperation shows a model of a learning community to the students and puts pressure on increasing co-design between teachers and the surrounding school community. Co-operation is especially needed in the planning and implementation of multidisciplinary modules. (FNBE, 2016, 38.) Flexibility in learning methods is encouraged to address the diversity of learners and co-operate with the school community that stretches outside the school building. Various working approaches and learning environments should be systemically applied in school work, and regular efforts made to work outside the classroom. Cooperation and interaction of the adults in the school and with the society around the school, is argued to support the pupils’ growth into persons capable of effective interaction and cooperation where pupils recognize their own uniqueness and are able to work constructively with different kinds of people. Adding technology to the equation is also encouraged “to promote interaction and the use of multiple senses and channels in the work” (FNBE, 2014, 28-29).

Another argument for student participation in the core curriculum 2016 is that students understand their influence and the consequences of their choices to the surrounding world: “The school demonstrates its responsible attitude towards the environment by its everyday choices and activities. Material choices and operating methods that waste raw materials, energy and biodiversity is replaced by sustainable ones. The role that immaterial factors of sustainable way
of living plays in well-being is highlighted, and time is set aside and visibility is given for these factors in everyday school work. The pupils are involved in planning and implementing sustainable everyday life (FNBE, 2014, 30).

Both teachers and students are seen in an active role in the current curriculum, which has changes from the 2006 core curriculum. The “methods of working” chapter emphasises student participation in the current version, but this same chapter is much shorter in the 2006 version. However, similar guiding aims of the methods occur in both core curricula. I see, the biggest change is in the role of a teacher going from a leader towards an instructor. In 2006, the teacher chooses the working methods. His/her task is to teach and instruct both individual students and the whole groups learning and working (Opetushallitus, 2004, 19). Whereas in 2016, the teacher chooses the methods of working in interaction with the students and guides students especially in use of the new working methods strengthening their ability for self-regulation. The core curricula 2016 suggests that the skills in learning to learn develop best if the teacher also guides the students to plan and evaluate their learning methods. This motivates students to take responsibility of their learning and working in the school community. Reflecting on the aims and evaluation criteria together makes student commit to working towards the aims. (Opetushallitus, 2014, 31). In the 2016 version students are guided to take and share responsibility actively in both individual and team work, but in the 2006 version it only prepares students for this. In choosing the methods, in 2016, students are also seen as more active knowledge creators, connecting, comparing, applying, creating and presenting knowledge. (Opetushallitus, 2004.) However, although self-evaluation and development in general is focused more on in the 2016 curriculum, it has always been a part of the Finnish school system, but mostly done by the school’s and education providers. (MEC, FNBE, CIMO, 2012,13).

An individual educational plan has its own sub-chapter in the 2006 curriculum and it has clearly been one channel for student participation where the student can build goal directed learning and learn to take more responsibility of his/her studies. Through the educational plan, students have been able to participate in defining their study aims and how to achieve them. It has also functioned as a communication channel between parents and the school, so that parents are aware of their child’s school plans and can support him/her accordingly. In the current curriculum, there is only a mention of an individual educational plan when discussing students requiring special support (FNBE, 2014, 71) but the students’ participation is handled in a holistic, embedded way taking it as the base of organizing school work (FNBE, 2014, 37).

The participatory learning concept in the 2016 curricula forms a basis for the development of both subject and transversal competences. “While acquiring new knowledge and skills, the pupils learn to reflect on their learning, experiences and emotions. Positive emotional experiences, the joy of learning and creating activities promote learning and
inspire the pupils to develop their competences. Learning in collaboration promotes the pupils’ skills in creative and critical thinking and problem-solving and their ability to understand different viewpoints. (Halinen, Harmainen, Mattila, 2015, 151.)”.

1.1.3. Embedded transversal competence

The objective for the integrative approach is to enable students to understand the relations and dependencies between study subjects. It helps students to connect knowledge and skills from different knowledge disciplines and structure them into meaningful wholes while interacting with others. Examining wholes and working in exploratory working periods, where different fields of knowledge are connected, should guide students to apply their knowledge and participate in constructing knowledge communally. Students could then understand the meaning of subjects studied in school in relation to their own life, community and society and humanity. (Opetushallitus, 2014, 31). The seven transversal competence aims are

- Thinking and learning to learn
- Cultural competence, interaction and self-expression
- Taking care of oneself and managing daily life
- Multiliteracy
- ICT Competence
- Working life competence and entrepreneurship
- Participation, involvement and building a sustainable future

(FNBE, 2014, 20-26)

FNBE considers multidisciplinary learning modules as new and efficient tools in promoting the development of transversal competences (Halinen et al., 2015). Especially the planning and implementing of the modules together with the pupils aims at advancing students’ transversal competences. (FNBE, 2014, 301.) Therefore, multi-disciplinary modules are included in the current core curriculum as a must, all though the practical methods of implementation are left open. “In order to safeguard every pupil’s possibilities of examining wholes and engaging in exploratory work that is of interest to the pupils, the education provider shall ensure that the pupils’ studies include at least one multidisciplinary learning module every school year.” (Finnish National Board of Education, 2016, 33). The objectives of multidisciplinary modules, contents and ways of implementation are decided in the local curriculum and specified in the school’s annual plans. The teaching modules should be planned in length so that students have time to immerse themselves in the content of the multidisciplinary modules and work in a goal-oriented, versatile and persistent manor. In the local curriculum and annual plan other integrative approach methods can also be
“In order to safeguard every pupil’s possibilities of examining wholes and engaging in exploratory work that is of interest to the pupils, the education provider shall ensure that the pupils’ studies include at least one multidisciplinary learning module every school year.” (Finnish National Board of Education, 2016, 33).

decided upon. (Opetushallitus 2014, 31.) The manner and duration of integrative instruction may vary depending on the pupils’ needs and objectives of the instruction. For example, integrative instruction may take place by parallel study, sequencing, functional activities, longer multidisciplinary learning modules, selecting and shaping content from different subjects into integrated modules, objective and holistic, integrated instruction in all teaching. (FNBE, 2016, 33).

The new core curriculum promotes multidisciplinary modules as a chance to collaborate between schools and the society around it arguing that the locality, topicality and societal substance creates extra motivation for both teachers and students. In the chapter covering working methods, student participation was encouraged, but when discussing multidisciplinary modules, the curriculum states that the participation of students is in fact crucial. The objective of multidisciplinary modules is to actively process the things related to and expanding the students’ own world of experiences. (Opetushallitus, 2016, 31). The aims of the multidisciplinary modules in the core curriculum are listed as

- Strengthening the pupils’ participation and offering opportunities for involvement in the planning of the objectives, contents and working methods of the studies
- Bringing up issues that the pupils find meaningful and creating opportunities for discussing and working on them
- Providing additional opportunities for studying in different groups and with pupils of various ages and for working with several different adults
- Offering opportunities for combining what the pupil has learnt outside the school with school work
- Giving space for intellectual curiosity, experiences and creativity and challenging the pupils to engage in many types of interaction and language use situations
- Reinforcing the application of knowledge and skills in practice and practicing agency that is consistent with a sustainable way of living
- Inspiring the pupils to act in a manner that contributes to the community and the society

(FNBE, 2014, 33.)

FNBE describes how the multidisciplinary modules should be seen from students’ perspectives: “Every multidisciplinary learning module involves skills and knowledge related to many subjects, for instance history, arts, math, physics and Finnish language, but from pupils’ viewpoint the boundaries vanish (Halinen et al., 2015, 141).” From the teachers’ perspective, the integrative approach requires a pedagogic approach that concerns both teaching content and working methods. In an article looking into the new curriculum, FNBE also reminds that not all subjects
can be incorporated meaningfully to every learning module. The lessons of other subjects are then organized normally. (Halinen et al., 2015, 141). “The development of transversal competences is supported in all subjects in the way that is most suitable for them (FNBE, 2014, 301).”

As does the 2016 core curriculum, the 2006 version talks about the integrative approach, but only gives the option of going in that direction as an addition to subject-based learning. The previous curriculum is not based on competences and does not have transversal competence as an objective. Therefore multidisciplinary modules, that aim to enhance transversal competence, are missing as such, but co-operation between different subjects are nevertheless encouraged, not forced, with the integrative approach as an option. The themes of the integrative learning periods are also readily given and are similar to the 2016 curriculum’s school culture principles. In the 2016 core curriculum, the themes should arise from the school culture and cross-section through the whole school’s activities. The key of the new core curriculum is wholes as a starting point. As this is a new approach, I assume that the core curriculum 2016’s only graph is drawn because of this, to help understand the role of multi-disciplinary modules in the curriculum (Image 2).

Because the addition of transversal competences and multidisciplinary modules does not mean that subjects are vanished from the new curriculum, the teachers must balance both aspects, the broad view and the subject specific focus. It has been attempted to solve the problem in the new curriculum by including the transversal competences also under the subject objectives: “In basic education the subject syllabi have been described so that their objectives include the competence goals which are most important for the said objectives. The competences will also be assessed as a part of the subject assessment. In this way, every school subject enhances the development of all seven competence areas. This is a new way of combining competence-based and subject-based teaching and learning.” (Halinen et al., 140-141).

Therefore, the new core curriculum is structured differently than its predecessor. In the new curriculum, structuring of subject goals are divided per grade and not per subject, which describes and supports the transversal and student-based objectives. In the 2006 version, content is structured under subject headlines, in which objectives per grade are shortly opened.

According to the current curriculum, students are given feedback during the multi-disciplinary modules. The students proven competence is considered in the construction of the subject-based verbal assessment or grade. (Opetushallitus, 2014, 32). In addition to being offered opportunities to influence the planning and implementation of the multidisciplinary modules and core curriculum, students should also participate in evaluating and developing co-operation with teachers (Opetushallitus 2014, 35).

In chapter 1.2., I interpret the current core curriculum’s multi-disciplinary modules as phenomenon-based learning and continue to open up the criteria and demands for teachers.
Before I go into the anticipated challenges in schools and teaching work, I would like to focus on the reading experience of the core curriculum 2016, which is rather heavy. The repetitive tone, lack of visualisations and also focus, in my opinion, might make it challenging for teachers to grasp what is the essence of the new curriculum.

As the 2016 curriculum has more text (150 pages longer) than its predecessor, it has a more descriptive tone. One aspect of the length might be explained by the new core curriculum being designed also as an e-version where you can search for different sections. Certain sections are repeated on each grade level. For instance, the general values and school culture’s guiding principles are repeated in the grade-specific sections and specified per age. Unfortunately, I only found the e-version towards the end of my thesis as there is no mention of this in the actual core curriculum text. The e-version is not visible and not easy to find. It is a the right side of the core curriculum 2016 website (Opetushallitus, 2017) and resembles an advert banner rather than an active part of the website.

Even if the descriptions are repeated on each grade level for the purpose of the e-version, this does not explain the repetitive tone of the main beginning part of the core curriculum (chapters 1-12), which is common to all levels of teaching. The reading experience of the core curriculum is heavy and repetitive in this section too. I drew a map of beginning part of the core curriculum 2016 structure and content, where you can see similarities in different sections. As they do also say in the 2016 core curriculum, the themes overlap (FNBE, 2014, 19). For instance in the section describing the operating school
culture (FNBE, 2014, 27), there are same things in the multidisciplinary learning module section (FNBE, 2014, 32) describing matters on student participation and collaborating with experts outside the school. The content is same or very similar in different sections, all though the headlines are different. Especially when we are talking about links and interdependencies between matters, I see visualization as a useful way to show this without the text becoming heavy. I am not a expert in visualisation, but image 3 is my attempt in making sense of the new curriculum’s structure and interconnections.

In the core curriculum 2006 values and school culture principles were covered under the same chapter (Opetushallitus, 2004, 12). But in the new core curriculum “Underlying Values of Basic Education” and “Principles that Guide School Development” are in separate chapters, which brings length (FNBE, 2014, 15-27). This leads me to think, why in fact are the general values and the guiding principles of school culture different? Would it be more clear and memorable to the teacher in everyday life actions if they were condensed into five values and guiding principles. According to Carbrera and Carbrera (2015), a few simple rules and a memorable vision guide action much more effectively than a long list of important matters to take in account. However, values education towards students is important and argued well in the new core curriculum, but from a teacher’s perspective a list of rather similar things, might just add confusion and unclarity. Then again, municipality and school specific curricula have the possibility to further specify the principles to help everyday teacher work.

Co-design — The repetitive tone of togetherness and all-inclusiveness in the new curriculum is extremely apparent, which makes me wonder
"As the pupils grow, they have a better capacity to develop their transversal competences. On the other hand, the cooperation between different subjects and the management of daily school life become challenging." (FNBE, 2014, 301.)

for whom and why is this being underlined. As an example, the word “together” is used 245 times within 473 pages in the 2016 curriculum while in the 2006 version the word together is used only 29 times out of 320 pages. In teacher interviews I carried out, the history of an individual working culture was mentioned and how challenging the structures make it to organise work between teachers. Clearly the new core curriculum addresses this and strongly encourages students and teachers to collaborate. Maybe this is also emphasized to encourage the municipality and headmaster to make the school structures better support collaboration for instance by allocating time and resources.

In transversal competences, one of the challenges appears especially entering the grades 7 to 9, where subjects are taught separately by subject teachers who handle one subject at a time. All though the students capacity to develop grows, the cooperation between teachers become more difficult due to the structure of teaching: "As the pupils grow, they have a better capacity to develop their transversal competences. On the other hand, the cooperation between different subjects and the management of daily school life become challenging." (FNBE, 2014, 301.)

Teachers talk about “co-design time” which is time allocated for co-planning in the State Civil Servants’ Collective Bargaining Decree. Basic education teachers have three hours a week of this allocated time. Majority of co-design time is spent on collaboration between home and school. Co-design time is also meant to be used on planning teaching together, developing the schools’ activities, planning shared subject wholes and multidisciplinary collaborations. Teachers say that the amount of tasks that should be accomplished during co-design time has increased and the given time is not enough for all the tasks anymore. (Korkeakivi, 2016, 6). Multidisciplinary modules often require co-design time, in addition to planning your own teaching. So, co-design time does not include teachers’ own planning time, but it can be used in planning parts of multidisciplinary modules. Along with the new curriculum, the sufficiency of the co-design time needs to be monitored locally even more. (Tikkanen, T. 2016, 22).

Ambiguity — One challenge of the curriculum is that it needs to last the next ten years, so it must be general enough that it can be adjusted in schools along the way. A challenge I find is that transversality mirrors the way the “real world” truly is: chaotic and complex. But for organising work there would be a need for pointing out the main points and root causes. Now, there is several bases, starting points, aims and aims of aims mentioned, which makes the reader lose track of what is the core most important thing to focus on. Often the different parts are emphasized as being “an important part of” something. When this is repeated, the reader loses the idea of what in fact is most important, if everything seems to be important. The word “important” is mentioned 101 times, while in the previous core curriculum only 8 times.

The old curriculum does not analyse relations between matters, but the new one does to some extent. However, I see that the relations
between matters are still left very open. Also, it is not mentioned separately that this analysis could be done on a local level. Giving a view on what relations mean in the national core curriculum, and what to focus on, might give a clearer picture to the teachers. One benefit of systemic design, which I will introduce more in chapter 2, is that it maps out relations between matters, but also aims to narrow down leverage points of the system and see what changes in the system could be most impactful. Even just opening the logic and structure visually could make the curriculum more usable and approachable.

Although visualisation is encouraged in the learning methods of the new core curriculum (FNBE, 2014, 24), there is only one visualisation of relations between different sections of the core curriculum 2016 (FNBE, 2014, 34) which mostly displays straightforward, one-way logic type of thinking. It repeats the structure of the core curriculum, but doesn’t display the interaction and adaptability of the system that is emphasized in the text. Almost every chapter mentions the word “together” or some other interaction describing verb, but this is not visualised. It is also unclear when the curriculum is describing the teacher interaction and work objectives and when the student interaction, learning objectives and working methods. (Opetushallitus 2014, 28-29.)

Although FNBE has invested effort and work in building the core curriculum, many questions remain open and still to be figured out on practical level in each school. In FNBE’s presentation introducing the core curricula, here are some of the questions raised: How do the teachers and external experts model the collaborative way of working and help students see the connections and dependencies between things? Can we make room for the student’s questions, ideas, thoughts and suggestions and their collaboration, participation and influence or do we adults fill in all the space? How do we create a space for the student where they can find out for themselves, explore and solve problems and work creatively? Is it meaningful to the student? Does the school work by the principles of a learning community? (Soini, T., 2014, Sep 29.) As one of my interviewees said: “HOW, that was the big question. How an earth does this succeed?”, referring to her experience in planning the multidisciplinary learning period.

Insights from the field — FNBE finds the challenge in a competence based approach, especially transversal competences, is how to teach and learn both wider competences and subject knowledge simultaneously. “Teachers seem to think that if they focus on the wider competencies they have to neglect subjects, or if they focus on subject studies, there will be no time for enhancement of competences (Halinen et al, 2015, 150).” So, another challenge that comes along with transversal competences is time and how to have enough to do both subject and multidisciplinary teaching. On the core curriculum level, FNBE has aimed to solve it in a way that has not been seen in other countries before. The subject objective’s include both subject and transversal competences, which makes sure transversal competences will be taught,
studied and assessed. (Halinen et al, 2015, 150.) This solution shows that teachers’ everyday challenges have been understood and there is an aim to ease them. Both the concern and challenge of maintaining the teachers’ expertise and finding time also come through in the teacher interviews analysed in chapter 5.

Generally, this curriculum has a lot of positive words and leadership through attitudes and values. But I see there is also quite a bit of jargon that stays on a high-level without concrete suggestions. A blogger and philosophy teacher, Arno Kotro (2016), criticises Helsinki’s local interpretation of the core curriculum to be high-level jargon and at the same time also to give too many conditions on work methods such as phenomenon-based learning and digital tools. He emphasises that the strength of the Finnish school system is professional and highly educated teachers who have strong autonomy in their work. They have been able to independently choose, which work method works best in terms of learning in the situation at hand. This has even been considered as one reason to the Finnish success in Pisa results. (Kotro, 2016). This is indeed another challenge in writing the core curriculum: how to balance between renewing the system and still bring it to a concrete level, without restricting the teachers too much. The core curriculum 2016 has added a pragmatic tone at the end of each chapter with a “Issues subject to local decisions” sub-chapter to make it easier for education providers to follow-up on the curriculum work on the local level. I find this as a good addition and attempt to bring the jargon to the municipality and school level, but of course it is up to municipalities and schools on how well they manage to translate this into concrete objectives.

The new core curriculum has raised much discussion in different media. Kari Uusikylä, professor of education theory at the University of Helsinki has written strong views on what is new and relevant in the curriculum. He sees the new core curriculum has many good things in it, but he is annoyed that in discussions related to the core curriculum, the old basics of teaching is not known and seems that the wheel is being reinvented again. Many areas are covered already in the 1970’s curriculum. However, he does see that if a school’s resources are sufficient and teachers have time for co-design, thematic teaching can activate and inspire students. But he still sees that there are subjects and learning content that take also hard-working study effort from individuals, that simply require cramming. When talking about co-design, he wonders if the local curriculum should be composed together with homes, students and stakeholders. Do all the parties even understand the basic concepts of teaching? He finds it important that the division of work should be made clear to avoid “supposedly” democratic co-design. (Korkeavuori, 2015.) Uusikylä raises important points about co-design and phenomenon-based learning being partially dependent on the schools resources and leadership. I agree that co-design shouldn’t be an aim in itself and if done there should be enough time to also analyse the outcome of the engagements. Supposedly democratic co-design
is a challenge not only in education, but in other fields too. Regarding how much is new or not, I think is less relevant. All though some of the methods might be the same, the context and paradigmas are different. Kirsti Lonka, Professor of Education Psychology at University of Helsinki gives more enthusiastic views. She sees the new curriculum itself does not revolutionize anything. But what is a revolutionary thought in the new core curriculum is that learning that is at the core, not just teaching. (Korkeavuori, 2015.)

In June 2016, just before transferring to the new curriculum, The Finnish Trade Union for Education (OAJ) published the results of a survey asking what teachers think and expect from the new curriculum? Over a hundred teachers answered the survey. Generally, teachers praised the functionality, the student-based focus, multidisciplinary learning modules and explorative approach. Praises were also given to communality, emotional skills and decreasing hours spent sitting at a desk. As in Uusikylä’s and Kotro’s views, many teachers were worried about the contrast between objectives and reality. The curriculum aims for a less rushed atmosphere but how can this be done in big teaching groups? Have the people writing the new curriculum sacrificed time and thought on thinking how do all these new changes fit in the teachers working hours? According to teachers’ answers, learning will not change in school before the conception of the teachers’ working hours change. The idea of annual working hours per employed should be hurried because it would make the teachers invisible work visible. So, although the new curriculum arises excitement, it also raises concern about teaching time and the budget cuts simultaneously done in municipalities that effect group sizes. Teacher Kati Järvinen answered OAJ’s survey and is excited and pleased about the new curriculum and the planning processes in their school, but unfortunately the excitement cuts short when asked about how the wonderful ideas are brought to practice: “No matter how reformist you are, it feels as, at some point you have to just raise up your hands. In what other field would companies be demanded to renew themselves comprehensively and at the same time would be told that by the way, you are running the new operations with the same resources, that are also being cut slightly! Do parents and tax payers know what is happening in the school world?”. (Tikkanen, T., 2016, 20.)

As Uusikylä, also teacher Mari Hämäläinen brings forth the point that the new core curriculum has quite a few elements from previous curriculum’s. She describes phenomenon-based learning as integrative teaching that was launched already in the 70’s which is very familiar to the older teachers. It is not something mind-blowingly new but old pedagogy that is found good. She also wisely points out that teachers diving themselves into camps of reformists and conservatives is not constructive. (Tikkanen, T. 2016, 22). If find that teachers being devided into two camps, is an extremely important point that should be paid careful attention to as it certainly does not help the development of the field. Also Kotro mentions that some teachers are labelled as “change resistant” all though he sees them just critical, in a healthy way. If
students are encouraged and expected to be critical, there should be room for teachers to do so too. (Kotro, 2016).

### 1.2. Background of phenomenon-based learning

Rather than a pedagogical model, phenomenon-based learning is a way of organising learning in which different research-based pedagogical models are applied. Therefore, there is not much theory and research available on the subject. Close or overlapping expressions are for instance phenomenon-focused teaching and learning, transversal or multidisciplinary learning modules, theme studies, cross-curricular teaching and integrative teaching. (Otavan Opisto [OO], Suomen eOppimiskeskus ry [SeO], 2014,7-9). In the teacher interviews of this thesis the terms seemed confusing and were understood differently. In the core curriculum 2016 phenomenon-based learning is referred to with multidisciplinary learning modules and integrative teaching. The word phenomenon-based learning is in fact not used, but the word phenomenon occurs often in the sections describing subject-specific objectives. Phenomenon-focused however is mentioned once. In the public discussion in the main medias mostly use the terms phenomenon learning or phenomenon-based learning when referring to the changes brought by the new core curriculum. In this thesis, I will also refer to phenomenon-based learning as I find this is often what teachers use when speaking of the new curriculum.

The aim of phenomenon-based learning is simply opening the bigger picture to the world and understanding it. The starting point is a holistic view attached to a “real world” phenomenon. Phenomena are inspected as wholes, and put into context, where knowledge and skills are learnt by overcoming subject boundaries. One might ask how does this differ from what is done in schools currently? Isn’t this what learning is about anyhow? Taru Kekkonen, the head of web training and headmaster from Otavan Opisto describes learning itself as an active exploration of the world and its phenomena, which goes beyond subject-boundaries (OO, 2013, April 22) and believes that in 2020 schools will have more learning rather than teaching (Ilmiöopas, 2016). In the traditional subject-focused school culture learning is based on singular subjects and are more easily dissembled into small, maybe even separate parts where the whole becomes less visible (Ilmiöpohjaisen oppimisen ja opetuksen foorumi, 2016). The attachment to real world phenomena is at the core of phenomenon-based learning. This focus on the learner learning rather than the teacher teaching, I find, is very much aligned with what the new curriculum emphasizes and where Finnish schools are heading, if the aims can be transformed into practice and into the school culture.

Phenomenon-based learning has many pedagogic routes, but not necessarily any close relatives. It could be described as an umbrella,
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to ask questions than to answer them. (Hellström, 2000, 55.) Another reason behind the integrative approach is that the adult’s subject-division logic does not match the wholeness of the child as well as natural wholes do. The child observes the world in undivided wholes and life situations. The school’s division into subjects mainly originate from the universities science field divisions. In subject-divided teaching learning is examined from the perspective of the teaching, not learning. (Hellström, 2000, 55).

Erika Maksniemi (2014) defines the main difference between integrative teaching and phenomenon based pedagogy as follows. Integrative wholes and phenomenon originated pedagogy are similar and close to each other, but the main starting point is different, because phenomenon projects start from students participating in choosing and confining the content. Integrative wholes integrate teaching subjects as wholes, but phenomenon originated pedagogy is based on “real world” phenomena that children explore. (OO, SeO, HI, 2014, 9). Based on Maksniemi’s definition, how multidisciplinary modules (FNBE, 2016, 33) are described in the national core curriculum of 2016 and how the curriculum emphasizing student participation, multi-disciplinary modules could be translated as phenomenon-based learning, not integrative learning.

Since child-centricity is a key part of the new core curriculum and phenomenon based learning, it is appropriate to mention a few words on its background. In Finland, the eras of child-centricity have been in the 1920-1930’s and in the 1980’s. The work school idea was developed in the beginning of the 1900’s with the focus on handcrafts, work books, the independent and initiative nature of the student, open teaching, self-governance and play. (Hellström, 2008, 56.) So, both thinking of the wholes and child-centricity is not new, but have been raised to discussion when debating the school’s systems objectives. Already, Johann F. Herbart (1776-1841), who is said to have been the father of scientific pedagogy, noticed that the subject-divided curriculum shattered the child’s experience field too much. He recommended the use of sectioning and comparison. John Dewey wrote that the child’s soul seeks for wholes. The child wants to know, what an object is and what it is used for. The school should focus on presenting and researching the child’s environment and life. Why do people do what they do? How and where have people succeeded? According to Dewey, the student builds wholes by itself when digesting the surroundings. The boundaries of teaching subjects, on the other, break and scatter the child’s world. Facts are detached from their original meanings. (Hellström, 2008, 16). Especially in the interviews I had at the Hello Ruby summer camp with children, I could recognise that looking at wholes seemed very natural to children aged 6-10 years, which I will go into in chapter 4.
Several pedagogical models fit into phenomenon-based learning, such as problem-based learning, explorative learning or project-based learning. Also design oriented pedagogy is suggested as one way of theoretically structuring planning phenomenon-based learning (Otavan Opisto, Suomen eOppimiskeskus ry, 2014, 7,9).

Because this is a design thesis, it seems only natural to open design oriented pedagogy (DOP) further. One of the teacher’s I interviewed also mentioned DOP as a good example on how to collectively define the phenomenon theme with students as the method lays focus on children’s own questions. DOP was developed in the School of Applied Educational Science and Teacher Education in Finland as a part of a EU-project Case Forest – pedagogics towards sustainable development during 2009-2010. It encourages teachers and students to go outside the classroom and provides a loose process cycle to provide some concrete steps: 1) Articulation of the phenomenon, 2) Designing of the learning object, 3) Data collection for the learning object, 4) Construction of the learning object. “From the perspective of learning design, the challenge is how to construct broadly based learning interventions that encourage students to perceive interesting objects of learning, to ask questions (theoretical as well as practical), and also to create and share the knowledge needed for finding answers to these questions.” (Finnish Forest Association [FFA], 2017).

I attended a seminar “What is design education?” organised by doctoral candidate Jaana Brink at Aalto University Department of Arts on August 31st 2016. The event had a fruitful panel discussion on the theme why does a design process benefit schools. Maarit Mäkelä Associate Professor of Practice Led Design Research at Aalto University answered “design offers the possibility to make and refine things better. It enables processes to look your own.” Kristiina Kumpulainen, Professor of Education at University of Helsinki and the Playful Learning Center also saw teaching and learning as design, where design brings thinking tools to students. She saw that as design focuses on user-centricity it fits the ideas in the new core curriculum, where the learner (user) is put to the center of schools. I agree with these comments and see there is potential in design and design oriented pedagogy in bringing a flexible process cycle that would help facilitate more student-lead learning.

Another interviewed teacher and their school had used explorative learning as the base of their multidisciplinary module planning and teaching. Hakkarainen, Lonka and Lipponen (2005) describe the explorative learning model and argue that it is harder for the student to remember and apply their learnings outside the school in other situations, when facts are detached from original meanings. The model gained much interest among teacher and the teacher’s education field and has since evolved into a holistic approach that ties together the mind and emotions and also the school’s teaching
and learning culture. (Hakkarainen et al., 2005, 5). The phases of explorative learning are 1. Creating the context, 2. Shared expertise, 3. Defining research questions, 4. Creating working methods, 5. Critical assessment, 6. Searching for new knowledge, 7. Refining new questions and 8. Creating new working theories. The phases can also be done in a different order or a continuous cycle. (Hakkarainen, Bollström-Huttunen, Pyysalo, Lonka, 2004, 36-38.) Explorative learning can deepen the learning community’s shared knowledge on the object of study, with the guidance and support of a teaching professional (Hakkarainen et al., 2005, 16). Some of the changes that come with explorative learning are to do with the new role of the teacher as a mentor and Socratic midwife. From the Socratic perspective, acting as a spiritual midwife, means helping new thoughts to be born and come out. The students must be raised to a quickly developing world where constant change is the only permanent starting point. To be able to act in the future society, students need new kinds of knowledge. (Hakkarainen et al, 2005, 15.)

Pasi Silander (2016), a computer scientist and an expert in digitalization with a background in learning psychology and pedagogy, has studied phenomenon-based learning. His five points of phenomenon based criteria show what are the most essential elements of phenomenon based learning.

1. Holisticity - from the traditional curricular integration to the phenomena in the real world.
2. Authenticity - in the learning situation used methods, tools, and materials, correspond to the real world, where knowledge is used.
3. Contextuality - learners learn things in their natural context. Contextualization vs. decontextualization.

4. Problem-based inquiry learning - learning and collaborative knowledge construction is based on the learner’s own questions. In phenomenal learning learners learn by wondering together.

5. Learning process - learning is seen as a process which is guided and facilitated by learning tasks. The learning tasks guide the learner’s perception and information process - the aim is to facilitate students to learn something new (methodological guidance.)

In his criteria rubric he also describes the different levels that these can appear in teaching and learning: limited evidence, emerging, developing, accelerating and advanced. (Phenomenon-based learning Rubric, 2016).

There are a few existing guides for Finnish teachers on phenomenon-based learning and more guidelines appear online as teachers share their practical experiences on the new core curriculum. For instance, Sitra and Ritaharju upper-comprehensive school organized a trial period on phenomenon-based learning in 2015 as a part of Sitra’s new education forum and shared their experience and process online. (Oulun kaupunki, Sitra, 2017). Another project is an EU-funded AVO2 run by Finnish eLearning Center (Suomen eOppimiskeskus) that aims to enhance communal and collaborative ways of working in schools and other organisations. They have produced three web-based phenomenon guides (Suomen eOppimiskeskus, 2017). These guides give teachers an overview on phenomenon-based learning. I find, there would be still need for a guide that collects all the different existing guides and cases on phenomenon-based learning or would go deeper in certain phases of phenomenon-based learning. Many teachers seem to be active in social medias too and there are several groups such as “The Revolution of Learning” (Oppimisen vallankumous) and also subject-specific groups where teachers actively share tips and links related to their teaching.
Systemic design process
The red core through my thesis work is the systemic design process, which combines systems theory to the design process. In short, systems thinking means learning to better understand interdependencies and change. Therefore, to better understand the forces that guide actions. (Senge, Cambron-McCabe, Dutton, Kleiner, Lucas Smith, 2000, 7-8). “Systems thinking attempts to better align how we think with how the real world works. The real world works in systems - complex networks with many interacting variables. Often non-linear, complex, and unpredictable, real world systems seldom correspond with our desire for simplistic, hierarchical, and linear explanations.” (Cabrera, Cabrera, 2015, 12.)

Systems thinking has been influenced by many disciplines, there is a wide array of literature to be explored, often to the point of confusion. For me, there is one book I keep coming back to, which is Donella Meadow’s Thinking in Systems. It opens systems thinking in a clear way, without simplifying too much. Donella’s starting point is from environmental studies and biophysics. She worked with systems her whole life, especially systems dynamics, and has been one of the head figures of the discipline. Another mainstream figure of systems thinking is Peter Senge, who has translated the abstract ideas of systems theory into tools for better understanding of economic and organizational change. Senge and his team (2000) defines systems thinking as a discipline that “provides a different way of looking at problems and goals - not as isolated events but as components of larger structures.” “The discipline of systems thinking is the study of system structure and behavior; it is enriched by a set of tools and techniques that have developed over the past thirty-five years, particularly since the advent of powerful computers. People who have experience with systems thinking can act with more effective leverage than a “short-attention-span culture” generally permits.” (Senge et al, 2000, 78.)

Forming a unified picture is indeed the challenge in systems thinking as it has welcomed a wide range of disciplines and experts, making it sometimes hard to see the core of systems thinking. “For systems theorists and historians this wide range of different theories is interesting and valid, but for practitioners the menagerie of varied guests is not only quite frustrating, but impractical.”(Cabrera, 2015, 23.) Theories you could find in systems theories are 1) formal theories such as network theory, chaos theory, or general systems theory 2) important concepts such as unintended consequences 3) approaches designed for specific purposes such as soft systems methodology (group process) and 4) modeling methods for building models of systems such as systems dynamics (Cabrera et al., 2015, 22).

The many applications of systems thinking make it confusing to grasp and hard to start applying. Discussions on systems thinking also tend to focus on what a system is rather than systems THINKING. “It makes no sense to us that in order to understand systems thinking - the
principles of which are deeply democratic - you have to receive elite training over decades. This seems aristocratic, not democratic, and a slap in the face to the philosophical foundations of the field”. (Cabrera et al, 2015, 23.) This view can of course also be argued, as Donella Meadows focuses on both, the system structures and the thinking aspect, starting her work already in the 60-70’s (Meadows. 2008). However, my general experience of seminars and events on systems thinking are similar to Cabrera & Cabrera’s and the discussion often focuses on what a system is. Cabrera calls this system-focused phase systems thinking v.1.0 and sees the field now moving towards systems thinking 2.0., where the thinking aspect is not neglected, taking into account how we perceive the world and our flaws as thinkers. “Systems Thinking v2.0 enables us not only to understand the real world, but also the fascinating world inside our minds - the world of subjectivity, understanding, meaning making, thinking, the creation and evolution of knowledge, and learning itself”. (Cabrera et al., 2015, 24-26.)

Cabrera & Cabrera (2015) argues that the best way to grasp systems thinking and develop in it, is by incorporating systems thinking into other forms of doing. They see systems thinking as an outcome of other processes. It should be a part of and emerge from a process, such as this thesis design process, where it is embedded in finding points of leverage in the school system. This way of describing systems thinking indicates that systems thinking is an emergent property and an adaptive system itself. (Cabrera et al. 2015, 26).

Behind every complex system are simple rules and Cabrera & Cabrera sees that if systems thinking itself has become a complex adaptive system, there should be certain basic rules that are common to all systems theories. They see the bare essentials that tie all systems thinking theories together as four simple rules (DSRP):

- Distinction rule: Any idea or thing can be distinguished from the other ideas or things it is with;
- Systems rule: Any idea or thing can be split into part or lumped into a whole;
- Relationship rule: Any idea or thing can relate to other things or ideas; and
- Perspective rule: Any thing or idea can be the point or the view of a perspective

(Cabrera, Cabrera, 2015, 9.) For me, the four rule list has been a good working tool when mapping out systems and reminder that all these four aspects have been taken in consideration.

One more way to understand systems thinking is through the habits and ways of a system thinker. Waterfoundation, an organization that “develops systems thinkers who apply 21st century skills in classrooms, schools, communities and future workplaces”, has made a popular “Habits of a System Thinker” graph that is often used as an opening picture to introduce systems thinking. (Waterfoundation, 2017).
However, I find that Linda Booth-Sweeney’s list of a systems thinker’s ways open systems thinking more quickly and also includes what Cabrera & Cabrera’s, Meadows and Senge see as systems thinker capabilities:

1. Sees the whole picture, changes perspectives to see new leverage points in complex systems
2. Looks for interdependencies
3. Considers how mental models create our futures
4. “Goes wide” (uses peripheral vision) to see complex cause and effect relationships.
5. Finds where unanticipated consequences emerge
6. Focuses on structure, not blame!
7. Holds the tension of paradox and controversy without trying to resolve it quickly
8. Makes systems visible through causal maps and computer models
9. Seeks out stocks or accumulations and the time delays and inertia they can create.
10. Watches for “win/lose” mindsets, knowing they usually make matters worse in situation of high interdependence
11. Sees oneself as part of, not outside of, the system.
   (Sweeney-Booth, 1995, 10.)

Because complex systems are often surprising and we are affected by our bounded rationalities, it might be hard to transfer systems thinking into practice. It is known how system behavior forms and what type of leverage’s there are, but... “Systems thinking can only tell us to do that. It can’t do it. We’re back to the gap between understanding and implementation. Systems thinking by itself cannot bridge that gap, but it can lead us to the edge of what analysis can do and then point beyond – to what can and must be done by the human spirit.” (Meadows, 2008, 185.) This also relates to Cabrera & Cabrera’s view on system thinking as an emergent property of other processes. As design has a practical approach embedded in it, the match of systems thinking and design seems natural.

The Design Council in UK mapped out a Double Diamond model that describes, the design process that is common to many designers across disciplines. It’s a simple visual map with four stages: discover, define, develop and deliver. Usually in the creative process there are several possible ideas created before narrowing down the best one. “But the Double Diamond indicates that this happens twice – once to confirm the problem definition and once to create the solution. One of the greatest mistakes is to omit the left-hand diamond and end up solving the wrong problem.” The first quarter of the Double Diamond covers the start of the project where designers try to look at the world in a fresh way noticing new things and gathering insights. The second quarter represents the definition stage where designers try to make sense of the possibilities identified in the Discover phase. What to prioritize
and act on first? Which ones are feasible? The goal is to develop a clear brief that frames the fundamental design challenge. All though the creative process is difficult and messy, this simplifying model makes it less mysterious and easier to follow. (Design Council, 2017.)

I see the beginning phase of the double-diamond clearly has links to systems thinking, where the designers map out the system from several perspectives, widening the scope and looking at the whole. The second phase then narrowing down and searching for leverage points on where to start solving challenges and effecting the system. The third phase is about testing ideas where there is a useful feedback loop back to the designers on how well they have interpreted the real world of the users and client.

Linking these two disciplines is not a new direction, they have developed clear interdisciplinary connections already during the era of the Ulm School of Design and Buckminster Fuller’s design science during the 60’s, which resulted in the design methods movement (informed by Rittel, Alexander, JC Jones and Archer). But during the recent decades the co-evolution has faded with each discipline specializing in core disciplinary methods.

“Practitioners in both systems science and design have attempted to entail the more effective models and techniques from the other field, but usually in piecemeal fashion, and only if a problem was so suited or if supported by clients. Systems thinking has generally considered design thinking a soft complement, or analogous to creative planning. Design schools and consulting practices have developed well-packaged presentations of “systems change” approaches, but these are poorly supported by systems theory, interdisciplinary courses or rigorous systemic methods.” (Systemic Design Research Network, 2017). So there is still much to discover in the area of systemic design.
Peter Jones, an Associate Professor at Toronto’s OCAD University, has written in length around the topic of systemic design and does human and organizations research in addition to working as a designer. He sees similarities in systems thinking and design, but remains critical and underlines also the differences of systems thinking and design. It shouldn’t be taken for granted that these disciplines intertwine either. The main common aim of these two disciplines is that they both enable appropriate, organized high-leverage action in the increasingly complex and systemic problems as design situations. Both are systems of organized cognitive models developed to enable practitioners to perform different types of problem solving for complex situations. Where they differ substantively is on the basic principles of approach and action, and stylistically. “While both schools of thought and practice share appreciation for some common intellectual influences, their approaches to inquiry, research, method, action, and outcome significantly diverge. Because the two fields approach the definitions of problems and the pursuit of problem solving in almost incompatible ways, the relationships between systems and design “thinking” ought not to be taken for granted.” (Jones, 2014, 11).

Jones defines systemic design by describing what it is and isn’t and what methods and objectives it entails. “Systemic design is not a design discipline but an orientation, a next-generation practice developed by necessity to advance design practices in systemic problems. As a strong practice of design, the ultimate aim is to co-design better policies, programs and service systems. The methods and principles enabling systemic design are drawn from many schools of thought, in both systems and design thinking. The objective of the systemic design project is to affirmatively integrate systems thinking and systems methods to guide human-centered design for complex, multi-system and multi-stakeholder services and programs.” (Jones, 2014, 3). Systems designers use universal design methods, such as reframing (boundary setting), iteration (trial-and-error of design options) and critical feedback (multiple modes of evaluation), to identify and reconfigure boundaries
The main common aim of systemic thinking and design is that they both enable appropriate, organized high-leverage action in the increasingly complex and systemic problems as design situations. (Jones, 2014, 11.) as ways of sensemaking with others, to evaluate design strategies, and to produce descriptive scenarios. (Jones, 2014, 5). The stakeholders define the social system, so the methods and strategies used in systemic design must be accepted and understood by these stakeholders. “As acknowledged by authors Banathy (1996), Gharajedaghi (2011), and Metcalf (2010) social systems design is more a guideline for systems thinking in complex social applications. It is a multidimensional inquiry, not a “studio” practice engaged by design firms. In practice, social systems are not approached with a set of design methods or a toolkit (such as IDEO’s Human-Centered Design).” (Jones, 2014, 7).

Jones sees systemic design used also as a part of service design (Jones, 2014, 10). Then again, Systemic Design Research Network sees them as separate disciplines, but continues to define the functions of systemic design in a similar manner than Jones does: “Systemic design is distinguished from service or experience design in terms of scale, social complexity and integration – it is concerned with higher order systems that entail multiple subsystems. By integrating systems thinking and its methods, systemic design brings human-centred design to complex, multi-stakeholder service systems. It adapts from known design competencies – form and process reasoning, social and generative research methods, and sketching and visualization practices – to describe, map, propose and reconfigure complex services and systems.” (Systemic Design Research Network, 2017.)

Jones compares how both disciplines define problems and sums up what systemic design problems look like: “Typical systemic design problems are complex service systems, socially organized, large-scale, multi-organizational, with significant emergent properties, rendering it impossible to make design or management decisions based on sufficient individual knowledge.” (Jones, 2014, 3). The Finnish school system is most certainly a large-scale and complex social system, with several sub-systems (municipalities, schools) and emergent properties, making it necessary to use a systemic design process and bring in the experiences of teachers. With the help of practical experience from the field, it is possible to narrow down the boundaries of the most challenging core curriculum areas. During my thesis process I identified and reconfigured boundaries as a way of sense-making with teachers to create a design strategy and scenario that could help teachers in co-design and phenomenon-based learning.

Jones listed 10 shared systemic design principles and reflected them on the basic service design process. He also compares the methods used in both systems thinking and design and how they relate to each of these principles. In image 5, I have summed up Jones’s systemic design principles and what methods from both systems thinking and design relate to each phase.

I see the aim of for systems thinking in systemic design in finding leverage. Adaptive cycles help to analyse and predict when these windows of opportunity might occur. The boundaries are defined based on the aim of the design. Where do the teachers see the problem
areas and where might they lead the system? Why systems thinking is important to use is because the more complex a system becomes, the less counter-intuitive the leverage points are (Meadsows, 2008, 9). All though intuition is one important tool of designers too.

To me, system thinking means a zooming in and zooming out action, where parts and the whole are both equally important. The key is to recognise the connections between the parts and understand they are a part of a bigger whole. In the school environment this would mean that both zooming into subject specific learning and zooming out into the surrounding context and drawing connections are equally important. It could also mean shifting the boundaries of a system back and forth into a wider and smaller picture. In one way the double-diamond design process is systems thinking in itself widening and narrowing down the scope to get a full picture of the challenge areas and then again being able to be concrete an accurate in solution possibilities.

As a process my work could be described by molding the double-diamond model and adding on approaches from systems theory (Image 8). I spent time on the defining the boundaries of the system in order to find the right leverage. Summing up the process of my thesis, first, my original goal was to design teacher tools for starting phenomenon-based learning. I had a hunch system thinking could be of help in analyzing phenomena and wanted to explore whether teachers could adopt its theories through teaching tools. I read literature on phenomenon-based learning, systems thinking and the new curriculum and participated in planning the teaching content of Hello Ruby summer camp. Resulting from the knowledge gained from this phase and seeing co-design as a challenge area, my second aim became to produce teachers’ tools for co-design. Based on this, I did interviews with teachers to understand their insights and challenges in co-design and phenomenon-based learning. After analyzing the school system from teachers’ perspectives, I once more narrowed down the design aim. My aim became to think of a concept that could make the teacher’s everyday life more meaningful through co-design so that it
enhances phenomenon-based learning. In this thesis, I see systemic design helping in 1) finding leverage for change 2) empowering teachers to create continuous change.

School as a system
3. School as a system

When you look at system theories, it is easy to start understanding why the school system is difficult and slow to change. There are certain mechanisms working in all systems that try to preserve the system as it is. But there is also many points of leverage. In this chapter I will introduce system elements and behaviours by applying them to the school system. In the 6th chapter I will go deeper into conclusions on how the school systems looks from the teacher’s perspective.

All though I will move forward using the school as a system example, the generic nature of systems thinking is important to keep in mind. For me, the wisdom of systems thinking theories comes from learning from all kinds of systems, for instance ecosystems or computer systems and being able to transfer this same knowledge into recognising similar structures in almost anything from bank accounts to a family. I would say systems thinking is in itself transversal. The new core curriculum promotes transversal competence, so applying a transversal method seems appropriate for this work.

3.1. System elements and interconnections

The thinking side of systems thinking has recently been emphasized, but it is still equally important to define and understand what is meant with a system. Trying to understand where design interventions might be most useful, I have looked at the school as a system. The thinking aspect comes from the acknowledgment that it is my interpretation of the system.

“A system is a set of things - people, cells, molecules, or whatever - interconnected in such a way that they produce their own pattern of behaviour over time.” (Meadows, 2008, 2). “A system is an interconnected set of elements that is coherently organized in a way that achieves something.” A system must consist of three kinds of things: elements, interconnections, and a function or purpose. (Meadows, 2008, 11.) There are four questions that help in identifying a system: 1) Can you identify parts? 2) Do the parts affect each other? 3) Do the parts together produce and effect that is different from the effect of each part on its own? 4) Does the effect, the behaviour over time, persist in a variety of circumstances? (Meadows, 2008, 13). With the help of these four questions I also managed to explain a system to 6-10 year olds during the Hello Ruby Summer Camp. Answering these four questions, you realize there are not many things that are not systems. A system could be for instance an organisation, a city’s economy, a family, an animal, an organ, a device, a sandwich and so on. Perhaps, a sand grain on a beach is not a system, but when you start looking at the sand grain over time, its purpose and the connections of how it is formed, then it becomes a system. It seems as anything you look at as a system, is a system. The word “system” descends from the Greek verb sunistanai that meant
“A system is a set of things - people, cells, molecules, or whatever - interconnected in such a way that they produce their own pattern of behaviour over time” (Meadows, 2008, 2). “

“to cause to stand together”. As this origin suggests, the nature of a system includes the perception with which you, the observer, cause the system to stand together. (Senge et al, 2000, 78.)

Both intangible and tangible elements can be a part of a system. For instance, in school, both the intangible “joy of learning” and tangible school building can be essential elements in a system. Systems do not necessarily have to be living systems either. A computer with non-living elements is a system. Although elements of a system can be intangible, they are usually easier to identify. Interconnections can also be physical ones, such as a cord attached to a computer, but usually interconnections, especially information-based relationships, are hard to see, functions or purposes even harder. When you look at a system over time, you can see from the way the system behaves, what its function or purpose is. (Meadows, 2008, 14.) The system’s purpose does not need to be a human purpose and it is not necessarily intended by any single actor within the system. The purposes of a system’s subunits may cause overall behaviour no one wants. (Meadows, 2008, 15). For instance, if the family and school are the subunits of a child’s upbringing and their purposes do not match, it might cause the child to become overall confused and insecure, even though that is not what neither the family nor the school wants. This nature of systems producing its own behaviour is often referred to (Senge et al, 2000).

Another example from a bigger system from ecological sustainability could be as follows. There are few people who want CO2 emissions to go up, but nevertheless the complex system of nations, local social systems, ecosystems and all their subsystems cause the behaviour of our global system to behave otherwise where the blame of rising CO2 emissions is hard to put on any single part of a system. A system is more than the sum of its parts and the way it behaves, makes its characteristics. It can produce adaptive, dynamic, goal-seeking, self-preserving, or even evolutionary behaviour. (Meadows, 2008, 12-13).

As everything is connected to everything in systems, starting to define its elements can easily become confusing, even when talking about a fairly simple system, such as a coffee maker in the teacher’s lounge. Before getting lost into subsystems of subsystems, which is endless, it’s recommended to start by looking for the interconnections, the relationships that hold the elements together. (Meadows, 2008, 13.) It is understandable to start from defining the elements as they are usually more visible than interconnections or purposes. Often (not always) the visible elements are “least important in defining the unique characteristics of the system – unless changing an element also results in changing relationships or purpose (Meadows, 2008, 17).” For instance, a classroom is a part of the school system, but changing the display of the classroom doesn’t necessarily effect how the school functions, unless it changes the relationships between students and teachers or the teaching objective. In the case of a classroom in Kankaanpää school in Mikkeli (Finland) changing the elements and getting rid of school desks, according to their teacher Outi Kunnamo, increased the
students willingness to help each other. (Kaita-aho, J., 2015). This is a good example of how the elements of a school effected the relationships between students and changed the system. At the start of this thesis, I also looked at concrete, visible elements of a school, such as written documents and the core curriculum. After familiarising with the most obvious elements, the main purpose of the Hello Ruby Summer Camp observation and teacher interviews in my thesis, was to understand the hidden elements: feelings, motivations, values and interconnections between teachers. Only after this I was able to draw a system that more closely resembled the teacher’s everyday life. When I understood the underlying motivations and hidden connections, it was also possible to draw the system boundaries based on the most important interconnections that define the system’s behaviour.

Beside a purpose/function, parts and relationships, systems also have functions such as stocks, feedback loops and flows. A stock is the core foundation of a system. Stocks are the elements of a system that you can see, feel, count or measure but they also have a function and act as the present memory of the history of changing flows between stocks. Through the action of flow, stocks change over time. (Meadows, 2008, 17-18.) Flows are another important function in a system. Meadows uses a bathtub as an example of a system, where the stock is the amount of water and the tap the inflow and the drain faucet the outflow. Understanding the dynamics of stocks, flows and their behavior over time, which most already do with experiences of bathtubs, makes us understand a good deal about the behavior of complex system. She also points that it is common for our human minds to focus more on stocks than flows and also more on inflows than outflows. “Therefore, we sometimes miss seeing that we can fill a bathtub not only by increasing the inflow rate, but also by decreasing the outflow rate.” For instance, for teachers this could mean not only getting more work time to be able to do everything, but also slowing down the “outflow” of time by for instance prioritizing, or eleviating unuseful and irrelevant work tasks.

When you think about why systems are so timely to change, flows have a key role in this. Though stocks can fill up quickly, they generally change slowly and act as delays and buffers of the system. For instance, the digitalization of schools cannot proceed faster than the rate of technical equipment can be bought into schools or the rate at which teachers and students can be educated to use the equipment. (Meadows, 2008, 23). If we think of the learning outcomes as one stock, we can of course change the objectives of the curriculum instantly to effect the amount of learning outcomes, but the stock of learning outcomes changes slowly because the information and expertise flows slowly from different parts of the school system to effect the learning outcomes. But time lags also have a positive role in the system and can be seen as opportunities in bringing stability and allowing room to maneuver, experiment, and revise actions that aren’t working (Meadows, 2008, 23).

Flows flow between stocks due to feedback loops. Feedback is the process of acting upon and reacting to a stimulus, environment, or
system. (Cabrera & Cabrera, 2015, 32). There are two types of feedback loops, balancing and reinforcing ones. A balancing feedback loop does what its name suggests - balances the system, if there is a stock going too far up or down. The balancing loop then kicks in and brings the stock back where it should be. (Meadows, 2008, 28-30). In many ways, teachers act as balancing feedback loops for the students. Whenever there is a behavioral stock that is going overboard, teachers bring the students back to the path that leads towards the learning objectives. As delays, also feedback loops can be both a source of stability and a source of resistant to change depending on what the systems goal is (Meadows, 2008, 28-30).

The second type of feedback loop, reinforcing loop, doesn’t have a stabilizing effect, but quite the opposite. They can cause snowballing, amplifying, self-multiplying as either a vicious or a virtuous cycle which generates more input to the stock the more that is already there. One simple example of a vicious one would be “When we were kids, the more my brother pushed me, so the more I pushed him back.” And a virtuous one “The more I practice piano, the more pleasure I get from the sound, and so the more I play the piano, which five me more practice.” (Meadows, 2008, 30-33.) So, balancing loops are needed to keep the reinforcing loops in tacked. When things are hard to change or people experience matters as being on a roller-coaster, that is usually a sign of a balancing feedback loop that has kicked in after a reinforcing loop, attempting to stabilize the system and proceed to its goal (Senge et al, 2000, 86-87).
When you look at feedback loops, instead of seeing only how A causes B, you also start looking at how B may also influence A. For instance, instead of thinking that the teacher must have done something to affect the students’ learning, you’ll see the students’ learning must have done something to affect the teachers’ motivation. Understanding feedback loops encourages a dynamic view and opens up the idea that a system can cause its own behavior. They also rarely come one by one, but in reality are linked together in complex patterns. (Meadows, 2008, 34.) Nevertheless, these complexities are still based on these simple mechanisms of feedback loops.

In image 9, you can also see a causal-loop diagram that describes how a teacher’s enthusiasm not only influences students’ but students’ enthusiasm also influences the teacher with both balancing and reinforcing loops.

### 3.2. Co-designing with bounded realities and mental models

The school system is so vast, that it hard for any single actor to have an accurate picture of it. It might be difficult for a biology teacher to entirely understand what the school system looks like from a visual arts teacher’s perspective. Or it might be difficult for the Finnish National Board of Education to completely understand what the new core curriculum looks like from the teachers’ perspective. This is what bounded rationalities and mental models are about and where I see the role of co-design is, helping to gather different mental models to form a more accurate picture of the whole. We indirectly interact with the world through mental models, and are constantly being tested against the real world and the feedback we get from it. Cabrera & Cabrera (2015) defines a mental model being any kind of conceptual model or schema that gets tested against the real world. It could be for instance a mental model of “how to educate our children better” or a genetic model such as the DNA. The feedback could come in the form of personal learning, organisational learning, science, adaptation or knowledge. (Cabrera et al, 2015, 29-34). Their definition of systems thinking is based on mental models. “Systems thinking 2.0. is predicated on more closely aligning our current mental models with the real world.” (Cabrera et al, 2015, 27). Mental models are always wrong in the sense that they never entirely capture the complexities of the real world. But mental models are useful because sometimes they get it “right enough”. (Cabrera et al, 2015, 30.)

To get things more confusing, Cabrera reminds us that the real world and mental models, are in fact the same. We interact with the world indirectly through our mental models. Therefore, the “real world” and the idea (mental model) that represent it are in fact the same. (Cabrera, 2015, 53). This means that all system diagrams are simplifications of the real world where we each choose what and how
“Systems thinking 2.0 is predicated on more closely aligning our current mental models with the real world (Cabrera et al, 2015, 27).”

The iceberg model (The Donella Meadows Project, 2016).

much we look at. (Meadows, 2008, 29). Meadows describes mental models by using economist Herbert Simon’s term bounded rationality, which means, “that people make quite reasonable decisions based on the information they have. But they don’t have perfect information, especially about more distant parts of the system”. This means decisions might be made on bounded rationalities of each actor in the system, but it doesn’t necessarily lead to further welfare of the system as a whole (Meadows, 2008, 106, 110).

One of Senge’s five learning disciplines is mental models. He describes this discipline as reflection and inquiry skills that is focused around developing awareness of attitudes and perceptions – your own and those of others around you. In addition, he sees that mental models can help in more clearly and honestly defining current reality. “Since most mental models in education are often “undiscussable” and hidden from view, one of the critical acts for a learning school is to develop the capability to talk safely and productively about dangerous and discomfiting subjects.” (Senge et al, 2000, 7). The iceberg model (image 10) is often used to show the seen and hidden factors of a system and to help to think and discuss in a more systemic way.

Also the core curriculum 2016 reminds teachers that there are underlying elements that effect the school culture, whether we acknowledge them or not, which is why systemic effort in developing school culture is important. One tool that can be used in co-design process to bring together different mental models, is a boundary object. The purpose of the boundary object is to make it easier for people to communicate across different bounded rationalities and mental models.
They can be abstract or concrete and are weakly structured in common use, and become strongly structured in individual-site use. Because they are recognisable to more than one mental model and on the other hand have different meanings in different social worlds, they act as a means of translation between intersecting social worlds. (Star and Greismer, 1989, 393.) For instance an art piece at a school’s lobby could be a boundary object that encourages interaction between teachers and students. Its function could lower the barrier to start co-designing the schools lobby together.

I find one of the trickiest things in systems design, is where do you draw the line? What do you and what do you not include into a perception of a system? Such as in my work, do I look at the co-design of teachers or both teachers and students? What is important when talking about a transversal topic such as phenomenon-based learning. Where you draw the boundaries depends of course on the purpose of the system discussion and what time frame you are looking at. And also, what questions you want to ask. It is an essential question for the design process because when the system is drawn too narrow, it might surprise you with behaviour outside of the boundaries. (Meadows, 2008, 97.)

When the new curriculum talks about the need for transversal competence to tackle future issues, for instance sustainability, boundaries of systems are to do with this topic: “The right boundary for thinking about a problem rarely coincides with the boundary of an academic discipline, or with a political boundary (Meadows, 2008, 99.).” Especially when solving wicked, sustainability problems in the long-term, one of the most important things is identifying what the problem is and what it is not. When solutions fail, it is often because the problem definition itself. (Cabrera et al, 2015, 59.) As with the double-diamond design model where the scope widened and narrowed back and forth, the challenge is to be able to drop boundaries that worked for the last problem and to find the most appropriate set of boundaries for the next question in the design process (Meadows, 2008, 99).

Cabrera talks about boundaries through the “distinction rule”, which means that “any idea or thing can be distinguished from the other ideas of things it is with (Cabrera et al, 2015, 57).” Sounds like common sense, as many systems thinking theories, but still surprisingly difficult to forget. Every idea starts with a distinction. Even the simplest thought involves drawing a boundary that distinguishes something from nothing or a thing from other things. We also define the things by what it’s not, so also the things that don’t belong to a thing, effect the thing, because those boundaries are based on others. (Cabrera et al, 2015, 56.) “Most of the time we communicate these ideas with words yet words fail to communicate the hidden elements of our thoughts (Cabrera et al, 2015, 57).” Cabrera describes that two ways distinctions end-up being not distinct: 1) when we use the same words to describe things or ideas that are different 2) when we use different words to describe things or ideas that are actually the same (Cabrera et al, 2015, 59). This why I see co-design processes often use drawing and making thoughts
visible, because it easier to understand what different actors mean with the same words. In addition to interviews, also other methods, such as observation, are important because they help get behind the meanings of words.

Meadows sums the meaning of understanding system elements, functions and behavior: “You can’t navigate well in an interconnected, feedback-dominated world unless you take your eyes off short-term events and look for the long-term behavior and structure; unless you are aware of false boundaries and bounded rationality; unless you take into account limiting factors, nonlinearities and delays. You are likely to mistreat, misdesign, or misread systems if you don’t respect their properties of resilience, self-organisation, and hierarchy.” (Meadows, 2008, 87.)

The Finnish school system is a perfect example of a hierarchic system, where the National Board of Education and Ministry of Education set the goals and budget for basic education, the municipalities govern and organize education, the schools divide work and set their own goals and teachers plan their teaching with students. The division of teachers into smaller subject teacher groups could be a hierarchical subsystem in a school for instance. “In hierarchic systems, relationships within each subsystem are denser and stronger than relationships between subsystems.” (Meadows, 2008, 83.) The strong relationships between within subsystems showed in the my teachers interviews too, when teachers questioned the relevance of training sessions together with different subject teachers. They found the trainings organized within subject subsystems most useful.
An interesting reminder is also that although hierarchical systems often have a connotation of a top-down governed system, how they originally formed is quite the opposite. Hierarchical systems evolve from the bottom up. From self-organisation towards hierarchies. And the purpose of the upper layers is to serve the purposes of the lower layers. “The original purpose of a hierarchy is always to help its originating subsystems to do their jobs better. This is something, unfortunately, that both the higher and the lower levels of a greatly articulated hierarchy easily can forget. Therefore, many systems are not meeting our goals because of malfunctioning hierarchies.” (Meadows, 2008, 84-85.) A conclusion could be drawn from this that if the Finnish hierarchical school system is not functioning towards its goals, it is because the upper layers are not serving the purposes of the student-teacher level and then again the teachers are expecting it to do so.

Managing a hierarchic system is indeed not easy and is a balancing act between a coordinated central control and giving enough autonomy to all subsystems to flourish, function, and self-organise. (Meadows, 2008, 85). The Finnish school system and core curriculum leans on the expertise and autonomy of its teachers, and in that sense has succeeded well. Self-organisation is the capacity of system to make its own structure more complex. “Out of simple rules of self-organisation can grow enormous, diversifying crystals of technology, physical structures, organizations, and cultures.” Self-organising systems require freedom with a certain amount of disorder, which can be scary or threatening for instance for power structures. (Meadows, 2008, 80-81.) I see the new core curriculum also aiming for activation and self-organisation of students towards their own learning, rather than teachers teaching. In order for this to succeed, it also needs a certain amount of disorder, which I can imagine teachers might find difficult. Rolling (2013) in fact suggests a model of “learning by improvisation” in education which is based on the idea and the power of system self-organisation. He sees this type of learning would “enable a creative worldview, spawning emergent learning methodologies wherein each swarm, small to large, creates its own methodology for exploring its interests and solving the tasks at hand.” He sees that all though all youngsters would be independently capable of collective, self-organizing and adaptive behavior, based on how social swarms behave, the non risk-taking environment of public school does not support this. (Rolling, 2013, 162.)

The culture of schools and habits of teaching have formed during the past century making the culture of doing resilient and hard to change. Resilience is the ability to bounce or spring back into shape, after being pressed or stretched. “The ability to recover strength, spirits, good humor or any other aspect quickly.” Resilience comes from many feedback loops restoring the system after perturbation. (Meadows, 2008, 76.) So even though there might be efforts to change habits, a feedback loop from the past kicks in and tries to stabilize the system as it was. But resilience and preservation is often also needed in systems. “Resilience is something that may be very hard to see, unless you exceed
its limits, overwhelm and damage balancing loops, and the system structure breaks down. Because resilience may not be obvious without a whole-system view, people often sacrifice resilience for stability, or for productivity, or for some other more immediately recognizable system property” (Meadows, 2008, 77.) For instance burnouts are a sign that your body as a system has exceeded its limits. In order to build-up its resilience, your do sports, eat and sleep well all though you would in the short-run prefer (or are forced) to do something else.

3.3. Finding root causes through archetypes

In the 1960’s, researchers began to notice that some more complex system structures are generic – they apply to a wide variety of situations, including many organizational situations. These “archetypal” system structures suggested new, counterintuitive ways to deal effectively with a wide range of organizational and community problems. About a dozen system archetypes have been identified and written about. (Senge et al, 2000, 91-92). I will go through five of these archetypes, which are described in the book “Shools That Learn” (Senge et al, 2000) and that I can also could see arising from my interview material with teachers. I used archetype diagnosis in my thesis design process, to find the root problems of co-design in phenomenon-based learning.

1. **Fixes that Fail** can come from the bounded realities of the system actors that each have their own goals for the same system. “When various actors try to pull a system stock toward various goals, the result can be policy resistance. Any new policy, especially if it’s effective, just pulls the stock farther from the goals of other actors and produces additional resistance, with a result that no one likes, but that everyone expends a considerable effort in maintaining.”. The different goals are caused by the bounded rationalities of the actors, each seeing only a part of the large system. Fixes that Fail include balancing feedback loops that try to keep the system according to its goal. When the subsystems have different or inconsistent goals, each subsystem pulls in different directions, where everybody has to invest great effort into keeping the system where no one wants it to be. And if one subsystem intensifies its efforts, this leads to more intensification of everyone else’s. (Meadows, 2008, 113-116). According to Senge, Fixes that Fail archetype is one of the most common system archetypes that emerges in school reform cases, with a symptom of unintended consequences. The principal’s well-intentioned, forceful reform fix often leads to teachers teaching “to the principal”, where they prepare lessons they think the
principal wants instead of what the students need. The outcome of course is not good education but something opposite. (Senge et al., 2000, 91-92). So in this case, the subsystems goals were only superficially the same, but in reality teachers changed their goal to teach “by the principal” rather than everyone having the same goal of increasing learning. The Finnish core curriculum reform is a different case, but if the reform is carried through too forcefully in schools, of course there is a risk of teachers starting to teach superficially.

Solution: Meadows suggests the best way out of this trap is to let go. Gather all the actors and use the energy, formerly used on resistance, to find mutually satisfactory ways for all goals to be realized or redefine larger more important goals that everyone can aim for together. (Meadows, 2008, 116). To me it sounds like Meadows solution in the Finnish school context could mean that all the actors should slow down for a moment and take the core curriculum reform one stage at a time, in order to remember the bigger goal of educating students.

2. Success to the Successful appears when accumulated wealth, privilege, special access, or inside information is used to create more wealth, privilege, access or information. “If the winners of a competition are systemically rewarded with the means to win again, reinforcing feedback loop is created by which, if it is allowed to proceed uninhibited, the winners eventually take all, while the losers are eliminated.” (Meadows, 2008, 127-131). Michael Goodman and Janis Dutton (2000) give an example of what success for the successful might mean in the school life: “Every year the administrators of a school resolve that all the students will be given equal opportunity to succeed. But every year, some students, often from the lower-income neighborhoods, seem to get caught in a vicious spiral of defeat. Despite the educator’s desire to help all children learn, the system itself seems to divide them into “good kids” and “problem kids”. Eventually, there is too much strain on the system’s limited resources, such as people’s time and energy, to help all the “problem kids”, so many of them are written off.” (Senge et al, 2000, 354.) In the teacher interviews also Finnish teachers were concerned that the new core curriculum starts to enforce the Successful to the Successful archetype. The goals of the new curriculum are ambitious for both students and teachers. Already successful students might handle it well, but teachers already
pressed with time, start to right weaker students off simply because they do not have enough time and energy.

As long as the reinforcing loops are tied together where the advantages of the stronger group is done by the expense of the weaker group, the Success for the Successful trap will persist. (Senge et al, 2000, 357). Meadows suggests several ways out of this trap, which are diversification, strict limitation on fractions any one winner may win, policies that level the playing field, removing advantages from the stronger players or increasing advantages for the weakest, policies that guide toward success that do not bias the next round of competition. (Meadows, 2008, 130.) Goodman and Dutton’s suggestions are overarching goals that will include the success of both groups. They warn setting policies that level the playing field in school which might set the two groups against each other, “with an oscillating pattern ensuing as they fight for a larger share of dominance over scarce resources” and rather suggests to look into the mental models that underlie the archetype: what are the values, attitudes, and characteristics of “successful” people at your school? Also thinking about how success is measured is a part of this. (Senge et al, 2000, 358).

3. The Tragedy of Commons system archetype appears when there is unintended escalation, in a commonly shared, limited and erodible environment. The common users of the resource increase the usage of the resource at a rate that is not influence by the condition of the commons but their good reasons of doing so. “The Tragedy of the Commons arises from missing (or too long delayed) feedback from the resource to the growth of the users of that resource”. The structure of this archetype makes selfish behavior more convenient and profitable than behavior that is responsible to the whole community and to the future (Meadows, 2008, 116-119). Unlike the Success to the Successful, where the resources end up in the winners circle, the tragedy of the commons makes everybody loose. “Overdepletion can affect every aspect of educational resources, from pencils, to staff development, to technology, in wealthy areas as well as poor ones.” Tim Lucas recalls a principal who made a plea to his staff: “Folks, I need your help. The photocopier is on its last legs. We can’t afford a new one until July, when the new budget comes in. Would you all take it easier and photocopy as little as possible until then?” The next day, everyone was lined up at the
photocopier, to get their individual needs met before the crash. The machine broke down in two days. (Senge et al, 2000, 508). I see a risk of The Tragedy of Commons archetype in the core curriculum reform if teachers are too pressed with time and resources. When an individual is pressed, it is easier for them to abuse common resources just to survive through the work day. Rather than putting the common goal and resources ahead, different subject teachers might go against each other in order to get more resources for their type of teaching.

How to govern a tragedy of common in a system is tricky, because it often situates well intentioned groups at odds with each other unnecessarily (Senge, 2000, 508). Meadows sees that there are three ways to avoid the Tragedy of Commons, which are education and exhortation, privatization of commons and regulating commons. The third option, regulation, makes and indirect feedback link from the condition of the resource through regulators to users. However, this option needs expertise on the expertise side to interpret the source situation correctly. Privatization is a reliable option compared to exhortation, but means some individuals have to learn the hard way. Then again many resources, such as the atmosphere or time cannot be privatized, which leaves us with the option of “mutual coercion, mutually agreed upon”, for instance children queing in line to get their lunch in order to save everybody’s time in the whole. (Meadows, 2008, 119-120.) Goodman and Dutton see four ways to intervene: 1. Collaboration, 2. Quarantine, 3. Replenishment and 4. Building renewable resources. In collaboration, the gain of collaboration can be brought to the tension of individuals, in quarantine the source is closed off until it has had time to recover, in replenishment, for instance additional funding could be sought for. And in the last option, you could think of designing the common system so that, instead of being depleted, it replenishes itself. “For example, can you set up a common staff development process among all the agencies and schools, so that the capabilities of everyone in the community keeps rising?” (Senge et al, 2000, 508-509.)

4. **Shifting the Burden** to the intervenor is an archetype similar to the fixes that fail, but instead of an immediate unwanted result of an intervention, this archetype might seem like it is working. However, in the long-run it creates an addiction to the intervention and doesn’t fix the root problem. In this archetype there is a stock with an outflow
and inflow which is maintained by an actor adjusting a balancing feedback loop. The actor compares the actual state of the system to its/his/her goal. If there is a huge gap between the current state and the goal, it is a quick and easy choice to rely on an intervenor, making the gap smaller more quickly. (Meadows, 2008, 131-132). As designs role is often acting as an intervenor and coming up with solutions to shift the systems state to a desired goal, the long-term effects on the intervened systems are of course ethical issues to keep in mind. The intervention can become a problem when the corrective feedback process is not doing a good job of maintaining the state of the system (Meadows, 2008, 133). This could be a description of a superficial design solution not solving the root problem and making the client dependent on the designer. Goodman, Dutter and Kleiner (2000) introduce examples in the American school system of shifting the burden to the intervenor, where a school can become addicted to solutions that doesn’t really help, instead of tackling the root problem. “When school districts put all their time and money into helping students pass tests, often they are forced to limit other services and programs – counseling, physical education, art, music, special education, nutrition, and connecting with parents. Before long, capabilities in these areas atrophy. If they need to return to some of these more fundamental areas, they will no longer have the staff, the knowledge, or the capability to do so. They will be addicted to the quick fix and unable to escape it.” (Senge et al, 2000, 360-361.) So, as a design intervenor, I would aim to work in a way that restores and enhances the school systems own capabilities to solve its problems, then remove myself.

5. Another archetype, that is common in the state where the desired state and existing state are too far from each other, is The Eroding Goals. When the system realizes the goals set are hard to reach (all though they are the right ones to reach), it starts lowering the goals to meet current performance. For instance, Goodman, Dutton and Kleiner’s example of when a school district decides on a guiding principle that “all kids can learn”. “After several enthusiastic months, it becomes clear exactly how difficult it will be to put this principle into practice (or how much of a change in attitude it will take). Gradually, without much fanfare, the aspirations of the district change – to “most kids will get better opportunities” and to “we prepare more kids for the job market” , and ultimately back to where it was when the initiative began. (Senge et
al, 2000, 363). If Finland’s new curriculum’s goals prove to be too difficult to implement in practice and the fundamental work, for instance raising the capabilities of teachers, is not supported, this archetype might come to play and in practice the core curriculum will not change much.

The archetype diagnosis mapping tool (Image 12) is meant to “help you use the relationships between archetypes to figure out how to begin looking at a new situation, and to gain increasing understanding of a problem as you work through the tree.” (Goodman, Kleiner, 2017).

Image 12.
The archetype diagnosis model (Goodman Kleiner, 2017).
It is guided to experiment and look at the particular situation or problem through the lens of several different archetypes moving through the “tree” as needed. This map also shows that the archetypes are not neatly separate from each other but in reality are linked to each other as problem systems. “You may find yourself combining archetypes, adding loops and links to adapt them more completely to your story. By the time you have gleaned what you can from them, the loops may be five or six generations removed from the original archetype with which you began.” (Goodman, Kleiner, 2017). By going through different paths of this archetype diagnosis tool, helped analyse what is the core archetype and problem to focus on in my concept. In chapter 6 I will present my conclusions.

3.4. Changing a system

The aim of my systemic design process is in short: change. How could my design concept change the system of co-designing phenomenon-based learning so that it would support teachers better than the current system does. Understanding the limiting factors, leverage points and time windows of change can be powerful starting points towards long-term change. Leverage points are points of power in a system that trigger change (Meadows, 2008, 101). As the archetype examples already showed, leverage points are often counterintuitive. Attempts to fix systems end up worsening it.

Time is one important leverage. If you can change the length of delay in a system, this is often a good leverage point that might have significant effects. But overall slowing down the system is usually better than shortening delays. Especially the size of stock can tell you how resistant to change the system most likely is. The bigger size of the stock (=buffer) makes the system more stable but also slower to change. (Meadows, 2008, 104-152.) For instance, the national school system ensures education for every Finnish child. It has an enormous stock of schools, teachers and knowledge of how the current system works, which makes it more stable, so that it does not change overnight to an unwanted direction. But it also slower to changes generally. The balancing loops (for instance learned practices) keep the change in tact. Also in the teacher interviews it was mentioned several times that change needs time.

In addition to leverage points, there are limiting factors. Limiting factors are parts of the system that it can’t do without and often they are the most important parts of the system. (Meadows, 2008, 100-101.). For instance, time is mentioned in the teacher interviews as one limiting factor that teachers are missing. It seems without sufficient amount of time, no matter how good of a leverage point there would be, unless it solves the issue of missing time, the system won’t function or change without it.

Adding all the elements, feedback loops, flows, interconnections, purposes and mental models of systems and multiplying them
equals Complex Adaptive Systems, which means “A system that adapts to become better suited to its environment (Cabrera et al, 2015, 32).” With these definitions the school system and the school reform could be described as a complex adaptive system trying to adapt to the needs of the changing world in order to sustain itself. When individual or collective behavior changes and organizes it to match the microevent or bunch of events encouraging it to change, this is called adaptive (Cabrera et al, 2015, 32).

In adaptive systems there are adaptive cycles that both preserve and create new. These adaptive cycles are called panarchies. The concept and theory of panarchy describes in what stages and what levels complex systems change. If leverage point tells you WHERE the system can be changed, panarchies can give an idea WHEN the system can be changed. Change often requires both the top and lower level to be engaged. The top level in this case, could be the Finnish National Board of Education. The issue that the new core curriculum felt forced from top-down came up in the teacher interviews, which is not surprising as the direction of the core curriculum change has been top-down all though teachers were engaged during the draft process. Changing the core curriculum is a slow and heavy top-down process, but understanding windows of opportunities where adaptive systems tip from conserving to a renewing phase can help understand and predict possibilities for also quick changes in big systems. (Resilience Alliance, 2017). I see the Finnish school system in a phase where it is releasing from previous ways of working and in is in a reorganisation phase, which ideal for changing a system and introducing interventions. In the images 13 and 14 you can see that change comes from both top-down as well as down-up. Both the teacher-student level and the FNBE level is needed to change the Finnish school system. Image 14 also shows how small reinforcing actions can make big changes in the whole system. This is what I would aim for in my design solution.

Image 13.
Panarchies. (Resilience Alliance, 2017)

Image 14.
Planting seeds of change. The relationship between balancing and reinforcing loops (Pulkkinen, 2014).
**Visible: Culture**
Not planned or designed but intended. Complex and diverse changes with simple actions creating something that people want.

- Growth Loop
- Balancing Loop

**Invisible: Rules**
Changing the balancing loop into a diminishing one, finding support and clearing obstacles.

**Nurturing**
Large and slow, small and fast.

**School as a System**
Outside the school system
4. Outside the school system

To gain answers and experiences from the field, I had the chance to join the Hello Ruby summer school team in planning a summer school on coding and phenomenon-based learning. Hello Ruby Summer School was a part of the HundrED project that seeks and shares inspiring innovations in K12 (kindergarten to 12th grade) education (HundrED, 2016). The planning was done with three teachers and the Hello Ruby staff including Linda Liukas who is the founder of Hello Ruby and a programmer and writer of childrens’ programming books. Hello Ruby is an organization that creates learning tools for children and educators on technology, computing and coding. During summer 2016, a two-week camp was organized on computational thinking. The phenomenon connecting all the activities and learnings was a narrative of Blob. Blob was an imaginary friend who’s space ship had crashed on earth. For him to get back home, the campers needed to build a new space ship for Blob and apply learnings from computational thinking and many other fields, for instance maths and physics.

During Hello Ruby I made notes based on the instructions on conducting ethnographic fieldnotes and research (Crabteel, A., Rouncefield, M., Tolmie, P., 2002; Emerson, M., Fretz, R., Shaw, L., 1995), which underlined the researcher as not only a passive, distant observer but an active part of what he/she is observing. “Through participation, the field researcher sees first-hand and up close how people grapple with uncertainty and confusion, how meanings emerge through talk and collective action, how understandings and interpretations change over time (Emerson, M., Shaw, L., 1995, 2).” The aim was to get an embedded understanding of what planning phenomenon-based projects could be in a limited timeframe. I also interviewed six students at Summer School to understand how they interpreted interconnections and systems thinking. I went through my notes and interview transcripts several times after the summer school and used my experience as a practical experience I could reflect upon when analyzing teacher interviews and searching for relevant literature.

I will only shortly go through Hello Ruby observation, but feel it is still important to include in my thesis, after all it was the trigger to my thesis topic and guided me to narrow down the subject of my thesis. I continued my field work by interviewing teachers in upper-comprehensive schools. My field work had two phases, the first being the summer school, which helped narrow-down my research questions, the second being the teacher interviews with more precise questions on the problem area phenomenon-based learning and co-design. The second phase, teacher interviews, will be more emphasized in my thesis work. I will go into the interviews in the next chapter.

During my reading, writing and interviewing process, the Hello Ruby Summer School enabled me to understand content on a more personal level, being able to understand what teachers actually meant. All though the camp was not done in a school environment, it gave me
a better understanding of how teachers work together in challenging situations, what are crucial elements in the school environment that were missing from the camp, how children work together across different age groups and how much students are capable of doing on their own and with each other, when they get excited about a phenomenon.

My role in the Hello Ruby Summer Camp was planning the systems thinking material for children with the teachers and observing the camp. I attended a handful of meetings with the teachers of Hello Ruby to plan the materials of the camp.

In practice, the schedules were so overloaded during the camp that the systems thinking sections were almost entirely cut off and the focus of the camp was strongly on computational thinking. I then spontaneously decided to have short one-on-one systems thinking lessons with six children 6-10 years old followed up with a few questions, to gain more insights for my thesis. I introduced systems thinking shortly and then we had a discussion on what the child sees as parts, interconnections and systems and what benefit there are about seeing connections and systems. Previously introducing systems thinking to adults I had often found it extremely hard to condense systems thinking and continue into a discussion. But with children, my experience was completely different. They seemed to immediately understand that all matter and things are interconnected and that the boundaries we draw are merely in our minds and perceptions. They understood different things such as a farm, a family, a plastic bag or a radiator as a system, which had parts, interconnections and a goal. Another thing that was interesting was that simply by introducing what systems thinking and a system is, their own wondering naturally lead them to sustainability questions "what is a plastic bag constructed from and where does this plastic bag go?" "what is energy and what is the aim of energy?". The older children also understood abstract things such as the camp as a system, which lead to interesting discussion also on what the camps goal might be and how collaboration is key to the success of it. Donella Meadows (2008) sees the systems-thinking lens allowing us to reclaim our intuition of whole systems, indicating that at some point we have had it and during our lives and at some point lost it. In this sense, having transversal learning and maintaining this ability also in schools is important. At least with the children at Hello Ruby Camp, transversal competence seemed to have good perquisites.

The camp was implemented in a rather extreme environment, one could say. All of the teachers were doing something they had not done before, with teachers they had not worked before, in an environment they had not worked in before with children they had not met before. I got insights for my work in seeing how things got easier while the teachers could adapt and change plans and also once they got to know the children more, the surroundings and also each other. I also felt how difficult it is to jump in the teacher team as an "outsider" not planning the camp at the office everyday, but coming in to give in put only partly. The camp also gave me a deep respect for teachers. Having
to plan system teaching lessons and also be an authoritative position in the camp, made me understand the complexity of issues one needs to consider when working with children. How much effort it took just to establish the basic rules for the children of how to act in THIS camp. In other words, the teachers had to start from almost zero. It helped to see why the school system is heavy, and changing it slow, but it also significantly makes the teachers work easier providing a basic framework to start from. You could see that the camp was missing buffers that stabilize the system when surprising events occurred. This was also a good and bad thing. It was good that there were less constraints, but it was extremely exhausting and tiring for the organisers, who were walking the edge everyday something surprising happened, such as organisers getting sick.

The main finding for me was observing that adaptive co-design between teachers was a key part of successful learning experiences. More towards the end of the camp, the teachers were able to change plans together according to the needs of students, which resulted in increasing learning outcomes and excitement. All though the circumstances were new and demanding for all, it seemed that it didn’t affect the learning outcomes significantly and the feedback from children was very enthusiastic. The criteria on phenomenon-based learning was fulfilled.

After this phase I decided to concentrate on co-design as I saw it was a significant part of the successes on the Hello Ruby Summer Camp. The questions that resulted from this phase were: How does the core curriculum 2016 perceive and guide teacher’s co-design efforts on phenomenon-based learning? How do upper comprehensive teachers practice co-design? What are the problems? Does phenomenon-based learning increase the transversal competence of students in the school environment?
Teachers’ practical experiences of the new core curriculum
5. Teachers’ practical experiences of the new core curriculum

During October-November I interviewed six teachers, five women and one man, from three different schools: one upper-comprehensive school and two comprehensive schools in the Helsinki capital region. All the interviews were done in Finnish. Interview times ranged from one hour to over two hours depending on the teachers' schedules and time available. For instance, teacher B only had time for a brief half an hour interview, so there will be less comments from her in my analyses of the interviews. Five interviews were done during working hours at the school buildings enabling me to also get an idea of the teacher’s everyday environment. Teachers F’s interview was done during the weekend and at a café.

Previous teaching experience ranged from 6 to 20 years. Three taught 7-9 graders, one taught 3-9 graders and one 6-9 graders. At the time of the interview, all but one taught full-time. Four teachers worked in the same school with different subjects. This school (school 1) was for Swedish speaking Finns that taught 1-9 graders and had altogether about 500 students. One teacher was from a school that taught 1-9 graders with over 600 students (school 2). And one teacher was from an upper-comprehensive school that had around 500 students (school 3).

I searched my interviewees mostly by school, first looking at schools I was interested in. The first school was chosen after a conversation at a “What is design education?” panel discussion at Aalto University. During the panel discussion one of the teachers described their school’s co-design challenges in the trial period of a phenomenon-based learning. I assumed teachers in this school might have valuable learnings on what to do and possibly what to avoid in co-design and so I contacted the teacher at the panel discussion. The second school was chosen, in contrast to the first one, because they had more experience in design methods and also phenomenon-based learning. From them I was also keen to hear how far they had got and what learnings they could pass on to other schools. Initially I was interested to also interview teachers in a school that had hardly any experience in phenomenon-based learning, but found these schools impossible to find or get a response from. Therefore, the last school and interviewee was chosen after a conversation with a teacher reached through a Facebook group for subject teachers. She was keen on sustainability and systems thinking and thought their school might also gain from the learnings of my thesis. I contacted the headmasters or and the teachers I had already been in contact with and asked to interview subject teachers from different subjects. I was also interested in teachers who were generally different from each other either in their approach to teaching or by their personalities.

I initially approached several schools aiming for up to 10 interviewees, in order to get a diverse understanding of different teachers. However, I found that six interviewees was already extremely challeng-
ing to nail down in a limited timeframe. In 2015, I had done a project related to the Design for Government course interviewing teachers and didn’t have this problem of getting hold of teachers then. I’m assuming that the new curriculum changes might have made teachers busier and schools are getting other contact requests relating to this matter. School 2 had already two doctoral candidates doing research in their school. And as teacher F said in the interview, people are quite tired at the moment which shows in how their school responded in interview requests: “It can be noticed from the fact that they (teachers) didn’t decide to join this like yes, yes of course, come and interview us”.

In analyzing the interviews, I will identify each teacher with letters A, B, C, D, E and F as follows:

- Teacher A teaches craft, has a qualification to teach also visual arts for primary school level, 6 years of teaching background
- Teacher B teaches home economics, has 20 years of teaching background
- Teacher C teaches biology, geography and health, has 6 years of teaching background
- Teacher D teaches mother tongue (Finnish) for bi-linguals, has 10 years of teaching background
- Teacher E teaches history, religion and society, has a qualification also in health, 15 years of teaching background
- Teacher F teaches visual arts, has 17 years of teaching background

Teachers A, B, C and D all teach in the same school. Working hours of teachers were around 35 hours/week and working time was usually between 8 a.m. and 4 p.m. However, work times were flexible and depending on teaching hours. Teachers A, E and F described planning work often taking place also outside school, for instance while in the metro or cooking. These hours are of course hard to calculate. Actual teaching hours ranged from 12 hours to 26 hours a week. Teacher C worked 80 percent of the working week and teacher E also acted as a vice head master where majority of her work time went to administrative and planning duties. Teachers A, B, C, D and E had three hours of scheduled co-design time in their weekly schedules.

5.1. Methods

I analyzed the teachers interviews with qualitative data-based analysis (Tuomi, Sarajärvi, 2013). The interviews transcripted were altogether 103 pages of text, which I then coded first into bigger categories: challenges, opportunities, needs, everyday life of the teacher, new curriculum and co-design. I organized these categories and the interview text into
an excel sheet (appendix 2) of all together 361 rows. All though I did a material based approach, on the second round of coding, I added codes for systems thinking and phenomenon-based learning and also marked parts that resembled either of these theories. On the second round I also made more precise codes through organizing the interview material based on challenges, opportunities and needs.

The teachers’ interviews were done as theme-based interviews, with a loose frame (Tuomi et al, 2013). We discussed the themes of co-design, phenomenon-based learning and the new core curriculum. Within these themes I asked about the possibilities, needs and challenges. I modified the questions slightly in between interviews. As the theme of lacking time emerged, I for instance added the question: “What do you see as unnecessary in your everyday work life?”. The list of interview questions are in the appendix in Finnish (appendix 1).

The interviews were carried out in Finnish, but I have still used quotes from the interview material in the text. All though they are in fact my translations from Finnish to English. In the appendix (appendix 3) I have added a few direct quotes from each teacher in Finnish, to give a feel of the language the interviewees used.

5.2. Start of the new core curriculum

In the interviewed schools, planning the new curriculum with the teachers started 1-2 years in advance. All the interviewed schools implemented a test project or projects of phenomenon-based learning before autumn 2016, when the new core curriculum started for primary schools. Most teachers had been involved in planning the municipal and/or school curriculum and all teachers had been involved in planning concerning their own subject, some more actively than others.

In school 1, the general principals had been discussed, but not so much subject-related details. The discussion was kicked-off through the transversal competences. The teachers discussed what do the competences actually mean and how could they be interpreted in different subjects. School 3 also had a teacher group that looked into the new curriculum and all teachers had different areas they covered. This was considered to be a good foundation to start implementing the new curriculum. Most of training/planning days (3days/year), that are included in the in the State Civil Servants’ Collective Bargaining Decree were used for planning the new curriculum. The headmaster of this school was excited about the new curriculum and saw it as an opportunity. Teacher F experienced this excitement also catching on to the teachers. In school 2, the new curriculum had already been taken into implementation on all grade levels of the upper school, all though the content still comes from the old curriculum. School 1 and 3 are transferring to the new curriculum gradually as suggested for upper-comprehensive schools in the cover letter of the new core curriculum.
In all schools, ideas and models were taken from other schools to some extent. Teachers’ previous experiences from other schools were utilized. But generally pre-existing models and ideas were applied rather little, at least on the teacher level. As teacher C describes: “we started to plan the new curriculum out of nowhere, so to say.” He said that the idea was to try and figure out what fitted their school best. Trialing phenomenon-based learning was at the core of starting to plan the new curriculum. Events were organized by the municipality and associations related to the curriculum to discuss and learn about changes among subject teachers from different schools. Teachers F and D mention that the level of relevant content in these events unfortunately had disappointed teachers and the introduction to the events had been inaccurate.

The interviewed teachers understood the ideas behind phenomenon-based learning and the core curriculum well. Learning together, playfulness, gamification, experimentation are all mentioned as key elements that appear in the new curriculum. Teacher A sees that the aim of the new curriculum is to concretize how different sections link to each other. “The purpose is to link together different parts and bring it to the level of the child’s own life, so that also they can understand how they benefit from it that the subjects are no longer separate from each other.” This teacher also highlights the skills of independence: “This is what the new curriculum aims at. That the students learns to think for themselves and learn to be small inventors and see possible solutions.”

Phenomenon-based learning was seen as especially essential for the skills needed in the future and therefore it is important content of the new curriculum. As teacher C puts it, it is not so important to memorize things anymore, but more important to learn how different matters link to each other. The changing role of the teacher was also seen as essential, enabling students to learn future skills. According to the new curriculum it is key to share the learning experience with the student. Teacher C continues: “The idea is more that you are not the lecturing teacher behind the desk”. And new curriculum gives opportunities to develop: “Phenomenon-based learning is important overall, but also from the point of view that it forces schools to do” says teacher B.

5.3. Important but difficult

All the teachers interviewed see that the new curriculum brings positive and needed changes in the school system and as teacher E states: “in fact, there is a lot of things that should have been integrated in teaching earlier.” According to teachers C and F it enables the joy of exploring and learning and the freedom to do bigger projects and phenomenon-based learning.

Teacher A sees the curriculums learning competences as “important and magnificent”. Teacher B sees the non-desk school as a
positive change that increases the use of authentic learning environments and phenomenon-based learning as a welcomed addition which forces teachers to collaborate with other subjects. Other things that are praised are the learning competences, the freedom brought by the new curriculum, the value base and the changing teacher’s role. Teacher B also says the curriculum supports her subject and its diversity nicely.

Phenomenon-based learning is seen as a good thing and as teacher C says: “if our basic task is to raise these as human-beings fit for society, it (phenomenon-based learning) has to be a good thing”. Phenomenon-based learning is seen as important also from the point of view that it forces teachers to collaborate with other subjects, all though it normally might not ideal to force things. But as teacher F says, it for instances enables the headmaster to also prioritize time for co-design and not assume that it just appears from somewhere. Teachers B, C and D mention the forcing of the teachers to collaborate as a positive opportunity rather than something negative, all though teacher E acknowledges the challenges of forced activities.

In the interviews, the general atmosphere within schools was discussed. The new curriculum has brought on an atmosphere of doing together which is changing the teacher’s role in a good way. But teacher F says that all though teachers get along with each other very well, people are quite tired at the moment, which appears as a tightened atmosphere, competition and a non-existing ability to invest in anything extra. The curriculum has also brought some more disorder which takes even more energy from teachers. And it seems it has divided opinions among subjects. Teacher F describes that in their school the biology teachers love it, history teachers don’t and language teachers hate it, which she acknowledges might also be a personality question rather than subject, but is interesting nevertheless that subjects stick together in their opinions. This also tells that subsystems of subject teachers have strong ties within their subsystem as described in chapter 3. Teacher A also says that all though the changes are positive, right now the new core curriculum feels quite heavy, due to the collaborative work between teachers. In their school there are teachers that are against the changes, which makes collaboration challenging.

The pressure and demands of the change were felt. To an experienced teacher, such as B, the aims of the new curriculum felt “un-realistic and even funny”, as she clearly saw that this level of change does not happen overnight. At the same time as the forcefulness of the curriculum were welcomed, the top-down direction of these changes were criticized in the sense that it was felt that the available resources do not support the changes. Teachers C fets that “up there” they did not really know what was happening on the school level and that they did not have a realistic understanding of what the changes on a practical, realistic level truly take.

Teacher A’s comment tells that all though in principal the new curriculum is full of positive things, on a practical level, the change is still in its early stages: “It is lovely. I eagerly look forward to the day we can realize the subjects based on the new curriculum (Teacher A).”
we can realize the subjects based on the new curriculum”. Teacher C saw it as a big structural change that demands a lot from the school system, teachers and also students.

5.4. Changes in planning work

The major change the new curriculum will bring is just starting and yet already the interviewed schools had taken big leaps with the phenomenon week. The new curriculum brought changes into the independent planning of teacher work because it increased teachers planning together with other teachers. It had already changed how the work was planned amongst teachers. Co-design had been done before, but not to this extent. The new curriculum forced to clear and dedicate time to co-design. Teacher A, B and F say that previously there has been the will to do more co-design, but taking it into practice was easily crushed by other everyday busyness.

Different opinions appear on what the new curriculum has done to the sense of freedom of the teacher. Teacher B felt that the amount of freedom had grown, as there was permission to renew oneself. This was seen as “nice and fun”, nevertheless bringing extra challenges too. Then again teacher D saw there is now too much freedom. And teacher A saw there is less freedom: “The new curriculum encourages teachers to support the students individual learning processes, but at the same time teachers should do more together, all though they are different too. That is an interesting combo. Before it was the other way around. The teacher has been able to do an individual solution, but the class has been the crowd to whom matters have been taught in the same manner. „The students are now the individuals who should be given the freedom to do in their own way”. Teacher C says: “With the new curriculum the teachers position changes more towards a supervisor, but the authority position should still be there. It doesn’t exclude that. This is something that has been critiqued in the press and wondered about: so what does the teacher teach then if he/she just supervises?”

Teacher D said that the amount of unnecessary meeting where “matters are just presented to us” had increased. The outcome of the meetings had not resulted in enough concrete results and therefore he saw that the new curriculum had “kind of yes, kind of not” changed the way teachers plan their work. At the time of the interview, there were very little concrete things coming out of co-design, regarding the lessons. The planning work amongst teachers had meant more general discussions. Teachers in also other schools shared this opinion that it had brought changes, to a certain extent. Teacher E pointed out that there were big differences between teachers. Some teachers do things because they must, because all teachers are encouraged to have at least one collaboration with another teacher. However, teacher E was also the only one to mention that the new curriculum had truly changed teaching on the student level: “Now that there is more of the new cur-
The new curriculum has also brought changes in staff. School 1 appointed a new role, a “pedagogical director”, at the start of the new curriculum. Her task has been to find out and present matters from the new curriculum for the weekly teacher meetings. At the time of the interview, the phenomenon project was on the agenda of the teacher meetings. Most of the teachers mentioned that the new core curriculum brought more work in general and more stress to their work and teacher D also calculated the actual hours. According to him, it had brought an average of 1-2h hours longer days than normal. While the amount of work load increased, this is how teacher F describes the competition between tight resources amongst tired teachers: “But it is so hectic now somehow and the group sizes are insane. And that brings a sort of crazy competition. Like how come the technical teacher gets to say he can take only 16 students and I have these 30. Like these sort of comments, which are completely unnecessary. And that... everybody knows that it is completely unnecessary but still it can’t be helped. People are people, so what can you do.” She seems to describe the Tragedy of Commons archetype where teachers that have tight resources start to unintendedly go against each other and abuse the common goal. You could almost interpret this comment as “systems are systems”.

Teachers generally didn’t bring out specific changes the new curriculum would have brought to their subject curriculum, but teacher F mentions that the elective study package had changed, at least in the municipality where teacher F works at. There will be more opportunities for young people to choose. The elective studies have more opportunities to support phenomenon-based learning. Teacher D felt that there was content missing from the new curriculum. Before the curriculum had been a support and a safety net in planning subject teaching, especially in the beginning phase of his teacher career when he had less experience. My questions were mostly related to phenomenon-based learning and co-design, so it is no surprise that subject teaching was lightly discussed.

All though the new curriculum encourages sharing responsibility with students, teacher A thought she had already previously done this and the new curriculum just strengthened her way of teaching. “I don’t feel I have had to change that much”. She had also encouraged students from a young age to teach one another. “It’s rather remarkable how kids survive and learn when they teach each other. That’s the best way of learning, when you repeat it to someone”. Teacher D had previously done a project where student-based learning was at the core of planning and he experienced it similarly as teacher A: “It’s the best when you get them to do and figure something out. And also, when they can teach each other.”

Teacher C said that the curriculum had not concretely changed anything in her everyday life, yet, except the two-week phenomenon period experiment. But the phenomenon project had been very differ-
ent to what was done before and appeared in the amount of increased collaborative work between subject teachers. Collaborations had also been done before between subject teachers so “this isn’t completely new”, said teacher F. Teacher E explains that there is in fact, a lot of things that have been in the old curriculum, for instance transversal learning. She pointed out that frontal teaching had not been encouraged in the previous curriculum either, all though this might be the image you got from press for instance. She found that the conversation of the new curriculum was often side-tracked and deluded. She elaborates that even in the education department of the city and also the media, it seems to have been forgotten what the old curriculum was like.

The new core curriculum is seen ambiguous, but whether or not this is considered a challenge, varies. Both the new and the old curriculum gives free hands to interpretation, thought teacher F. She mentioned that of course it is good to renew the curriculum in certain periods to keep up-to-date, but in the end, it is the teacher who makes the change. “I will continue to do as I see best. I haven’t followed the curriculum that precisely previously either. I can justify all the choices I have made, but it (the new curriculum) is so vague.” She also doubted that all the teachers have even read the new curriculum. Teacher E saw it in fact completely normal and essential to interpret the curriculums and focus more. “There is a lot of knowledge that could be left out also in the previous curriculum because it wasn’t essential and at the core of building the world view of the student.” Then again teacher A hopes for some focus on the national core curriculum level. She hopes that maybe the next curriculum will be somehow crystallized with only the essential things. “Well, already the broadness tells you that, oh my god, this new curriculum is unreal, hundreds of pages. Could it have been somehow compressed and thought through more?”

You could tell from the students reactions the changes to the previous curriculum. The teachers experiences match the Success to Successful archetype. A part of the students had already gotten used to the “traditional” way of teaching and the new approach felt challenging to them, according to teacher C. The 7-graders adapted to the change more easily as they were not yet so accustomed to subject devided teaching. Teacher C says that teachers in her school have been amazed about how natural the new ideas are to the 7-graders. She feels that generally the curriculum seemed to work well with the talented and interested students, but the weaker students might see a possibility to do nothing or something else in class. The new curriculum demands a lot from students too and demands a skill to work independently. “The new curriculum doesn’t take in account different students. It assumes that all students are basic, happy, healthy, handling things or doing even better type of young people.” Teacher A also thought that phenomenon-based learning is harder for students who are used to studying separate parts with the teacher’s lead.

The amount of new was experienced differently than with previous curriculums. Many curriculums had been such that in practice
teachers were able to continue what they had done for years. On paper they looked different, in reality they weren’t. Teacher A sees that this curriculum is different.

5.5. Experiences in co-designing phenomenon-based learning

All the teachers interviewed had previous experience in co-design with teachers. Some had less experience and some say they had always done it to some extent. But the teachers’ ideas and criteria on phenomenon-based learning were still ambiguous. A conversation with teacher F showed that concepts of transversal competence and phenomena-based learning are fused together. She said that the criteria of phenomenon-based learning is unclear and that its crystallization is hard.

In each school, they had a trial period where they experimented with phenomenon-based learning. The trial period lasted from one to two weeks. Schools 1 and 3 had the period as one intensive period with all days in one go. School 2 had the one week phenomenon-based learning period spread out as a five-week period, having one day a week of phenomenon-based learning. All three schools used the “co-design time” for planning phenomenon-based teaching periods together.

First, I will go through each school’s implementation on co-designing phenomenon-based learning periods, in more detail. Second, I will go through the interview findings in themes that emerged from the data: missing student and expert engagement, the balancing act of teacher collaboration, the concern of missing time, the relation between motivation and workload, wide phenomenon themes and shallow learning, the outcome of teachers’ changing roles and work habits and co-design needs. All of these themes of course relate to each other in the everyday life of teachers. Despite the fact my questions were only about planning teaching work, I will also describe connections between teachers and students as this came forth strongly in the interviews. It appeared that the way teachers planned their lessons was so tightly connected to the students feedback and learning results, that it was almost impossible to separate planning and interacting with students. I felt I would have narrowed down the boundaries of the system too narrow and would have ended up solving a less significant problem, if the teaching event descriptions would have been left out. Student participation in the theme ideation is also one important criteria for phenomenon-based learning which makes it even more crucial to describe what happens in the classroom too.

School no 1 — I interviewed teachers A, B, C and D from this school. Planning these teaching periods started in the previous term, about half a year before in October 2015 and the teaching period was two weeks in February 2016. Two of the teachers estimate that they used 10 hours of co-design time to plan the phenomenon-based learning period.
In this school, they divided 10 seven grade teachers into three groups for ideating and implementing a more focused theme under the bigger theme “Finland 100 years” which had been given to them by the school’s board. Before their first ideation meeting all the teachers were given a pre-assignment related to the “Finland 100 years” theme. All the theme ideas were first listed and clustered. The themes that emerged were nature, society and people. The teachers could then choose the groups/clusters that interested them the most. Practical subjects, such as hand crafts, home economics and physical education seem to gather in the same group. Another group was technical crafts, history, mathematics and biology. The teachers’ own interests clearly drove them to form one group. According to teacher A, one teacher in this group had a ready idea of pre-made material she had already considered, which made it easy for some teachers to come along into her team. Examples of themes that came up were “Around the World”, “Applying for a Job” and “Historical Aliases”.

Students were then divided into the smaller groups by the teachers. Teachers were also divided into even smaller groups, which meant that they taught in pairs, and in some cases by themselves. The phenomenon-based period was carried out simultaneously in the whole school. Eight grade teachers did the planning somewhat similarly. They were given planning time on the first day of planning the new curriculum which resulted into two concrete phenomenon-projects between different teachers. Planning and ideation was first tried in a bigger 10 teacher group, but it was found impossible with all the teachers having different interests and ideas. They also ended up dividing the teachers into four smaller groups as did the 7-grade teachers. Each group then had two teachers in charge.

Teacher C described that in her group each teacher first thought through what they could tell about the subject. Also, each teacher’s contacts that could be made use of, were discussed. After that, they divided specific tasks of “who would call who”. The roles came quite naturally to this group, so there was enough to do for everyone. This group also did the supervising together and helped each other whenever needed. Teacher C realized it was lucky their group dynamics worked automatically from the beginning. “It went very naturally. There was me with the biologist background, the history teacher, the technical crafts teacher, the worldview teacher. So, it was divided very naturally”. Other teachers in this school said the same, that roles were found naturally and organically, all though different rhythms of working caused challenges. For instance, teacher D’s group divided tasks in a manner where two teachers created the facilities for the period, and the rest of the teachers focused on creating content. Teacher D estimates they had eight preparing meetings all together for the two-week teaching period: three planning meetings, one presentation event for the students, one event for students choosing the groups, one event for dividing students into groups, one meeting for teachers planning what grants to apply for the expert visits.
During the teaching period, the students circulated also in other groups, but had one main group where they spent most of their time in. The main group was chosen by the teachers for them, but the two other groups students could choose themselves. Teacher A found planning the schedule, with the students circulating in different sub-themes and co-ordinating lunch times, challenging for the teachers. During the teaching period, the teachers scheduled a meeting with their smaller groups at the beginning and end of each. In practice, this meeting was held only a few times, due to schedule issues. Teacher D described: “This is a terribly logistical event also and how do you organise the teaching spaces, what kind of equipment is reserved and and and then also the content (laughs) added to that”. At the end of the two-week period, each grade presented their findings to each other at an event that wrapped up the learnings of the phenomenon-based period.

During the first trial, the teachers didn’t take any ideas or models ready-made from other schools in how to plan a phenomenon-based learning period. The idea was to figure out what would suite their school best by trying themselves in practice. This school is now planning its second phenomenon-period but next time the teaching period will be a shorter one-week period. This time, not all teachers will be planning, but a smaller group of teachers. The next theme will be equality. Teacher C said that a consultant organisation and expert in equality will be part of the planning, so not all planning must be done by the teachers. The consultant company was found and contacted through teacher C’s personal contacts.

School no 2 — I interviewed teacher E from this school. She was also the vice-headmaster of the school, so her teaching hours were slightly less than normally teachers would have and she used time also on administrative work. As she was the vice-headmaster she had a good overall understanding on how the teachers had adopted the new curriculum and phenomenon-based learning and could describe the general atmosphere in the school.

This school started to test phenomenon-based learning around 2014 when phenomenon-based learning had been raised in the general discussion. Phenomenon-based learning was discussed and familiarised within the school. Teachers were encouraged to test phenomenon-based learning, but it wasn’t obligatory. Some started trying phenomenon-based learning more eagerly and some left themselves out at that stage. During the next year, the aim was that all teachers try at least one phenomenon. Some did more traditional co-teaching and some took it already a step further. In 2016, phenomena became obligatory and during the interview the school was in the middle of a five-week phenomenon-based period of 30 teaching hours altogether. It was then recommended that all teachers do collaboration with other subjects all though it doesn’t have to fulfil all the criteria of phenomenon-based learning.

The planning of the whole school phenomenon period was during the “co-design time”, but each teacher’s separate phenom-
The whole school’s first phenomenon-based learning period, similarly to school no 1, was done as their own piloting. Models and ideas weren’t taken from outside, except from some evaluation models and tables. The planning team included all together around 10-20 teachers. During the “co-design time”, teachers were divided into different planning groups, such as “phenomena”, “design” (one of the schools focus areas), “future”, “evaluation”, “participation” and “physical education”. The “phenomena” team is responsible for the overall development of the phenomenon period, such as evaluation of teacher work. The planning started in spring 2016 and the period was during fall 2016.

The school utilised the “explorative learning” method where they opened the process to students through the different phases of “explorative learning”: hypothesis, research questions, searching for information, conclusions and searching for deeper knowledge. During the process, the progress to different phases were repeated and reminded to the students. For instance, what are the advanced and basic skills in creating a research problem or searching for information, were explained to students.

For several years, teacher E had also done a project around energy with her societal learning subject and the physics teacher. Recently also the mathematics teacher had joined in. This had proven to be an extremely good theme and collaboration. On the second year, the teachers had only used around 40 min of face-to-face planning time. All other planning was done by shared documents and digital tools, so that the project progressed all though the teachers weren’t able to schedule time together. The theme had also guaranteed that the subjects were naturally very intertwined and gently forced teachers to collaborate. On top of this, each of the teachers had own motivations in bringing their own workloads to the project were extremely important in making this phenomenon a success.

School no 3 — I interviewed teacher F from this school. In this school all the grades were mixed together during the phenomenon week, which meant that students might have not known their peers attending the phenomenon lesson. However, to ensure the students always had someone to talk to, they divided them into new groups in pairs with someone from their own grade class. The students had three 90 minute lessons during a phenomenon day and the teachers had planned learning paths from each lesson to another. Teachers taught their subject by themselves and always to a new group. The phenomenon-period’s theme was “food”. In practice, the teachers didn’t manage to build a continuum from one class to another, and the first three days were spent on students getting to know each other, rather than diving into the theme. The teacher describes the period as “a nice social experiment”, but she is not sure the students even remember what the theme was. The school’s board gave the subject “food” to the teachers on the first
year and had pre-planned quite a lot to save the teachers time. However, the teachers now think they could be burdened a bit more and their opinions could be asked in planning phenomena.

The planning was done in one big group of teachers, where it was challenging to get to one conclusion and more time would have been needed for this. Teachers did not know what they were doing during the teaching period, which teacher F saw a result the lack of planning time. A part of the “co-design time” was used for planning the phenomenon-based teaching. In 2017, three hours of co-design time were scheduled for planning the next phenomenon period. On top of the three co-design hours, teachers meet closer to the event and go through a checklist making sure everything is taken care of. Teacher F considers three hours of planning to be a lot to invest in one project.

The next phenomenon period done in 2017 won’t be implemented mixing the students together, but dividing them in 7th graders and 8-9 graders. However, students will be mixed together in these two groups. The theme will be “Finland 100 years” as school number 1 had on their first phenomenon trial. The bigger theme is divided into groups such as “before and now” and “future visions”. This time the teachers could choose what grade they would like to teach. The first thing the teachers decided this time was that students will not go from one teacher to another, but instead one teacher would have the same students for the first three days. The last days of the week are used for sharing between different groups and learning from each other to understand the whole. This enables to go deeper in the subject, but there will be slightly less teacher collaboration.

Teacher F had also previously done several projects between different subjects, from her own interest. The teachers have had a manual and now an electronic chart where they share their teaching plans to other teachers, encouraging collaborations throughout the year between different subjects, if there appears natural links in content. Not many collaborations however are initiated through the chart, but most of the collaborations start at coffee tables through casual conversations between teachers.

5.5.1. Engaging students and experts is missing

School 2 engaged the students in all the stages of the phenomenon-based learning period, from planning to evaluation. Teacher E had critique, too, towards engaging students. She had expected more learning results from student engagement, especially among the less engaged students, but there had not been a big improvement. However, she says “we need to be hopeful”, because over the years, she has seen that, those phenomenon projects which are planned by students themselves, have been the most rewarding ones, compared to those planned by teachers. She also realized that phenomenon-based learning is still being trialled in their school and there is room for development. One suggestion of

There is a common misconception among people, who aren’t actively working with young people in schools, that engaging students automatically would have a positive effect to learning motivation (Teacher E).
hers would be to link grades to the phenomenon period as a reward of the students’ work. With students this age, this might act more as a motivational driver than ideating the theme. Teacher E saw that, the inner motivation is missing from students aged 13-16, and to get them motivated, it must be clearly indicated how their work effects and what. She adds that there is a common misconception among people, who aren’t actively working with young people in schools, that engaging students automatically would have a positive effect to learning motivation. However, this often might not be the case. The students might also feel she/he has failed. Teacher E describes that when students see other possible theme options, they might afterwards be bothered that they weren’t able to choose a fun theme.

In schools 1 and 3, students weren’t engaged in the theme’s ideation phase, all though the importance of engaging students in phenomenon-based learning was acknowledged, at least on the level that the teachers knew the curriculum clearly said that this should be done. There was a fair amount of doubt whether student engagement in ideation would truly work and could be seen in the learning results. Teacher E was hesitant that all students would have an interest and motivation of their own which could also be studied as a phenomenon by all the students and link to the school’s curriculum. Teacher A reckoned that if they would develop more student engagement in the ideation phase, it would have an impact on the student’s motivation to study. Teachers A and F also talked about boundaries. They thought that it is important to put some boundaries from within the students can make choices as complete freedom usually didn’t not work.

The positive side of brainstorming with the students, according to teacher E, was that both the students and teachers “got in to the mood of the phenomenon and into a state of seeing possibilities”. After the students had brainstormed, they then voted for the most popular ones that were topics such as “sports”, “food”, “science & technology”, “popular culture” and “mysteries and mysterious phenomena”. They then picked their groups based on their interests. Many of the students “happened” to pick the same interest as their best friend, all though they claimed it was a coincidence. When the students had picked their topic and group, they start to form research questions and a more exact research plan within their chosen theme. School 3 also tried to ideate with the students, but the teachers then concluded that the topics were too difficult to take forward, such as “horses”, which was a specific interest of only a few.

All though students weren’t engaged in the ideation phase in schools 1 and 3, these schools still gave the students certain choices at different stages of the project. In school 1 they let the students choose two groups they would attend along with their main group given by the teacher. In school 1 they let students choose from subject options creating the frame students could then fill in with their ideas and content. The subject options were also created so that they could support different students’ strengths, so that they could choose the area they felt best at and most comfortable in. But teacher F even described
their trial period in phenomenon-learning so that “students just did as they were told”.

It was well acknowledged, that this is an area of improvement. But why weren’t the students engaged? I did not ask this separately from the teachers, but teachers intuitively started talking about this. Both students’ perspectives and the teachers’ perspectives could be seen in their reflections. The students’ perspective argued that giving too much freedom is difficult for students, critically analysing whether engaging students was as useful as thought. Teacher A acknowledges the room for improvement and describes that if the subject chosen by the teacher does not interest the student, the interest is hard to “just dig out”. At the same time, she says the students can’t think of phenomenon-subjects if they can do anything. The teachers’ perspective argues the lack of time, supervising, methods and confining the subject. Teacher A talks about the stressful experience of the first phenomenon-based learning period and collaboration. She felt that on top of other challenges engaging the students would have taken too much time and at the stage they were at, would have simply meant that the project wouldn’t have become ready. Also, the documentation would have not been done, if the students would have been given free hands. She saw that even letting the students partly pick the groups they attended seemed challenging to many teachers and said some teachers find it hard to let students make decisions.

Teacher C also thinks about the question of how to engage all the students. Teacher F elaborated that students’ worlds are still quite limited at upper-secondary school and that their imagination should be evoked. It might be difficult for them to come up with subjects outside their own living environment and it is unfair to expect them to do so without guidance. Teachers need tools and methods with which ideation can be done, so that the idea is taken further than “the first idea that comes to mind”. Teacher F didn’t believe that the phenomenon’s subject would be limited enough if it came only from the students. Teachers need to learn new methods and receive education on how to engage the students in the planning phase. She mentioned for instance WWF’s material on engaging young people and also methods from The Finnish Forest Association, that I interpret to be the design oriented approach covered in chapter 1. The methods she described resembled co-design tools with photos and material to first evoke imagination and then narrow down interests. Narrowing down the research question with students also helps students understand the process of phenomenon-based learning better. Teacher E says that she noticed very different levels of student engagement during the phenomenon period and also talked about the need of guidance during the engaging process. Some student groups were left entirely without guidance in narrowing down the ideas, which showed in the learning results. She also said not all student-based learning is good and that sometimes the teacher’s inspiration is needed. Students often might be more motivated if a teacher can describe and open a new subject in

It might be difficult for students to come up with subjects outside their own living environment and it is unfair to expect them to do so without guidance. Teachers need tools and methods with which ideation can be done, so that the idea is taken further than “the first idea that comes to mind” (Teacher C).
“There is a lot of commonalities in co-design than there is in learning together. Co-design is collaboration where each member’s best competences come to use.” (Teacher A.)

In phenomenon-based learning the responsibility of livening and deepening their learning experience falls on the student, which they might not have the capabilities to do yet.

Outside experts weren’t engaged much in the planning phase, but in all the schools they did visits to outside venues, events and exhibitions where there was a chance to interact and ask questions on the topic. In school 3, they let students plan and do the expert contacting entirely by themselves. All the schools had worked with outside experts before. During the next phenomena periods two of the schools will engage outside experts also in the planning phase, once the phenomena-based learning has become more familiar to the teachers and students after the first round. Teacher E felt that students contacting and burdening outside professionals can be a challenge in the long-run without fees that can be paid for their participation.

5.5.2. Teacher collaboration is a balancing act

In the vast amount of Finnish teachers, you would expect of course, to find a diversity of personalities, ways of working, age groups and levels of motivations. This came apparent in the interviews and conversations with only six teachers. The different teachers and the different norms and necessities of a certain subject gave color and were the essence of teacher collaborations. Teacher A describes the nature of collaboration as follows: “There is a lot of commonalities in co-design than there is in learning together. Co-design is collaboration where each member’s best competences come to use. Someone can do one thing and the other another. How can we work together so that each one’s best competences are used?” In the best case, this win-win situation is how collaboration should be. Everybody being able to bring their best competences to use and complement each other to gain more than you could if you worked alone. Teacher B also said the same: “In co-design, you should try to get everybody onboard, so that everybody gets excited or at least finds some section they can work on”

Teacher A described collaboration as a balancing act between planning, focusing and reacting. This balancing and sensitivity to also react to what others said, not to mention having the patience to do so, was seen important among other teachers’ comments too. For quick tempoed personalities, such as teacher C, who liked to get things done, this slow nature of collaborations, where also others need to be heard and understood, felt challenging. Teacher C described the colourful and authorative nature of teachers: “Teachers are known to be quite colourful personalities and like... these sort of, rulers of their own classrooms. And I recognise that in me too, that I am not a very good team worker. That I want to do things my way and if I have an idea, I think it is the best idea. And then I get frustrated if in the fact, that if I would do this myself, this would be done in a much shorter time”. Teacher A also mentioned this frustration when having to work in other ways than are
natural to yourself. Teacher B said that collaborating needs a little bit of giving in from all teachers. A big group size was more challenging and took more work to open each individual's background of thoughts, thinks teacher E and other teachers are on similar lines.

Teacher A said that in collaboration you must proportion your thoughts related to other teachers' thoughts and in that sense, you are by force connected to the other plans and ways of working. Even if there are good experiences of co-design, the nature of it in schools so far was heavy, due to the structure of the surrounding school system. Teacher C says: “But honestly, it is much easier to do all things alone in school. That is for sure. At the moment you start doing something together with others... In addition to matching chemistries, you also need a kind of rhythm to match, and schedules. And you must find the time, that is a prerequisite absolutely.”

A characteristic for phenomenon-based co-design specifically was the balancing act between the individual and the whole, which sounds like the zoom function in systems thinking. Teacher A says it is hard to consider the whole when at the same time you must consider each individual in the collaboration process. The typicality of the whole-individual balancing act comes forth also in teacher D's comments, when he says that their group had the challenge of linking their phenomenon project to the rest of the school’s phenomenon-projects which where all under the same theme. While each teacher group concentrated on their own teams within a wide topic, the groups each went their separate ways without linking back together.

### 5.5.3. Concern over missing time equals a sticky start

One of the main challenges in collaborations was time. About half of all the collaborating challenges mentioned were related to the difficulty of scheduling within the school system or the lack of time. According to teacher A, different subjects, students and teachers need different amounts of scheduling and planning time. She for instance explained that in her subject, she would rather leave many things open to the last minute. During the teaching lessons she could easily adapt and change plans. Whereas, some other teachers and subjects may require much more planning ahead. Collaborations between these two teacher and subject types might be tricky. How to plan ahead and still remain flexible to adapt? This might be demanding to the students, too, as some students might find it difficult to cope with the unpredictability of the learning process of phenomena, said teacher A.

The lack of time appeared to be a constant burden in the teacher's everyday life. Adding new things to school life, brings on the worry of more work. Also, how the time was used in meetings for instance was a concern. When planning phenomenon-based learning together, there should be more time to discuss the aims and the best way for imple-
“So, well, when there are many people rushing around, everybody maybe pulls a bit to their own directions, and wants to get just their own way, but does it bring anything useful to the students. That is another thing and what they remember of it afterwards.”

(Teacher D.)

mentation, thought teacher D. Lack of time brings on the worry of other subject teachers taking your subject’s teaching hours, which sounds like the Tragedy of Commons archetype trap. The lack of common time could be seen as a common sources where each starts to understandably and unintendly abuse it, trying to get their own matters on the table and solved in common meetings rather than aiming the good of the whole.

Because teachers work within the school’s timetable, scheduling the collaborations is difficult. Teacher A found it was difficult to estimate the time needed for different phenomenon-based tasks and that therefore wasn’t enough time to implement them. Teacher F also described miss-judgements in time are related to how the tasks and groups were organised. They had spent more time on general instructions, and the group getting to know one-another, that there had not been enough time to share learnings between groups. Teacher E also mentioned that the lack of substitute teacher resources maked the timetables even more inflexible. She also adds, simirarily to teacher D, that another viewpoint can be that collaborations take away other teachers’ teaching hours. “And of course it’s annoying. I mean, I myself wouldn't like that for instance a basketball game would be organised on top of my teaching hours. And when there is a lot of these kind of special events, it eats the amount of basic education hours and without a doubt disturbs many teachers.”

The consequences of the lack of time can be that it drives teachers to be more efficient for their own good where even the students might be forgotten. Teacher D describes the situation: “So, well, when there are many people rushing around, everybody maybe pulls a bit to their own directions, and wants to get just their own way, but does it bring anything useful to the students. That is another thing and what they remember of it afterwards.” Another consequence is that when the teachers planning time is short, the teaching and supervising becomes confusing, as teacher F describes happened during their first phenomenon-based teaching trial period in school 3.

Getting started was the biggest problem area, where all the challenges somehow culminated. Especially, if the school hadn’t pre-scheduled time and individual teachers wanted to start trialling phenomenon-based teaching with other teachers, getting started could be very tricky and was usually stopped by not finding a common time between teachers, experienced by teachers A, B and F. Teacher F commented that planning time needs to be the right type of time in the sense, that everybody has the time to sit down and concentrate and not have to run off to the next thing in a few minutes. Teachers could have very different schedules and different days, teacher A emphasizes.

Current challenges in phenomenon-based learning, based on teacher F’s experiences, was that the first implementers don’t know where to take ideas and models from and how to do it in practice, which leads to using time on unnecessary things. For instance in their case students spent too much time getting to know each other in mixed groups. Teacher E agrees on this point and said that getting started is most challenging.
for teachers. Coming up and finding new ideas for phenomenon-based learning was still difficult for teachers. Many of their school’s troubles where to do with getting started with students. Teacher A saw that although there might be existing phenomenon models from other schools, the difficult question is how to find a way to apply it to your own school.

Teachers B, C and D from school 1 all commented that it is unclear where the planning time for collaborative teacher work should be taken from and how it is “handled in working hours”. They found that too much of the planning was done on their free-time. And indeed, teacher D did calculate that his working days increased by 1-2 hours per day after the new curriculum planning started. Teacher A brought up that she is worried that unless there is enough time allocated for collaborative planning, it will be run over by other urgent matters in everyday school life. “I am a bit scared that this collaborative planning will stay on a level such as oh, it will sort itself out somewhere besides everything else”. Teacher E from school 2 described that most teachers tend to think of planning phenomenon-based learning as something extra rather than a part of normal planning of work. In her opinion, collaborative planning should not be taken from the “co-design time”, because this should be used for other developmental planning, but instead shared tools for remote working between teachers should be made use of. Teacher F again found that even though they were given time in their school to plan together during the “co-design time”, it somehow always slipped into doing something else. Which brings us to another problem area: the planning and content of meetings. Based on teacher D’s description, the teachers don’t prepare for the “co-design time”: “If the planning is on “co-design time”, it somehow always dropped into doing something else. Which brings us to another problem area: the planning and content of meetings. Based on teacher D’s description, the teachers don’t prepare for the “co-design time”: “If the planning is on “co-design time”, it somehow always slipped into doing something else.”

Teachers A, D and F mentioned meeting planning and content as inefficient and wasteful both in the schools own planning meetings and in outside planning meetings or training events for teachers. Teacher A described the contrast of what is expected from the students and how the teachers’ working culture is like: “So we use quite a lot of time to cover matters we could have read, ourselves. So, we sit there and listen. So that is quite crazy, because we are trying to get the kids moving and out of classrooms and then our own meetings are such that we sit there and listen”. Teachers D and F also described the meetings and trainings outside the school were usually more about lecturing on general issues and sitting rather than discussion and going deeper into concrete, specific questions. Teacher D said that the increasing number of meetings had decreased the effectiveness of his work and that meetings, how they were currently organised, take a lot of energy. He also underlined the need for more concrete lesson planning together face-to-face rather than going through matters on a general level.

All these problems already mentioned, do not make it easy to start collaborating. Teachers D, E and F from different schools men-
tioned the start as one core problem. Teachers E said that the first steps with collaborative work in phenomenon-based learning were difficult and unclear to teachers. Also, shallow collaborations may have been the result of not knowing what should be done.

Everybody knew how their own subject should be taught, but collaborative work doesn’t necessarily have clear instructions. It takes time, effort, contacting people, being flexible and organising things, which teachers were not necessarily willing to give. And even when there might be initiatives towards collaborations, teachers who are used to planning alone, might give up when they face the first challenges: “When teachers are used to planning alone, that easily leads to a thinking that “I never find can find that crafts teacher, so I can’t do this” -type of thinking”, said Teacher E. Teacher F had previously done more collaborations, but in the recent years less, because she knew it was quite hard in the school environment. Listening to these types of comments leads me to think that collaborations might be initiated often either by force or by teachers who have less experience and who haven’t yet been discouraged by the school system. “But seriously, in schools it is much easier to do everything by yourself, that is for sure.” She also says that doing things the easiest way, printing out ready-made test forms and so on, is of course one way to avoid any extra work, but nobody imagines that that is the deepest way to learn.

In addition to not finding a shared time slot between teachers, another challenge according to teacher F is that collaborations doesn’t start by just sitting down and systemically planning it. There is a risk of it being forced, which usually leads to shallow collaborations, if the teachers are not genuinely interested in each other’s subjects. Unformal places and situations, such as around the coffee tables, were the usual place where successful teacher collaborations started to form and these could be also places to develop the culture of teacher collaboration.

Teacher F reflected that what could be even more important than schedules, is one’s own motivation to get collaborations started: “Hmm, I think it’s easier, well. It’s like, it’s true there’s always that time question. So, if we start to search for a common time slot. We have in our timetables in a way that common time slot, but that somehow never happens. But per se, I wouldn’t see that... I mean, that it’s more a question of organising. But if it’s a question of organising, that never happens, then... is it then a question of motivation?”. She also adds that finding a common excitement and motivation at the same moment rarely happens. Both teacher B and teacher F praise their schools’ enthusiastic atmosphere and say that in that sense, it has been easy to find a common excitement and motivation. But teacher B thinks that some schools that aren’t so fortunate might have it very difficult, because some kind of common excitement and motivation is needed in collaborative work.

“When teachers are used to planning alone, that easily leads to a thinking that “I never find can find that crafts teacher, so I can’t do this” -type of thinking (Teacher E).”

“But if it’s a question of organising, that never happens, then... is it then a question of motivation? (Teacher F).”
5.5.4. Relation of workload and motivation

Another example of problematic collaborative work was a situation that teacher E described. It was common that teachers wanted to join in collaborative work without taking planning responsibility. “...and say that I will join in, which means that what do I have to do, where...and demands others’ guidance and in the worst case only asks what time do I need to come and where. Then the planning burden is divided unevenly”. Without being proactive and bringing their own expertise, the teacher ended up being a burden to others and in the worst case, demanding guidance from others. In school 1, the teachers’ roles seemed to divide themselves quite organically and evenly, but there was some mention also of free-riders either due to their subjects colliding schedules with the collaborative work or just generally that not all teachers were that responsible they could be trusted. The free-riders were mentioned when analysing collaborations that were done on the whole school level, in the cases where collaborations were forced. Teacher D also mentioned that different types of evaluations could divide the work load unevenly. For instance, if there was a subject that didn’t require numbers in evaluation and a subject that did require number evaluation. In this case the teacher working with the numbers, teacher D, ended up going through the student material in a heavier manor. Then again, he didn’t mind it, because at the same time, he got valuable feedback from the students’ material on how the period had worked.

Teacher F said that in their school’s phenomenon-trial, clear roles for teachers were missing, and then again, many things were already decided by the school’s board and brought to the teachers too “ready”. Also, when teachers have planned things in a bigger group, it has missed a clear leader role, which is required, teacher F thinks. Otherwise everybody just does something and then notice “oops, we forgot to do this and this”.

All the teachers say that what ultimately motivates them in their work and what makes them proud is when they have managed to influence the students’ learning or to give something useful to them in life. That is why they have entered this profession to begin with. However at least two teachers said they have started to question their choice of becoming a teacher. A third teacher, teacher F also said something similar about teachers in general: “I myself still believe that teachers have per se we have all entered this job because this is important and we believe that... There is the hope for the future, that is also in the new curriculum. We like truly sta... quite clearly even... at least at some point in our lives have thought, that it is what we, it’s the most important task. And then at some stage, the everyday life has confronted us and then we have realized that the most important task is in fact to keep the head above surface, somehow teach all these things that we need to do. But it is still there somewhere deep down. That is what says that teachers per se want to be the good guys, I am sure of that, they want...
to be there doing the good things. But then, we are not like entirely... If we get all other kinds of demands. That is when it feels like it weighs so much. That how do I handle this, how can I ever make it."

Each teacher mentioned that the school’s phenomenon-based learning periods weren’t as impactful on students learning as hoped or that it was just average, and there was a lot of room for improvements. Especially teacher D mentioned its link to how it effects the teacher’s motivation and feeling of accomplishment. He said that also in a normal class, it could be frustrating, when your teachings did not show in the learning results, but especially in phenomenon-based projects, where there was a lot of energy and time put in collaborative work, teachers ‘expectations also grew. If these bigger projects result in the students not getting anything out of them, this could be considered as a failure for the teacher, teacher D thought. Because ultimately the teaching work was being done on the student’s terms, and for them. The fact that extra working hours did not show in salary nor the students learning, compared to “normal work”, made collaborative work less appealing. Teacher C talked about students not necessarily always appreciating and understanding the workload that goes into collaborative planning such as the phenomenon-based trial period. Students’ comprehension is completely understandable and could not even be expected from them, teacher C added. But of course, for a teacher, it can nevertheless be unmotivating if you have put in hours of work and the result is that some students say something like ”blaah, why can’t we just have normal class? Why do we need to go to a museum?”. Here you could see a clear causal loop where students’ motivation effect the teacher’s motivation and hours put into planning, which again effects student motivation.

5.5.5. Wide phenomenon themes result in shallow learning

The phenomenon theme as a source of challenges was almost unanimous. Teachers A, B, D, E and F all talked about the challenges of the phenomenon theme. Four of the teachers discussed the problems of a too wide phenomenon theme. Teacher A said that the theme, Finland 100 years, was too wide and got spread out too much to still be one theme the whole school looks at. The students did look at the theme from several different perspectives, but overall it had stayed on a shallow level. When working on another theme, called “Around the World”, teacher A noticed that already the name of the theme put pressure to handle more content than would have been wise in a short time, which also lead to shallow learnings. She found that the wide theme lead to a type of working that was not characteristic to her subject. In schools 2, teacher E found that when the subject was too wide, the students had challenges to find something to do for the whole day. Teacher F said that in school 3 the theme was “ludicrously” wide. There were pitfalls in wide topics. Teacher F continued that it might be easily
thought that a wide theme enables that all the students could take part in it, but when the theme was not narrowed down, it was hard to bring all the different knowledge together at the end. “When the theme is too wide, you poke around in every direction”. Finding a theme that is narrow enough but allows everybody to find a suitable subject is a challenge in phenomenon-based learning. Time, narrowing down the theme and getting under the surface were typical challenges in phenomenon-based learning and a core bunch of problems according to teacher F. She saw, these result into the biggest problem for teachers, which is the shallowness of the phenomenon-week. At least during the first year the phenomenon-week’s content had stayed on the surface.

The students’ participation in the ideation of the theme was analysed earlier in this chapter, which is of course tightly linked to the topic of the phenomenon theme and content of teaching. Teacher E discussed the issue of themes picked by the students where they might contradict with the subject content of the core curriculum and the subject schedules. For instance, if the winter war is a content for the 9th graders, and students on the 7th grade pick this for a phenomenon subject, it causes confusion. She felt there would be a need for someone to examine all the subject content in the curriculum and suggest suitable subject areas and schedules for phenomenon themes considering how subject content and their schedules link to each other. Now, hardly anyone has a clear overall picture of this, says teacher E. This would help in cross-grades collaborations.

5.5.6. Matching subject expertise to the teachers changing role

All the teachers talked about their subject’s nuances and needs in teaching when it comes to collaboration and phenomenon-based teaching. Teacher F’s comment about each teacher’s expertise became clear to me in all the interviews I did: “Subject teachers are not experts in cross-disciplinary thinking, but their own thinking”. Subject teachers have built up their expertise and you could sense pride and ambition for their specific area of knowledge. “This is a matter of pride in our profession, maybe, I think. That I don’t want anybody to come and tell me how I should do this.” Teacher F continued with the reflection that not all subject teachers have the abilities for multi-disciplinarity. Therefore, it is no surprise that collaborating is hard, not only because the school system is not adaptive, but because teachers rightfully defend their subjects and expertise that is essential to it. Teacher E described a situation where it seems that when teachers are genuinely thinking about their subject’s important points from the student’s learning perspective, at the same time, to other teachers this could appear as inflexibility and a reluctance to collaborate. This is a good example of different perspectives on a system and could even be a characteristic for collaborations between subject teachers, who each represent their

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own thinking. Teacher F reflects on her expectations and describes her hope that subject teachers could genuinely bring new thinking through their subjects into phenomenon-based learning. Her fear was that the expertise of subject-teachers would get run-over by supposedly doing something rather than actually doing something. And that subject teachers would become too generalistic. She felt that on the upper-comprehensive level it is possible to go deeper into different subject areas with the help of subject experts.

In phenomenon-based learning one subject-teacher might also be in a situation where she/he must supervise and guide students working on a different subject than her/his own expertise. However, teacher E argued that it is possible to guide 14-year olds on what is a good research question or what are deep types of organising knowledge, even though you were not the expert the exact subject at hand. She felt there should be more willingness to do guide across disciplines, because student-lead phenomenon-based learning needs guidance from teachers. Some teachers still felt they weren’t qualified to give instructions to another subject’s student. Teacher D saw students needed guidance and help in focusing the theme, so that they could progress in finding information on the topic. Teacher F described the challenges she faced when she realised she only knows her students and their skills from her subject’s perspective. It was hard to guide the student to the right direction without knowing their capabilities in the subject at hand.

Schedules were mentioned, once more, for instance teacher F talked about crafts projects usually taking a longer period, which might be hard to fit to other subjects’ schedules. According to teacher B, different subject-schedules might affect how much responsibilities each teacher can take on and how committed they are. Also, the width of phenomena may vary in different subjects. In visual arts, it might be more fruitful to concentrate a narrow subject. Teacher E would like to develop phenomenon-based learning so that the subjects would be more binded to the content of the new curriculum. So that certain subjects could give a loose frame for the theme.

5.5.7. Changing working habits might cost content

In all these schools, phenomenon-based learning had been trialled only once or twice with the whole school, so it is understandable that it is still a learning process, for the teachers too. To develop their work, evaluating it would be important. According to the teachers and their knowledge on the school’s developments, evaluation had not been organised or done systematically. Teacher E described however that they organised a discussion event after the first day of the phenomenon-day and were organising another one after the whole period. But they had concentrated more on creating evaluation tools for the
students. Teachers C described the two-week trial to have been such an intensive experience and effort that their energy was rather low after the period and they didn’t do a proper evaluation amongst teachers.

Teacher E from school 2 mentioned the shallowness of the collaborations that exists in these first trials of the new curriculum content and that there was difficulty in finding meaningful teaching content together. In their school, each teacher should do at least one collaboration a year with one other subject. There are very different levels of doing this and she says that some teachers might do it very mechanically, not putting much effort into planning, which results into shallow links between different subjects. Teacher E also experienced that there were very different levels of remote working and the willingness to use shared documents and electronic tools of co-working.

Teacher D said that their superior aims flattened during phenomenon-based learning project and the challenges they met. He says that the phenomenon-based learning period was “a group work, but just marketed better”. Teacher D says working methods and outcomes ranged enormously even within a group of teachers teaching the same grade. Teacher E from school 2 says the exact same thing about students, that learning results had varied significantly between stronger and weaker students. Teacher D saw that the content was left lacking during the phenomenon-trial. It was left on the shoulders of students, too much so. He thinks that when the projects content is ambitious, it is difficult to challenge your own working methods and habits. In other words, changing your working habits may come at the cost of the content.

Teacher E talks about her expectations for phenomenon-based learning and that she was even partly surprised not to have seen more results. She expected to see more hidden talents and skills to emerge when the students get to influence the ways and subjects of teaching. In this sense, it is not surprising that she doesn’t believe that many teachers find collaborative work important and useful at this point. “It has a bit of a, maybe this forceful and unnatural twist to it, and well, that partly is related to the fact that this is new to us and we are trying and testing, so of course it comes with these just practical challenges and even a little, like, failures”. She thinks that phenomenon-based learning would open better through the teacher’s own subject at this beginning phase. It is also normal that there will be failures at this trialling phase.

Other challenges that related to phenomenon-based learning, were documentation, evaluation, communicating subject plans amongst teachers and spaces. Teachers A, D and E talked about evaluation as a problem area. A lot of challenges were related to the school system, atmosphere and environment in general that already burdened the teachers work. Also teacher A and F discussed that a teacher in the neighbouring class might have been talking about the same thing, but you have been unaware of this. Or how information on phenomenon-learning content doesn’t necessarily travel from one class to another.

“When the projects content is ambitious, it is difficult to challenge your own working methods and habits (Teacher D).”
“It (collaboration) has a bit of a, maybe this forceful and unnatural twist to it, and well, that partly is related to the fact that this is new to us and we are trying and testing, so of course it comes with these just practical challenges and even a little, like, failures (Teacher E).”

Summing up the results of phenomenon-based learning trials and looking back at the criteria of phenomenon-based learning and aims of the new curriculum, it seems the areas most lacking at the moment are student engagement in planning, a peaceful working atmosphere and deep learning results building transversal competence. These are areas that need development and support. The aim of the teacher interviews were also to look at values, beliefs and assumptions that shape the system. The core value that guides teachers behavior is students’ learning.

5.5.8. Needs in co-design

Listing all the needs that came up from teachers, you can quickly see from the demand list that there are contradictory ones, such as some feel it is important to be physically in the same place and then again some say there is a need for more use of digital tools. Digital tools make it possible for teachers to do planning work together but in separate places and times, as it is hard to find a common time and place between different teachers due to limiting school timetables.

The needs that emerged from collaborative planning in phenomenon-based teaching were:

The spirit of collaboration
- Collaboration demands some giving in from all the teachers involved
- Mutual trust is needed to smooth and quicken collaboration
- Collaboration needs a lot of mutual understanding and listening
- A common excitement should be found within the planning group
- There is a need to find a way of working that everybody in the group is comfortable with and that feels nice
- Collaboration needs a lot of giving in
- Collaboration needs a different kind of attitude than before
- Collaboration needs patience, conversation and letting ideas simmer
- There is a need of chemistry between teachers to achieve a successful collaboration

Starting
- In collaborative planning, there is a need to know the other person’s plan before yours
- Teachers needs to first familiarize with the teaching content of other subjects to successfully ideate with other teachers
• Starting collaboration needs a motivation to collaborate from a teacher

Where
• Collaborative planning needs teachers to be physically present in the same place at the same time
• Collaboration needs spatial places where planning material can be left and continued upon later
• There needs to for places and spaces where informal collaborations can start to form, such as coffee tables
• Collaboration would need more readiness from teachers to work remote with each other

How
• Trans-subject planning needs to be as concrete as possible from the point of view of teaching lessons
• Collaboration needs a system that allows working on matters together
• A need to concentrate more on doing than talking
• There is a need for sharing end results and working methods, to save time and overlapping work
• Starting collaboration needs ideas and models for some teachers
• There is a need for digital tools and shared documents
• There is a need for sharing good ideas, their utilisation and the forming of structures

Group size
• Smaller teacher planning groups (2-3 maximum) work best
• If the teacher team is bigger, there is a need to open each member’s thinking and aims more

Time
• Trans-subject planning needs the encouragement of prioritising and focusing time
• If the dynamic of the group is missing, there is a need for more planning meetings

Roles and tasks
• All the teachers should find some section to work on and get excited about
• All teachers should be able to commit to one task despite their own subject-specific challenges in schedules
• Projects that are spread out on a longer period, would need a person in charge
• There is a need for a supervisor/project leader also in collaborative projects
Students’ learning

- The student should be at the centre of planning and evaluation teacher collaborations
- There is a need for more collaboration ideas that would benefit the students

Perquisites

- The people “up there” should see and understand what teacher collaborations take in practice

A mix

- A fluent collaboration needs both a good phenomenon and collaborative, proactive teachers
- Developing the new, in other words, teacher collaboration needs time, effort, contacting, flexibility and organising
- Collaborations demand that chemistry, the rhythm of working and scheduling all fit together
- Compatibility, own interests and matching schedules are needed to start collaborating easily
Starting phenomenon-based learning
6. Starting phenomenon-based learning

Both in systems thinking and phenomenon-based learning, where you are looking at wholes, it seems characteristic to have to balance between a variety of challenges and needs. This is also how the new curriculum appears to teachers. But when looking for solutions, finding leverage points is important. You could say my solution is answering to the need for prioritization. Of course, this is already done in the school level curricula, but based on the interviews, there is still a feeling of too many demands, a missing focus and too little time.

Meadows (2008) describes the need for broadness and then again the importance of looking at what is essential to the system behaviour. “To ask whether elements, interconnections, or purposes are most important in a system is to ask an unsystematic question. All are essential. All interact. All have their roles. But the least obvious part of the system, its function or purpose, is often the most crucial determinant of the system behavior.” (Meadows, 2008, 17.) Thinking about wholes is necessary, but to come up with solutions on a practical level, there is a need to refine the most impactful elements of this particular system. So what purposes or in this case goals can be seen?

I see two subsystems under the same educational system, both with slightly different or inconsistent goals. On one hand, there is the top-down level of the educational system, the new curriculum and the Finnish Board of Education, aiming for ambitious learning results that match the surrounding world, but not taking practical steps towards it. Then there is the second system of schools and their teachers, who are just trying to survive their everyday life, on a practical level. The school system and teachers have gradually become cautious of change because of a feel of too heavy work load and new tasks that the change might bring. At some point the goals of the teachers have shifted more towards “just surviving” rather than impacting the future and learning of students. This resembles the Fixes that Fail archetype where both subsystems start to pull in their own directions with the result of no change and no-one reaching the overall goal. The solution to this was to back down and strive for common goals. To move change forward, both systems should be matched with common goals. Teachers should be able to focus on teaching and the Finnish Board of Education and especially the government (Ministry of Finance and Ministry of Education) should take in consideration also the practical level to achieve goals. Teachers are in the risk of shifting their goals to the actual standards, and some already have as they just try to keep their head above the water.

To get on the same page with goals and bridge the gap, there is a need for more understanding between all subsystems. On the speech level, everybody is on the same page already in fact. No teacher in these interviews disagreed that the content in the curriculum wouldn’t be relevant, positive or important, quite the opposite. Also in the curriculum there has been an aim of easing teachers work. At the end, both systems are actually striving for the same thing, but little resources
and the massive educational system have driven them a part, into a Tragedy of Commons trap and into their own bounded rationalities where the big picture is hard to see. Co-design methods and empathic design could be one way forward in aligning goals and gaining mutual understanding of the whole system. Both the top-down and the bottom-up systems are needed to achieve sustainable changes in the system. As teacher A says, “It isn’t so that teachers are just machines and can be put to act a certain way.”

But since my main aim was to ease the system from teachers’ perspective, my solution will focus on that. However, I feel the system boundary would have been too tight if the top-down system is not taken in consideration as it is an essential part of the core curriculum change which we are examining. This is why I will keep the top-down factors in my system maps, too. The aim in the end to is that changes on the teacher level could also have systemic effects and long-lasting changes also in the whole Finnish school system. As teachers’ practical perspectives have been missing from understanding the effects of the curriculum change, my work focuses on that perspective. The best outcome would be a solution that solves teachers’ problems and eases their work load while changing the system toward achieving the new curriculums goals. A “win-win-win”, in other words. In fact, when analyzing the answers of teachers and looking what feels as unnecessary and overloading to teachers, it is indeed everything that interferes with teaching and the students learning. And if the teachers feel that the goals are good in the curriculum, going for the curriculum’s goals should ease the teachers’ work load, in theory.

Looking at the teachers’ perspective and the interview answers, I see these problem areas as the main ones and ones that should be developed:

- Problems in getting phenomenon-based learning started
- Problems in narrowing down and finding a suitable theme.
- Feeling and concern of heavy workload
  This is caused by many things mentioned in the interviews: missing time, poor organising of meetings, the chaotic, uncertain feeling when trialing something new and not receiving enough impact or meaning from work. In fact, these same thing are mentioned of building the students wellbeing in a presentation on the new core curriculum in chapter 2. This should be applied also to the teacher level who are role models for children and a part of building the school culture.
- Feel of forced up-down change
  The change is initiated elsewhere and still feels forced, not coming from the teachers own experience. Especially the role of teacher changing more from lecturer to supervisor.
If you look at the results of phenomenon trials compared to the core curriculum objectives, these are areas of development:

- Engaging the students is missing
- Phenomenon projects are not impacting transversal learning
- Peaceful co-design atmosphere is missing

6.1. Leverage

Managing to narrow down the subject of the phenomenon linked to the teacher’s feeling of how well the phenomenon period succeeded. My conclusion is that the theme of the phenomenon, how broad it is or how well it has incorporated links between subjects, is a crucial part of setting the path towards a successful and collaborative phenomenon week. And with successful I mean getting under the surface and past superficial and forced teaching or learning, avoiding the “Fixes that Fail” archetype. In the interviews, each teacher talks about the workload of teaching and how the meaning of their work is drowning in “other” tasks. There is a risk that the increasing (at least in the starting phase) amount of planning work, that comes with the new curriculum, feels pointless, if in practice a sufficient change cannot be seen in the learning results and depth of learning compared to “normal” teaching. And this seems to be the case. The phenomenon themes haven’t engaged the students in a manner that was expected, at least yet.

I see many problems would start to unravel if the learning of students through phenomenon-based learning could be impacted. Lack of time might still persist, but the workload could be made lighter by impacting how the students learn in the multidisciplinary modules, in other words by making the teachers work meaningful. The interviews clearly voice that helping students learn and progress is what motivates teachers, and is why they are in this profession to begin with. Seeing students learn, or just generally being able to handle life, makes the hard work worthwhile and meaningful. In my view, the question is less about missing time, nevertheless this comes up frequently in interviews, and more about what is done with the time and how phenomenon-based learning will be integrated to “normal” planning of teaching. Increased motivation for phenomenon-based learning should also effect the willingness to find common time between teachers for co-designing phenomenon periods. But of course, if the solution could also aid in the lack of time and encourage time management, all the better.

There is several archetypes at play, which leads me to the leverage I chose. For instance the Fixes that Fail scenario, where the need for co-design produces the fix of organising more meetings. But if meeting preparations time is not added accordingly, more unorganised meetings
end up reinforcing the teacher’s frustration and sense of workload and accomplishment. They end up swallowing even more precious time. And therefore add to the feeling of frustration and pointless work.

Overall there is a risk of “Eroding goals” archetype to kick in, if teachers don’t see sufficient changes in the students learning despite the extra efforts of multidisciplinary modules. Teachers are the ones implementing this change. Their self-organisation and motivation is extremely important in making the change happen. Once they start lowering their goals and standards, it does not matter what the curriculum says anymore.

So if students’ learning effects teachers’ motivation: How could you effect students’ learning in phenomenon-based learning? According to the teachers, narrowing down the theme was very important. To get teachers on board, to make the change their own, to avoid superficial “teaching by the principal” there is a need for self-organisation. What makes teachers self-organise? Giving them a push at the start and triggering co-design with questions, models and tools. This would also hopefully remove the delay between seeing results of planning and putting effort into multidisciplinary modules.

One thing that effects many things, according to the interview data, is narrowing down the phenomenon. The solution would then be a guideline for starting a phenomenon project and narrowing down the theme with teachers and students (possibly also outside experts). The beginning of the project all in all is important and if focused on, it will likely run smoother and be more enjoyable. And in the end, save time and effort too by having a more sensible work load. Getting started seemed tricky to the interviewed teachers, so if there would be a model or a guideline on how to start, this would hopefully make it a grade easier. The teacher’s resistance to change comes from the gap of goals of what the teacher’s profession should be and what it actually is. Adding balancing loops that

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Image 17.
My interpretation of how phenomenon-based learning is experienced by teachers and what stocks, flows and feedback loops are at play.
focus on the start of the phenomenon, reinforces the meaning of work and learning results, which then should motivate to organise more time for co-design and end-up in a positive reinforcing loop.

Education could be one leverage, but I am also looking for ways in the scope of my thesis to affect the school system. There is a big gap between the education the teacher has received and the demands of the new curriculum. Some upper-comprehensive school teacher’s feel they do not have the competence to guide students over subject boundaries. Changing the teachers education would be of course one important leverage, but going out of the boundaries of my thesis and the timescale that changes should need to appear in. Most important phase is the start and how you define the theme, so this is the problem I choose to tackle.

6.2. Vision & drivers

The vision for the concept is that within one year most teachers would know where to start doing phenomenon-based learning and feel a sense of control and results. Encouraging the learning community with the attitude and objective of “renewal and results” rather than just “can do”. In five years phenomenon-based learning is a normal part of everyday school life.

Design drivers

- Helps spark conversation between different subject teachers to encourage more collaborations that are started from the teacher’s own motivation.
- Helps to understand how different teachers and students understand the phenomenon theme
- Visible process that shows mental models in action
• Doesn’t require a separate budget or much time to start
• Can be used in both informal spaces and planning meetings

**How**

• Guidelines for getting started in phenomenon-based learning
• Questions for narrowing down the theme with teachers and students
• Suitable for different personalities and subject-teachers
• Displayed on a website, which is easy to scroll through
• Material easy to print out and make visible in an analogue environment
• Communicating the concept through tutor teachers in schools, who’s task is to bring the curriculum to the teacher level

### 6.3. Concept: Phenomenon Dimensions

The solution is on a concept level, but important to include in any case, to give an idea of what it could be like and what to develop further together with teachers. The concept includes 1) guidelines for getting started 2) a tactical tool and conversation sparker 3) website for further information and existing models.

**The phenomenon guidelines contain a route of:**

1. Draw your ideas of a phenomenon, or list questions.
2. Trial in your own class: question ideation from drawings or photos with students
3. Put questions on the wall for students and teachers. Vote for favorite ones.
4. Trial the question in your class. What pattern and phenomenon is starting to form? Draw it together.
5. Bring ideas and drawings from class trials and discuss with teachers. Which elements or connections are repeated? Which have most connections to subjects taught? Pick one core element. What is the goal of the core element? Why does it exist?
6. Define the core element’s characteristics according to it’s goal. Mirror the characteristics to the teaching schedules. What could be left out? Draw the phenomenon boundaries and divide roles for next steps.

The guidelines are displayed on the website and can also be printed out. The aim is to get started from the student view and gradually narrow down the theme and linking it to different subjects.
The tactical tool — The tactical tool and conversation sparker acts as a boundary object, narrowing the gap of communication between different subject teachers and also students. The tactical tool can be printed out and folded into a square that can be visibly placed on meeting tables, coffee room or class rooms to spark conversations. On each side it has questions from different angles to get common ideas started.

Website — Website contains ideas on where to look for ready ideas and models, such as the DOP model. It also has theme suggestions that other teacher’s have found fruitful, such as “energy” which links to many subjects.

Concepts advantages
- Helps in making thinking visible by giving a tactical tool
- Able to easily place in teacher rooms and meetings where teachers feel comfortable sharing information
- Gives concrete steps to those wanting more clear instructions to follow
- Gives questions, ideas and inspiration for teachers, who want more freedom in planning

**Phenomenon dimensions tool**

1. Print as A3
2. Cut
3. Fold into a square
4. Place on a coffee table or take it with you to class and meetings

1. What makes you proud? Why? Ask your colleague the same question. What theme can you see in the discussion you are having?

2. What interests you today? What questions arise? What question would you like to explore further?

3. What did you do yesterday? Can you see a pattern leading to a goal? What bigger phenomenon is this pattern connected to?

4. How would you draw your expertise? Help others understand your thinking. How does your expertise link to others?

5. How do you plan your work? Draw your pace of working and see how it matches with others.

6. What can you do today to take your phenomenon ideas into actions? What would be your first step? What do you need from others?
Discussion
7. Discussion

As in the double-diamond and systemic design processes, the next phase of my design work would be to test and get feedback on how well I managed to interpret both the system and the concept as a leverage. With the system, I mean especially the experience of teacher’s doing phenomenon-based learning and co-design. How “right enough” did I get the system map from teachers’ perspective? Does the concept answer teachers’ needs and bring value to them? I could also show teachers the system map and ask if they see the driving factors as I do. Would narrowing down the phenomenon theme unfold the way I describe? Would it increase students learning and start a chain reaction of changes? What do teachers see are driving the driving factors? The “Dimensions” tool would also need to be tested and iterated. I could observe if teachers would be spontaneously interested in “Dimensions” at a coffee table. Would it trigger discussion between teacher’s or simply be taken no notice of? In any case, system map and concept testing would give me valuable information on what details work and don’t work in the school context. Once I had something concrete to show, it would likely trigger more conversation and give me even deeper information on underlying values.

Although I put in a lot of work in the problem definition phase, the design process is still half way through. At this stage, the concept is only a best guess. I could have gone in many directions and just as well chosen developing meetings as one solution to save time and increase teacher motivation. Or education events for teachers to build up their competence coaching students and improving phenomenon-based learning outcomes. Then my system map would have looked different. But I was looking for a solution that would trigger change in a short amount of time with as little initial efforts from teachers as possible. Developing meetings or diving into teachers’ education would have been a too wide a solution area to give a few simple, feasible tools for teachers. It is also a very good question whether designing a few tools for change is even possible in such a complex system of diverse teachers and personalities. But with systemic design principles, I believe there could be a chance to plant seeds of change that start self-organisation and gradually flourish.

There are some indications that the challenges mapped out in my work reflect the “real world” of teachers. Similar answers in The Trade Union of Education in Finland’s (OAJ) and Yleisradio Finnish Broadcasting Company’s (YLE) questionnaires show that insights of the six interviewees in this thesis might reflect the situation also in other schools around Finland. My interviews with the teachers were done during autumn 2016. YLE’s article published in December 2016 concludes insights from a questionnaire sent to 209 teachers and 184 headmasters in primary schools. Similar experiences, which were the feeling of haste, changes coming from up-down, increased work load, increased number of unnecessary meetings and increased col-
laborations also appeared in YLE’s answers. (Kröger, 2016.) Another questionnaire from YLE done in collaboration with the Teachers Union and The Union for Finnish Headmasters and published in December 2016, tells that there is significant hesitation from the teacher’s on whether the new curriculum effects the learning of students. Teachers also comment that the new curriculum works for talented students, but the weaker ones are left behind more easily. One headmaster comment says that the new core curriculum doesn’t affect the learning results, but it is believed to make the motivation towards school better. This questionnaire was answered by 209 teachers and 184 headmasters. Only one percent of teachers experienced the learning results improving significantly and 20 percent to some extent. 33 percent said there is no change and 24 thought they weakened the learning results. Headmasters were slightly more optimistic in all their responses. Over half of both teachers and headmasters thought that the new curriculum can’t be done with the municipalities current resources. These are somewhat alarming results that show there is need for actions, before standards start lowering in schools. Otherwise the curriculum reform can become a superficial attempt to change schools, which doesn’t change the way schools work in practice.

My thesis is still lacking many views, such as the headmasters who have an essential role in organising the work load and resources in schools. An answer in the YLE interview describes how one school has tried to ease the work load by organising the timetables so that co-operation with teachers’ colleagues would be easier. I could have considered interviewing headmasters, the Finnish Board of Education and the municipalities education departments to get a more accurate view on the whole system and how it works. Interviews also only rely on what the teacher’s say, not how they act. Observing teachers would have given more in depth answers of hidden behaviours and structures. But since I am only one person, this all would have been impossible to handle in one thesis.

Which brings me to the advantages of working alone versus working together. It is ironic that I encourage co-design, but have spent most of the thesis working by myself in the library. For me, the advantage of working with a team would have been a more diverse view on the problem. There would have been a possibility to get more data in a short time and utilise the team’s different expertise and insights on directions to take. For instance, visualisation is not my expertise area, but it would have been useful to communicate more visually and to express and test ideas with teachers. I feel the advantages of collaboration between teachers could be talked about more. Is teacher collaboration as essential as the curriculum leads us to believe? All though many teachers talked about the need to co-design, what extra value does it bring to phenomenon-based learning? And at which stages of the process does it bring value? At the Hello Ruby Summer Camp I could see it effected the learning results. But does collaboration always bring value in the school context? This I would like to dig into
next, as in my interviews so far, I concentrated more on the challenges. Could cross-disciplinary work and phenomenon-based learning be done also by one person? It could be easier for teachers to first test phenomenon-based learning by themselves in their classrooms, get encouragement and learning results first within their classroom and then start to gradually extend into collaborations.

Generally, FNBE has a fairly good understanding of the challenges teachers face. FNBE (Halinen et al, 2015) recognises the lack of time, and what it means for subject-teachers having to go back and forth between their subject expertise view and the broad view. They also describe the drafting of the curriculum as an open design process, which gave a good view on teachers’ and students’ needs. Reading the core curriculum makes me conclude that FNBE understands the meaning of shared goals very well: “Cooperation in the preparation of the curriculum and annual plan promotes commitment to shared goals and the coherence of instruction and education (FNBE, 2016, 10).” But the system is so vast that I don’t think anybody can truly anticipate what these changes mean in practice, which is why it is good to constantly check and get feedback from how it works on the teacher-student level. In practice, it seems teachers feel they are being governed from up-down, which is not the ideal way for a hierarchical system to work. The upper layers should rather work on terms of the lower layers.

The process of the thesis has been extremely rewarding, though a rollercoaster of discovering my weak and strong points. In this sense, I must say I also gained a lot from working alone. During the master’s programme, we worked mostly in teams, which is more beneficial for project outcomes. But as I am entering a new profession, understanding my own limits, for instance how much I can do in a certain time, was greatly useful too. During the process, I also started to understand, in a more profound way, how balancing feedback loops link to goals and reinforcing loops. Being able to prioritize during system mapping and draw boundaries without becoming overwhelmed by complexity, is also one of the major takeaways and gives encouragement that I could work as a systemic designer. The thesis opened a whole new world of systems thinking resources, which I look forward to diving into in my future projects. My interest towards systemic design grew, as well as confidence that I could have something concrete to give to this field of expertise. I am amazed how far I got with understanding systems and though only a fraction is written in this work, I hope I can use my new learnings in my future projects.

Most importantly, I got sucked into the world of teachers and am grateful to have had the chance to do so. Learning the nuances of their everyday challenges made me respect these multitaskers and the amazingly important work even more. I truly hope that they get all the support possible in facing these changes and making the future a better place. And instead of letting missing resources drive the way, I wish the whole school system stamina, stubbornness and of course more systemic (or service) design in keeping the student in the center.
of developments. From the perspective of sustainability and resilience of systems, diversity is always good and therefore, if the new curriculum and teacher co-operation succeeds in practice, the students should get a more diverse view of the whole and the school system in general should be more resilient and able to adapt to change.
References


### Appendix

Appendix 1. Teachers interview questions in Finnish

Appendix 2. A sample of my excel coding system

Appendix 3. A sample of teacher quotes in Finnish

### Acknowledgements

Although most of the thesis involved lonely hours at the library, I received a great amount of support.

**Thank you to**

- My advisors, Mira and Mikko, for your patience and guidance.

- The interviewed teachers, for finding time from your busy schedules and lending me your thoughts.

- The Hello Ruby staff, especially Jemina, for inspiring me to take on this topic and letting me be a part of the camp.

- New and old friends, especially Bice, Elise and Philip for not letting me give up. And Päivi, for being my reality check.

- My family and Matti, for letting me put our life on hold several times. And for unconditionally supporting me.
Appendix 1
Interview questions (in Finnish)

Maisterityön haastattelukysymykset 26.10.2016

Ilmiöpohjaisuuden toteutuksesta


Arki ja motivaatio — Millainen on tyyppillinen päiväsi? Mistä olet ylpein omassa työssäsi? Onko jotakin, mitä voisit jäädä päivästä pois, mikä tuntuu oman työsi tavoitteiden kannalta turhalta työltä? Miten motivoit itseäsi hankalissa tilanteissa?

Muutos — Oletko aiemmin tuonut jonkin uuden työtavan (metodin tai konkreettisen työkalun) koulussi ja esiteltyt kollegoiille? Miten se onnistui?

Miten omaksut parhaiten uuden työtavan (metodin tai konkreettisen työkalun)? Mikä auttaisi sinua uuden omaksumisessa (muutoksessa)?

Missä muodossa (esim video, pdf, nettisivu, printattu kirjanen, juliste, artikkeli tms.) oleva materiaali tavoittaisi sinut parhaiten? Tuntuisiko jokin muoto arjenviikosta kaikista luontevimmalta?


Ilmiöpohjainen oppiminen ja yhteissuunnittelu — Onko ilmiöpohjainen oppiminen sujuu? Onko se säästää aikaa kompetentia tai edes autoriteettiä?

Mitä mahdollisuuksia oman työsi kannalta näet ilmiöpohjaisessa oppimisessa? Entä haasteita? Mikä olisi mielestäsi pettymys/onnistuminen ilmiöpohjaisessa opettamisessa?


Kuinka paljon aikaa käytätte suunnitteluutöhön? Miten arvioitte/mittaatte suunnitteluunnon onnistumista?

Mitä odotat yhteissuunnittelulta seuraavan tänän lukuvuoden aikana? Mitkä ovat tavoitteesi yhteistyöskentelylle?


Ulkopuoliset asiantuntijoiden osallistaminen yhteissuunnittelulua — Ovatko ulkopuoliset asiantuntijat ole sayttäneet mukana suunnittelutyössä? Miten valmistaututte/valmistauduite ottamaan ulkopuoliset asiantuntijat mukaan? Miten heidän mukaan ottaminen mielestäsi onnistui? Tekisitkö jotakin toisin?

Edellytykset — Millaisia käytännön toimia tai päätoksiä tarvitaan, jotta yhteissuunnittelulua ilmiöpohjainen oppiminen onnistuu?
### Appendix 2

A sample of my excel coding system for the interview material

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Appendix 3
A sample of quotes in Finnish

**Teacher A** — “Mä oon sellainen viimeisen minuutin ihminen, mulla saattaa tulla joku idea aamulla alkavasta tunnista tulla vasta metrossa, miten sen toteuttaa. Ja sit mä oon sellainen että mä haluun jättää auki koska ei tiedä, mihin suuntaan vie. Ja sit oli opettajia, jotka haluua tietää todella tarkkaa tunneitaan, mitä tekee, kuka tekee, missä tekee. Meihän ryhmässäkin olen tyypissä ihmisissä.”

**Teacher B** — “Kylhän se syventää sitä, että ne hokaa et aihaa he mitä tai tietää mä matikkaakin tai tätä fysikkaakin. Aijaa et englantiakin voi opiskella niinku tai jotain. Tää on ruokakulttuuria, ai se on toisessa maassa, mut mistä muta siellä on.”

**Teacher C** — “Et ihan oikeasti koulussa on paljon helpompia tehtäjiä, saa asiointia. Se on ihan varma. Ja sit heti kun ruvetaan tekee jotain yhdessä. Ni paitsi et ne kemiat natsaa, ni jotainkin semmonen rytimä natsaa, ja semmonen aikataulutettaminen ja sit pitää löytää se aika, se on aina se kynnyksesymys ihan ehdottomasti.”

**Teacher D** — “Uusi ops on tuonut noin 1-2h pituutta lisää työpäivään, mutta kompensaatio siitä ei näy palkassa, eikä myöskään oppimistavoitteissa. Se tuo vain hemmetistä työtä lisää mutta sitten se niinkun verrattuna siihen mitä mä normaalisti teem, ni mä en nä il et ois kollektiivisesti ainaan nää siitä normitasosta ohi tavallana.”

**Teacher E** — “Ni itse asiassa niinku mun mielestä keskusteluessa joskus vähän niinku enonnetaan et minkälainen se vanha ops olen, eli mediassa ja niinku tällaisissa virastotasonkin keskusteluissa annetaan ymmärtää et vanha ops ois jollain tavalla kannustanut esimerkiksi frontaaliopeutukseen. Joka ei siis niinku pitänyt niinku on palikkaansa. Että ehkä sellainen harha että niinku vanhassa olen samojen niinku juttuja kuin niinku uudessa. Mut e tää keskustelu on ollut ollut vähän harhaantunut...”
