Collaborative Design and Implementation of Digital Tools in Education as Part of National-Level Programmes in a Decentralised Education System

Diseño colaborativo e implementación de herramientas digitales en educación como parte de programas a nivel nacional en un sistema educativo descentralizado

Jari Lavonen[a], Klinge Orlando Villalba-Condori[b]

[a] Faculty of Educational Sciences, University of Helsinki, Finland; Department of Childhood Education and Centre for Education Practice Research, University of Johannesburg, Soweto, South Africa
https://orcid.org/0000-0003-2781-7953   jari.lavonen@helsinki.fi

[b] Universidad Nacional de San Agustín, Arequipa, Perú
https://orcid.org/0000-0002-8621-7942   kvillalbac@unsa.edu.pe

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ABSTRACT

An interesting characteristic of Finnish education policy is collaborative design of national and local-level strategy, development programmes and curricula. The planning of strategies, programmes and curricula typically begins with recognising the challenges and needs at the classroom, school and municipality levels. These programmes are then planned through a collaborative partnership between the teacher's union, Ministry of Education, universities and providers of education, typically municipalities and several other stakeholders. The general aims are agreed upon in consensus, and these aims are discussed at the local level, modified and implemented in local contexts. After agreeing upon the aims, resources from the state and municipality budgets are made available for the piloting and implementation of the aims. Three current programmes and curricula are here introduced and discussed in detail. The introduced development programmes were designed in the Basic Education Forum and in the Finnish Teacher Education Forum. Moreover, the preparation of the National Core Curriculum for Basic Education is introduced and analysed. Finally, the use of digital tools and environments in education is analysed as a part of the preparation and implementation of the programmes and curricula.

RESUMEN

Una característica interesante de la política educativa finlandesa es el diseño colaborativo de estrategias nacionales y locales, programas de desarrollo y planes de estudio. La planificación de estrategias, programas y planes de estudio generalmente comienza con el reconocimiento de los desafíos y necesidades a nivel de aula, escuela y municipio. Posteriormente, estos programas se planifican a través de una asociación de colaboración entre el sindicato de docentes, el Ministerio de Educación, las universidades y los proveedores de educación, típicamente los municipios y varios otros interesados. Los objetivos generales se acuerdan por consenso y estos objetivos se discuten a nivel local, se modifican y se implementan en contextos locales. Después de acordar los objetivos, los recursos de los presupuestos estatales y municipales se ponen a disposición para la prueba piloto y la implementación de los objetivos. En este artículo se presentan y discuten en detalle tres programas y planes de estudio actuales. Los programas de desarrollo introducidos se diseñaron en el Foro de Educación Básica y en el Foro de Educación de Profesores de Finlandia. Además, se introduce y analiza la preparación del Plan de Estudios Básico Nacional para la Educación Básica. Finalmente, se analiza el uso de herramientas y entornos digitales en educación como parte de la preparación y ejecución de los programas y planes de estudio.

1. Introduction

At the beginning of the 2000s, the Programme for International Student Assessment (PISA) ranked the performance level of 15-year-old Finnish students in reading, science and mathematics as high (Organisation for Economic Co-operation and Development [OECD], 2007; 2010). The programme further demonstrated that variation in performance levels, especially variation among schools, has been low. High scores and low variation in performance level are typically considered outcomes of a successful education system. However, three major challenges have recently been recognised as facing the Finnish education system. The learning outcomes, especially in reading and mathematics, have decreased, and the number of weak learners has increased (OECD, 2014; 2016). This is evident, especially, when comparing the PISA data relating to Finland to that of other Nordic countries (Blömeke *et al.*, 2018). The second challenge, according to the PISA surveys (OECD, 2016), is increasing inequality in Finnish primary and lower secondary education according to gender, migration background, socio-economic background and area where the student is living. The third challenge relates to the use of digital tools in teaching and learning; they are not yet being used as frequently or in as versatile a way as they were intended to be used. Although there has been a decrease in learning performance and an increase in inequality, and although digital tools are not yet being used to their greatest effect in teaching and learning, Finland remains one of the highest performing and equal societies in terms of education (OECD, 2108). If these three challenges can be met and overcome, Finland will continue to improve and excel in providing an exceptional level of education.

A national-level development programme, project or reform –such as a curriculum reform or digital strategy– is a common tool for improving education and overcoming recognised challenges (Garm & Karlsen, 2004; Young, Hall, & Clarke, 2007). Nonaka, von Krogh and Voelpel (2006) argue that putting new ideas into practice builds on learning processes and knowledge creation that spans the individual, group, and collective levels, where peers seek help and guidance from their colleagues who have greater expertise. A similar idea is emphasised in the communities of practice or learning in the workplace or in communities where professionals access, adopt and internalise knowledge that has been developed in the community (Fidalgo-Blanco, Sein-Echaluce, & García-Peñalvo, 2014, 2015; Rubio *et al.*, 2018; Wenger, 1999). In order to succeed in designing and implementing reform or development programmes at the national level, the OECD (Burns & Köster, 2016) recommends that the reforms or programmes should do the following: engage stakeholders, such as teachers, university professors and teacher's union members; employ organisations to design the strategy; strive for consensus in the design; allocate sustainable resources for the design and implementation of the strategy; organise pilot projects; and disseminate the outcomes of the pilot projects.

The aim of the paper is to analyse the challenges of Finnish education and how these challenges can be overcome collaboratively through national reform or development programmes. As examples, curriculum renewal, the work of the Basic Education Forum and the work of the national Teacher Education Forum are analysed. The development of the use of digital tools is integrated into all these programmes (Silveira & Villalba-Condori,2018). Therefore, the aim it is not to learn how a single issue is organised or improved in Finnish education but rather to learn how the education system is continuously improved through collaborative and strategy-based development at the local level. To provide further context, we first shortly introduce the characteristics of the Finnish educational context.

2. Finnish educational context

Recognising challenges in education and discussing these challenges as a part of quality assurance at national and local levels is an important characteristic of the Finnish education system. Quality assurance in Finland has never been based on control, such as inspections or standardised testing, as is the case in many other countries that follow an outcome-based educational model. Providers of education, typically municipalities, have been responsible for quality assurance and the preparation of local curricula, in collaboration with local stakeholders and families (Niemi, Toom, & Kallioniemi, 2013). Most providers of education have a quality handbook; for example, the city of Turku (2017) describes, in depth, the scope of the procedures used in pre-primary education. Only basic guidelines are prepared collaboratively at a national level, such as core curricula and teacher education strategies. Moreover, the Finnish Education Evaluation Centre (FINEEC) is responsible, at a national level, for monitoring of the quality of education. Since the 1990s, the quality of education has been promoted through a decentralised approach that combines national-level monitoring with local-level discussions, in all areas of education (Villalba-Condori, García-Peñalvo, Lavonen & Zapata-Ros ;2018).

In Finland, there have been six official national digital education or information and communication technology (ICT) strategies, and hundreds of national-level development projects during the last 25 years. During the last five years, digital education strategies have been integrated or implemented into other strategies and national framework curricula (Mahlamäki-Kultanen *et al.*, 2014). Within the government programme of 2015-2019, two programmes that especially focused on digitalisation were introduced: The Knowledge and Education programme and the Digitalisation programme (Prime Minister's Office, 2015). These two programmes and the established forums aim to support the use of digital tools in education. For example, the Basic Education Forum analysed the use of digitals tools in education and decided to establish 2,500 tutor teacher positions in Finnish municipalities, to support teachers in using new technologies in education and to develop digital learning environments.

Teachers have played an important role in Finland's decentralised educational system, and for this reason, teachers in Finland are highly educated. All teachers at the elementary, middle and high school levels are required to have a master's degree. In fact, the education of elementary teachers (i.e., teachers of grades 1-6) at the master's level has been established in Finland for 35 years, while secondary teachers (i.e., teachers of grades 7-12) have been trained in master's-level programmes for more than 100 years.

The use of digital tools in pre-service teacher education is integrated into both courses and teaching practice in addition to introduction courses. This integration supports the student teachers as they plan lessons and instruction and, in turn, support their pupils/students in achieving the aims indicated in the national- and local-level curricula. The development of the use of digital tools in teacher education is organised through strategic actions and through several research and development projects. The Finnish National Board of Education (FNBE) has long allocated support in the form of government funding for the development of innovative learning environments and teachers' in-service education several times a year. Altogether, an average of 100 million euro is available for this type of support each year.

Finnish teachers are responsible for participating in local curriculum work, planning digital and physical learning environments and courses, and assessing both their own teaching and their students' learning outcomes. Consequently, quality is assured at the teachers' level. Over recent decades, studies have indicated that local curriculum processes have inspired and empowered teachers and principals to develop the local curriculum, to use digital tools and their own work practices in more versatile ways, and, finally, to increase the overall quality of education. Education authorities and national-level education policymakers trust professional teachers who, together with principals, headmasters and parents, know how to provide the best education for the children and adolescents in a specific district (Holappa, 2007; Jauhiainen, 1995).

3. Challenges in Finnish education

Challenges in the Finnish education system have been discussed in several forums and committees during the government period of 2015 to 2019 and during the preparation of the latest National Core Curriculum for Basic Education (FNBE, 2014). The examples of the forums analysed here include the national Teacher Education Forum (Ministry of Education and Culture [MEC], 2016) and Basic Education Forum (MEC, 2018). The challenges were recognised on the basis of the OECD, PISA and Teaching and Learning International Survey (TALIS) surveys, and national-level monitoring reports, which were produced by the FINEEC.[1] Although Finnish student performance is still relatively high, the two latest PISA studies reported decreases in the performance and engagement in learning of Finnish students. The FINEEC (2018) published an overview of the challenges facing the Finnish education system in the summer of 2018, based on the results of national education evaluation activities. These challenges in Finnish education can be summarised in different levels, as follows:

- *Student-level challenges*: Challenges at this level include a decrease in learning outcomes, wellbeing, and engagement in learning and a lack of interest in science, technology, engineering and mathematics (STEM) careers; various needs in supporting the learning processes of various learners; and challenges in integrating the use of digital tools and formative assessment for supporting learning.
- *Classroom-level challenges*: This includes challenges in guiding students in active and collaborative learning processes; challenges in teaching and learning in heterogeneous and multicultural classrooms; challenges in supporting students to learn 21st century competences, including the versatile use of

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digital tools, according to the new curriculum; and challenges in designing and using versatile digital and physical learning environments.

– *School- and city-level challenges*: Challenges at this level include an increase in the variation between schools in terms of learning outcomes; a lack of teacher collaboration; organising quality work at the local level; designing and implementing improvements or education reforms and using digital tools in teaching and administration; a lack of pedagogical leadership support for teachers' professional learning, including teachers' personal development plans and support in the induction phase; and a lack of resources.

– *Challenges in teachers' competencies*: This includes challenges in pedagogical competencies, including digi-pedagogy, and innovative orientation; a lack of willingness and competencies for personal professional development and for the development of the school environment; and teachers' local and international networking.

– *Society-level challenges*: Some of the main challenges at this level include young people dropping out of school and the labour market; the influence of digitalisation, such as artificial intelligence and automation, on the education sector; the need for the continuous training of adults to reflect changes in working life, such as digitalisation; and the need to support sustainable development.

Tanhua-Piiroinen *et al.* (2019) recognised challenges related to the use of digital tools in primary- and secondary-level education based on a national-level survey. Over the two-year follow-up period (2017-2018), positive yet slow progress was seen in the strategic work of schools. Increasingly, schools have a common vision of digitalisation, and its realisation is supported by the working communities. There are, however, aspects that still need to be developed, especially in relation to the regular evaluation of the quality of digital online learning and learning environments. The digital competence of teachers has improved markedly in terms of teachers' skills, especially among the teachers who took part in the measurements conducted in both years under review. The active role of students in using digital tools, emphasised in the extensive competence goals of the national core curriculum, has not yet been realised in practice. Differences have been observed in the use of digital tools between municipalities and within them in the digitalisation process.

Because of the recognised challenges, several national forums, committees and projects have been launched in Finland since 2013 –including the Future Upper Secondary School (MCE, 2013), the Future Primary and Secondary Education Group (Ouakrim-Soivio, Rinkinen, & Karjalainen, 2015), and The Finnish Teacher Education Forum (MEC, 2016)– as a part of Prime Minister Sipilä's government and the previous programmes (2015-2019) (Prime Minister's Office, 2015). Moreover, the preparation of a national core curriculum for both basic (i.e., primary and lower secondary) and upper secondary education (FNBE, 2014; 2015) are included in these endeavours.

4. Curriculum Reform in Basic Education: Aiming to Support the Development of Competences for the 21st Century

Since 1985, the Finnish curriculum has been written for two levels: the national-level core curriculum and the local or municipal school-level one. The national core curriculum includes general aims as well as the objectives and core contents of different school subjects. Schools and municipalities prepare the local curriculum, which takes into account the local context and local needs based on the national core curriculum.

In Finland, curriculum reform starts at the political level, where the government emphasises that integration between the aims related to learning 21st century competences and the aims of schools should be done better than what was done in the previous curriculum (Change in Basic Education Act 642, 2010). The national framework curriculum was designed in 2013 and 2014 through a collaborative project, which is described below. Some guiding questions related to the reform were stated by the FNBE[2], as follows (Vahtivuori-Hänninen *et al.*, 2014):

– What will education mean in the future? What types of competences will be needed in everyday and working-life situations? What kind of learning environments and practices, including the use of digital tools or teaching methods, would best produce the desired education and learning?

2.   The FNBE is the national development agency responsible for preparing the national core curriculum, supporting its implementation, developing school education and financing in-service training programmes for teachers (https://www.oph.fi/english).

- How will change be realised at the municipality and school levels, and even in every lesson?
- What kind of competencies, including digital competencies, will teachers and other school staff need in order to be able to collaborate and promote learning for the future?
- How does the national core curriculum guide the preparation of the local curriculum and support the work of teachers and the whole school community? (FNBE, 2014).

The design process of the curriculum was collaborative, as it has always been. Large panels of experts—involving pre-primary classroom teachers, subject teachers, principals, teacher trainers, educational scientists, researchers from different subject areas and representatives of various stakeholders—prepared the curriculum together. The whole process was transparent and available to follow through social media, a variety of different open discussion forums and local meetings held in various areas in Finland.

After the expert team completed the first draft of the curriculum, all the materials, including the draft curriculum itself, were uploaded to the FNBE website, where all teachers, teacher educators, stakeholders and even parents could view and comment freely on the first draft. The comments were read, and a content analysis of the comments was conducted. After this, a new draft based on the comments was prepared and posted on the website, again being made available for comments. The involvement and feedback of the various stakeholders throughout the design process has been essential for the implementation of curricula. As a result, stakeholders feel involved in the implementation of the curriculum in a way Ogborn (2002) has described as the development of ownership of the reform or development programme.

The above questions guided the design of new curriculum, as did discussions about the competences needed in the 21st century, about redefining of the aims of education and about how to organise learning to meet the demands of the 21st century. Consequently, the national-level curriculum design process that occurred between 2013 and 2014 helped to develop the Finnish education sector for the 21st century (Vahtivuori-Hänninen *et al*., 2014). The identified 21st century competences, or transversal competences, were grouped under the following competence areas: taking care of oneself and managing daily life; multiliteracy; digital competence; working life competence and entrepreneurship; participation, involvement and building a sustainable future; thinking and learning to learn; and cultural competence, interaction and expression. According to the description of what is involved in learning digital competences, students should first be able to do the following:

- learn to use digital tools in diverse and creative ways;
- collaborate and network with digital tools; and
- work with data, information and knowledge.

Second, the student should be guided in the following:

- critical and creative knowledge practices, such as searching information and generating ideas;
- collaborative knowledge-building and the use of knowledge in different situations; and
- constructing and working with abstract artefacts, such as texts and concept maps, and concrete artefacts, such as Lego robots and 3D printers, with digital tools in different in- and out-of-school learning environments (García-Peñalvo, Rees, Hughes, Jormanainen, Toivonen & Vermeersch, 2016; García-Peñalvo & Mendes; 2018; Fernández-Llamas, Conde-González, Rodríguez-Lera, Rodríguez-Sedano, & García-Peñalvo; 2018).

The processes involved in learning digital competences are similar to those involved in learning science research methods. According to Krajcik and Shin (2015), in order to support learning, students should be active in the following key areas:

- *Knowledge building*. This refers to the process of creating cognitive artefacts, such as concepts and models, as a result of common goals, group discussions and the synthesis of ideas.
- *Knowledge practices.* Krajcik and Merritt (2012) emphasise the use of reasoning, critical thinking and knowledge practices –such as questioning, observing, inferring, classifying, predicting, measuring, interpreting and analysing– as a part of learning. In so doing, students are expected to be engaged in practices similar to those of professional scientists.
- *Social interaction*. Learners develop an understanding of principles and ideas through sharing, using and debating ideas back and forth with others. This process helps create a community of student learners that supports their ability to make connections between ideas.

–   *The use of cognitive tools*. Learning science research has demonstrated the importance of cognitive tools, such as graphs, that help learners see patterns in data. Therefore, digital tools could be considered cognitive tools because they allow learners to carry out tasks.

In addition to a general description of the transversal competences required, the subject-specific curriculum aims for those competences were included in the curriculum. This approach sought to help teachers understand the meaning of the competences and help the teachers implement them (Halinen, 2018).

In order to support the learning of transversal competences, curriculum reform aims to increase collaborative classroom practices through engaging students in multidisciplinary, phenomenon- and project-based studies in which several teachers may work with any number of students simultaneously. In practice, all schools must design and provide at least one such study period per school year for all students, which focuses on studying phenomena or topics that are of special interest to students. Students are expected to participate in the planning process of these studies. Schools provide their own specific viewpoints, concepts and methods for the planning and implementation of these study periods. In addition, the topics that are chosen and the way in which these integrative study periods are realised are decided at local school level.

To support the local level in the preparation and implementation of local curriculum, the FNBE established the Majakka network (FNBE, 2016). This network organises meetings for teachers and designed a web platform, which support schools in the preparation of the local curriculum. In the autumn of 2017, the FNBE allocated 100 million euro to support the implementation of the transversal competences at the local level (MEC, 2017). Moreover, a total of 2,000 teacher tutor positions were established in Finnish municipalities to support the learning of transversal competences, especially for creating new digital learning environments (Oppiminen uudistuu, 2018).

In 2018, the FINEEC evaluated the implementation of the national core curriculum at the local level and the process of preparing local curricula by analysing the local curricula of all education providers. Moreover, the centre interviewed curriculum specialists to learn about the success and challenges of implementing the local-level curriculum. According to the evaluation, national and local steering systems have supported the implementation of the curriculum, and this implementation has been carried out at the classroom level. It was seen that the transversal competences have been integrated with the aims of the school subjects at the school level, and teachers are aware of this integration. However, challenges remain in relation to integrating the transversal competences into classroom teaching and learning (Saarinen *et al.*, 2019).

5. Basic education forum: Decreasing variation in learning outcomes

The Basic Education Forum was nominated by the MEC in February 2018 (MEC, 2018). The forum consisted of administrators and stakeholders, including teachers, principals, students, parents, researchers and teacher educators. The forum recognised equality as the most important strength in Finnish education; however, equality has been recognised to be weakening in the Finnish education system. For this reason, equality was analysed in the forum in terms of district, the socio-economic and linguistic background of families, students' genders, and other key factors.

The forum suggested a number of concrete measures for the development of structure and operations in basic education. The forum suggested, for example, that more support be given to schools operating in challenging areas and to the development of management and leadership at schools. It also suggested that parents should be more involved in school activities. The measures proposed by the Basic Education Forum represented not only the opinion of the government but also of Finnish society more generally; this is because the forum consisted of experts and stakeholders at various levels who were committed to the development work.

According to the final report of the Basic Education Forum, the basic school of the future will be a more equal community of teachers and pupils (MEC, 2018). It will be characterised by diverse instructional and learning models, the versatile use of digital tools in teaching and learning, the systematic development of teachers' expertise, strong pedagogical leadership and well-established partnerships with parents and society. The future basic school will ensure a sufficient level of knowledge, skills and competences for everyone and to support the development of the willingness and competences needed for lifelong learning. Equality requires that learning paths are individualised but also that student wellbeing and welfare are considered. The forum therefore introduced a special 'guarantee of learning', which means that individual variations in learning conditions and interests are the starting point for schoolwork.

The recommendations of the Basic Education Forum were partly implemented in the beginning of autumn term 2017 before the final report was published. For example, 2,000 teacher tutor positions were established in Finnish municipalities to support teachers in the use of new technologies in education and to create digital learning environments (MEC, 2018). Moreover, in the late autumn of 2017, 100 million euro of funding was allocated for local-level measures (MEC, 2017). Furthermore, the MEC allocated 25 million euro to support education measures in challenging areas in order to increase equality in education. For example, a city with 5,000 people received 250,000 euro at the beginning of autumn 2017 term to reduce the number of students in each classroom and to allow for extra teachers to be placed in the classrooms. Moreover, in 2018, the FNBE allocated resources to municipalities and schools (FNBE, 2018). The funded measures focused on three areas: support to the development of new student centre pedagogy; active learning processes; and use of digital tools; more versatile assessments; equality, taking into account the variation among learners; more versatile language education); new operation and learning environments (in- and out-of-school learning, better operation culture of the school and pedagogical leadership); and digital learning.

6. Teacher Education Development Programme: Supporting the Development of Teachers' Competences

To make progress in teacher education and overcome the recognised challenges, the Minister of Education and Culture nominated a Finnish Teacher Education Forum in 2016 (MEC, 2016). The forum was asked to collaboratively prepare a development programme for teacher education. Furthermore, the forum was asked to identify key actions for developing teacher education and supporting the implementation of the development programme.

Between 2016 and 2018, the teacher training forum organised a literature review related to teachers' knowledge and education. The literature review introduced the outcomes of research related to the role of education in a society; teachers' knowledge and learning; teaching and learning in a heterogeneous classroom; the individual differences of learners; and the design and use of educational innovations, such as education technology (Husu & Toom, 2014).

A national web-based brainstorming process related to the renewal of teacher education was organised based on the idea that a large group of people is smarter than small group of a few elite individuals; such a group is also better at generating ideas, solving problems, fostering innovation and making wise decisions (Surowiecki, 2015). This nationwide brainstorming session also supported the implementation of the development programme, as people more easily adopt a strategy if they participate in developing it. A call to participate in the web-based brainstorming process was sent to teacher educators in all Finnish universities as well as to all teachers and administrative employees working in the field of education at both the national and local level. The participants were guided in generating ideas about what is important for the future of teacher education and in evaluating and ranking 10 ideas contributed by others. In the ranking, participants assigned a number from 0 to 100 to evaluate the importance of these ideas. The web-based brainstorming tool combined similar ideas for ranking. According to participants, the most important skills for students to learn in teacher education are learning-to-learn skills, along with interaction skills and collaboration skills. Competences involved in generating ideas, preparing for change, conducting research-based action and collaborating in partnerships and networks are also needed so that teachers can participate collaboratively to develop classroom practices and culture in particular school contexts. Most of the top-ranked skills and competences identified are also necessary outside of the classroom. This means that in teacher education, participants believe more attention should be paid to the skills and competences needed for effective teacher collaboration.

Altogether, 12 nationwide meetings and 7 local meetings took place, in which teacher educators from Finnish universities and stakeholders related to teacher education, including unions and regional authorities participated. In these meetings, challenges and aims of teacher education were discussed and the development programme for teacher education was prepared. The literature review had an impact on the forum meeting discussions, and it influenced the design of the development programme.

The development programme sets out three strategic competence goals for teachers' pre- and in-service education and for their continuous lifelong professional development. These competence goals do not include all the possible goals, but they do highlight the direction for the development of teacher education. According to this document, a professional teacher should have, first, a broad and solid knowledge base, including knowledge about a particular subject and pedagogy, about how to accommodate diversity among learners, about collaboration and interaction, about digital and research skills, about their school's societal and business connections and about ethics. Second, a teacher should be able to generate novel ideas and educational innovation while making

the local curriculum, to plan inclusive education initiatives and to design and adopt pedagogical innovations, including the use of digital tools (Villalba-Condori, Castro, Guillen, Deco & Bender, 2018). Third, a teacher should have the competencies required for the development of their own and their school' expertise, especially for the development of networks and partnerships with students, parents and other stakeholders.

In addition to strategic competence goals, the development programme also includes six concrete strategic action guidelines that determine the direction for the development of teacher education. After the development programme was published in October 2016, 31 pilot projects were selected and started at the end of 2016. These projects were organised according to the three strategic aims and six strategic action guidelines for the development of teacher education. Altogether, 30 million euro was allocated to these projects in the state budget. During the forum meetings in 2017 and 2018, the pilot projects gave presentations and gained feedback from other participants in the meetings.

The FINEEC evaluated the implementation of the Finnish development programme for teacher education by analysing the pilot project documents, organising a survey for the pilot projects and interviewing the stakeholders and pilot project experts. According to the evaluation, the teacher education reform model prepared at the teacher education forum had several strengths, including the use of networking and bringing together different experts and stakeholders. This networking supported the implementation of all strategic competence goals, including the emphasis on 21st century competences. Most pilot projects were recognised to have a strong emphasis on community-building and collaboration. The evaluation also noted challenges and further targets for implementing the programme, such as creating a clear plan for supporting the achievement of the strategic competence goals. Moreover, the effectiveness of the pilot projects should be monitored and evaluated during and after its completion in 2024 (Niemi *et al.*, 2018).

7. Discussion

This paper analysed the challenges Finnish education has faced, especially those related to student engagement and learning, the lack of the use of digital tool in teaching and learning and the increase in inequality according to gender, migration background and student socio-economic background. Moreover, it analysed how the recognised challenges are aimed to be overcome, specifically through the collaborative design and implementation of national-level curriculum and national basic school and teacher education development programmes in a decentralised education system, where autonomy is emphasised at the teacher, school, municipality and university level. As a part of the design and implementation of the curriculum and programmes, the role of digital tools and environments in teaching and learning were discussed and developed. In order to support teachers in the use of digital tools and in supporting students to learn 21st century competences, various resources have been allocated at the school level. For example, 2,500 teacher tutor positions were established in Finnish municipalities.

Based on the national evaluations, the implementation of the core curriculum in school education and the teacher education development programme in teacher education have supported the development of education and overcome the recognised challenges. However, it is too early to evaluate the level of impact the curriculum and development programmes have had on education practices or how well the curriculum and programmes have supported teacher education and schools in overcoming the recognised challenges in education.

A number of methods can be used to support the design and implementation of national-level strategies, curricula and programmes, including goal orientation and planning; designing and timing; collaboration and networking; piloting and the dissemination of the pilot outcomes; and reflective orientation (Burns & Köster, 2016). Collaboration and networking create forums for discussing the challenges in schools and teacher education, as well as for setting strategic aims to support core curriculum design and teacher education development programmes (Kitchen & Figg, 2011; Paavola & Hakkarainen, 2014). Therefore, collaboration occurs between teachers and teacher educators in schools and universities; between the schools, universities and stakeholders in education, such as the MEC; and between providers of education or municipalities and individual teacher educators and teachers. These characteristics, which support the implementation of the development programme or strategy, have been put in place to aid in teachers' and teacher educators' professional learning (Maier & Schmidt, 2015).

The characteristics of the Finnish education system include a strategy-oriented design in a decentralised education system where is autonomy in each level of education. Decentralisation allows teachers and teacher educators to address local contexts in the implementation of the national curriculum, strategies and programmes. Decentralisation and autonomy are strongly linked to the Finnish way of interpreting the teachers' and teacher

educators' professionalism as well as the status of teachers and teacher education in Finnish society. However, decentralisation and autonomy make the preparation of national strategies and guidelines challenging—how should autonomous entities be supported to adopt these strategies and guidelines?

The Teacher Education and Basic Education Forum and the group behind the Core Curricula for Basic Education consist of administrators, researchers, experts and stakeholders, such as teacher educators, teachers, principals, students, parents, heads of education and training, researchers and experts. Consequently, development programmes and core curricula are prepared in collaboratively at the national level but are implemented at the local level. The Minister of Education and Culture has organised several workshops, meetings and web-based brainstorming sessions to allocate resources to pilot projects and other initiatives during the planning process all over the Finland; such avenues for communication engage local-level stakeholders, helping them to participate and prepare for the implementation of the developmental plans and core curricula. Therefore, the published developmental plans and curriculum do not represent only the opinion of the government but rather represent a consensus view. This collaborative process and use of resources support the planning and implementation of the development plans and curriculum in many ways. First, the design and implementation have been supported by engaging teachers and teacher educators in the preparation of the development programmes and curriculum. Second, they have been supported through organising professional learning through mentoring, training and pilot projects. Third, several national- and local-level meetings and seminars have been organised to support communication and professional learning. Thus, the design and implementation of the national core curriculum and teacher education development programmes foster a supportive environment for teacher educators and teachers, providing them with help throughout the implementation process (Müller, Norrie, Hernández, & Godson, 2010).

National-level collaboration in designing curricula and developing reforms is a tradition at both the national and local level. Curricula, reforms and programmes are always designed in heterogeneous groups, with experts from different fields. During the process, the aims of the changes are clarified, as are the methods for achieving these aims. A draft reform plan is discussed, and feedback is collected and analysed. Moreover, resources for piloting and implementation are offered. Consequently, the nature of the design and implementation of curricula, reforms and programmes is in line with OECD recommendations (Burns & Köster. 2016).

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