Digital Education Evolution:

Investigating Finland's Past and Future Directions

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Abstract

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This thesis investigates the evolution and current landscape of digital education in Finland, emphasizing the implications of a heavy reliance on digital tools in educational settings. As Finland's education system faces increasing challenges, particularly concerning the integration of diverse student populations, this study aims to explore the balance between digital and traditional educational methods. The research highlights the need for educational reforms that accommodate various learning styles and backgrounds, particularly for students from immigrant families who may require tailored support.

Utilizing qualitative interviews with educators across different school levels, the study examines historical milestones in Finland's digital education journey, current practices, and future directions influenced by technological advancements. Key factors such as policy decisions, social changes, and the impact of artificial intelligence on learning processes are also addressed. The findings reveal significant concerns regarding the implications of digitalization, including ethical considerations surrounding AI usage, reduced human interaction, and the effectiveness of digital tools compared to traditional methods.

Ultimately, this thesis advocates for a mixed approach to education that prioritizes human interaction and inclusivity while integrating digital technologies. By providing insights into the benefits and drawbacks of digital education, the research aims to contribute to ongoing discussions about optimizing educational strategies in Finland and ensuring that all students have equitable access to resources and support.

Key words
Digital education, digital tools, human interaction, AI usage

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1 Introduction

The focus of this thesis is on the evolution of digital education in Finland, particularly concerning the unique needs of immigrant-background pupils. As a father with concerns about my child's educational experience, I wanted to understand how the Finnish education system is adapting to the digital landscape. My interest in this topic is also sustained by my prior experience teaching in an Erasmus+ project, which exposed me to various educational practices across Europe. This background has driven me to explore how Finland, known for its exceptional education system, is integrating digital technologies while maintaining its commitment to high-quality learning outcomes.

The importance of this research centres on two main areas. First, it highlights the risks associated with an over-reliance on digital education. While digital tools offer innovative ways to enhance learning, excessive screen time can negatively impact social interactions and learning effectiveness. Therefore, a mixed approach that incorporates both digital and traditional methods is essential for fostering a supportive learning environment. This balance is crucial for growing essential skills like critical thinking and communication, which are vital in today's interconnected world.

Second, the research addresses the need for optimizing educational methods for immigrant students. With an increasing number of immigrant families residing in Finland, it is essential to create accessible and inclusive educational frameworks that cater to their unique backgrounds and experiences. Providing equitable access to information and tools will empower these students, ensuring that they can thrive academically and socially.

This topic is timely as Finland navigates the complexities of digital education against the backdrop of economic challenges and a declining native population. By examining how educators are adapting to these changes, this research aims to contribute to the ongoing dialogue about the future of education in Finland.

In this thesis, I will employ qualitative research methods, primarily through interviews with teachers, to gather insights into their experiences and perspectives on digital education. This approach will help to illuminate the current landscape of education in Finland, revealing both the opportunities and challenges presented by digital integration.

1.1 Research Objectives

This study aims to explore the evolution of digital education in Finland, with a particular focus on the needs of immigrant-background pupils. The research objectives are as follows:

1. **Explore the History of Digital Education:** Investigate significant milestones in Finland's journey towards digital integration in education.
2. **Understand Current Perspectives:** Gather insights from educators to assess the effectiveness of digital education and its impact on student learning.
3. **Address Challenges in Digital Education:** Identify barriers that immigrant-background students face in accessing and benefiting from digital education, including language support and social integration issues.
4. **Examine Future Trends:** Analyze how new technologies, like artificial intelligence, can enhance digital education and improve learning outcomes for all students, while also considering potential drawbacks.
5. **Promote Inclusive Practices:** Highlight the importance of creating an inclusive learning environment that supports language learning and social integration for immigrant-background students.
6. **Provide Recommendations for Improvement:** Suggest practical steps for policymakers and educational institutions to enhance digital education and ensure it meets the diverse needs of all students.

By focusing on these objectives, this research aims to provide a comprehensive overview of digital education's past, present, and potential future in Finland, ultimately contributing to a more inclusive educational framework that benefits all learners.

Ultimately, this research aims to challenge traditional notions of education by emphasizing the importance of human interaction and mixed methods in teaching, particularly for immigrant-background pupils. By fostering a more inclusive and supportive educational environment, we can better prepare all students for the demands of the 21st century.

2 Key Concepts and Implications in Education:

Everyday we hear around us words like “digitalization”, “digital tools”, “online courses”, “virtual meetings”, signalling the ongoing revolution in digital education and transformation of of traditional learning paradigms into dynamic, accessible, and interactive experiences that transcend geographical boundaries. I believe we should start by explaining some of the related terms which will make easier to understand the big picture.

2.1 Digitization, Digitalization, And Digital Transformation

Digitization refers to the process of converting analogue material into a digital format, typically for storage and use in a computer. This process involves transforming physical resources, such as documents, into electronic form. (ScienceDirect 2017.) A simple example is scanning a photo into computer.

Digitalization - According to Daniel Kreiss, Associate Professor at the University of North Carolina, digitalization refers to the restructuring of various areas of social life through digital communication and media infrastructures (Bloomberg, 2018). This concept highlights how technology is reshaping traditional systems and interactions across different sectors. In simpler terms, represents the process of incorporating digital technologies and tools into various aspects of our lives. It's about using the power of computers, the internet, and digital platforms to enhance and streamline how we communicate, work, learn, and interact with the world around us.

Digital transformation is the process of using digital technologies to create new — or modify existing — business processes, culture, and customer experiences to meet changing business and market requirements. This reimagining of business in the digital age is digital transformation. It transcends traditional roles like sales, marketing, and customer service. Instead, digital transformation begins and ends with how you think about, and engage with, customers. As we move from paper to spreadsheets to smart applications for managing our business, we have the chance to reimagine how we do business — how we engage our customers — with digital technology on our side. (Salesforce 2024.)

2.2 Digital Education – definition and impact

In education, digitalization means leveraging technology to create new opportunities for learning, whether through online courses, interactive educational apps, or virtual classrooms. It's about making learning more accessible to people regardless of their location or circumstances. Digitalization in education isn't just about using technology; it's about using it thoughtfully and innovatively to improve the quality and effectiveness of teaching and learning experiences.

Digital education represents a strategy in learning and training aimed at meeting the evolving demands of the information society. It emphasizes the enhanced use of technology and the cultivation of digital skills within educational environments. Essentially, digital education involves utilizing digital tools to support and improve teaching and learning processes. It goes beyond enabling remote interaction, embodying a deep transformation in education driven by the rise of Information and Communication Technologies (ICT) and their societal influence. Consequently, it is essential to integrate ICT across all educational and training levels, including the human resources that support these sectors. (Smowl.net 2023.)

Digital education encompasses two key aspects: the use of digital tools in pedagogy to enhance teaching, learning, and assessment, and the development of digital skills in both students and education professionals. These elements aim to foster more effective learning environments while ensuring that all participants are equipped with the necessary skills to navigate an increasingly digital world. Unlike Online Education, which focuses solely on remote learning, digital education integrates the development of digital competencies into both curricula and teaching practices. However, the terms are sometimes used interchangeably. (EABHES Europe 2022.)

In modern educational systems, accessibility, flexibility, and personalization stand out as the most crucial elements. These three factors ensure that education is available to everyone, adaptable to diverse needs and circumstances, and tailored to individual preferences and abilities.

Digitizing education brings challenges, including the difficulty for teachers to stay updated with rapid technological changes and ensuring all students have the needed devices. Privacy concerns also arise when using digital tools in classrooms. Despite these issues, digital education is transformative, enhancing collaboration between students and teachers and providing access to learning resources globally. With technology evolving rapidly, even more advancements in education are anticipated in the future. (Roberts 2023.)

3 Theoretical Framework

3.1 Historical evolution of Finland’s Educational System

Finland's first schools were founded by the church and Catholic monks at the latter part of 13th century. The church was the main organizer of education until the mid 19th century. The languages of schooling were Swedish and Latin. The first school where the language of instruction was Finnish was founded in 1858. (Eurydice 2024.)

The first university, the Royal Academy of Turku was founded in 1640. The university was moved to Helsinki during the Russian rule, where it eventually became University of Helsinki. (Eurydice 2024.)

Finland was among the last countries in Europe to make education compulsory. In the 1920s, Finland was a poor, predominantly agricultural country, and had just recently become independent. The act concerning general compulsory education came into force 1921. However, schooling was very common in urban areas also long before that, in rural areas it was less common. One of the aims was to do away with the educational inequality between children in towns and the country. In 1921 the so called folk school (kansakoulu) offered six years of education and education became compulsory for all children aged 7-13. (Eurydice 2024.)

After the 4th grade in the folk school, academically gifted pupils could apply to grammar schools (oppikoulu). This school path comprised of a 5-6 year middle school and 3 year high school, and was more theoretical and academic in nature than folk school, preparing pupils for future academic study. Tuition fees in grammar schools, especially in smaller cities and rural areas, made these schools unavailable for economically disadvantages families. (Eurydice 2024.)

One of the recipes for success in the Finnish school system is the school lunch. In 1948, the act on school meals was enacted, obligating municipalities to provide a free-of-charge lunch in schools on each of the then six school days. (Hannele Tavi 2017.) The first dishes offered were mainly soups or porridges. The objective was, and still is, to maintain and improve pupils’ health and well-being and to give them energy to concentrate on their school work. Nowadays, the purpose extends far beyond just serving school lunches, and food education in schools is a holistic pedagogical tool. Every municipality is required to draw up a plan for maintaining and improving the pupils’ welfare. This plan provides the key principles for arranging school meals and sets out the objectives for health and nutritional education and for teaching good manners. School meals in Finland serve not only as a source of nutrition but also as a pedagogical tool. They promote healthy eating habits by encouraging the consumption of vegetables, fruits, whole grains, and low-fat dairy. Teachers

typically eat alongside students, reinforcing good table manners and fostering a communal atmosphere. This approach integrates health education with daily routines, supporting the development of lifelong healthy eating habits. (Visitedufinn 2018.)

Over the years the two-path system was starting to be seen as old fashioned. A new school system was seen as necessary to provide citizens with the skills and knowledge they need in the fast-changing society, with one path for all pupils to give equal opportunities for everyone despite their socioeconomic status. (Eurydice 2024.)

Education has expanded rapidly in recent decades, when Finland transformed from an agricultural society to a modern information society. Figure 1 shows the education structure of the population aged 15 or over from 1970 to 2017 in five-year intervals. It shows that from 1970 to 2017, Finnish education has expanded at all levels. In 1970, on average, only 9 percent of Finland's population were tertiary educated, whereas in 2017, 30 percent on average had a tertiary education degree. Thus, from 1970 to 2017, the proportion of the tertiary-educated population increased more than threefold. Additionally, the population with secondary education increased from 16 percent to 41 percent. In 2017, 72 percent of the Finnish population on average had some education qualification compared to 1970, when, on average, only 25 percent had such a qualification. (Lehti 2020.)

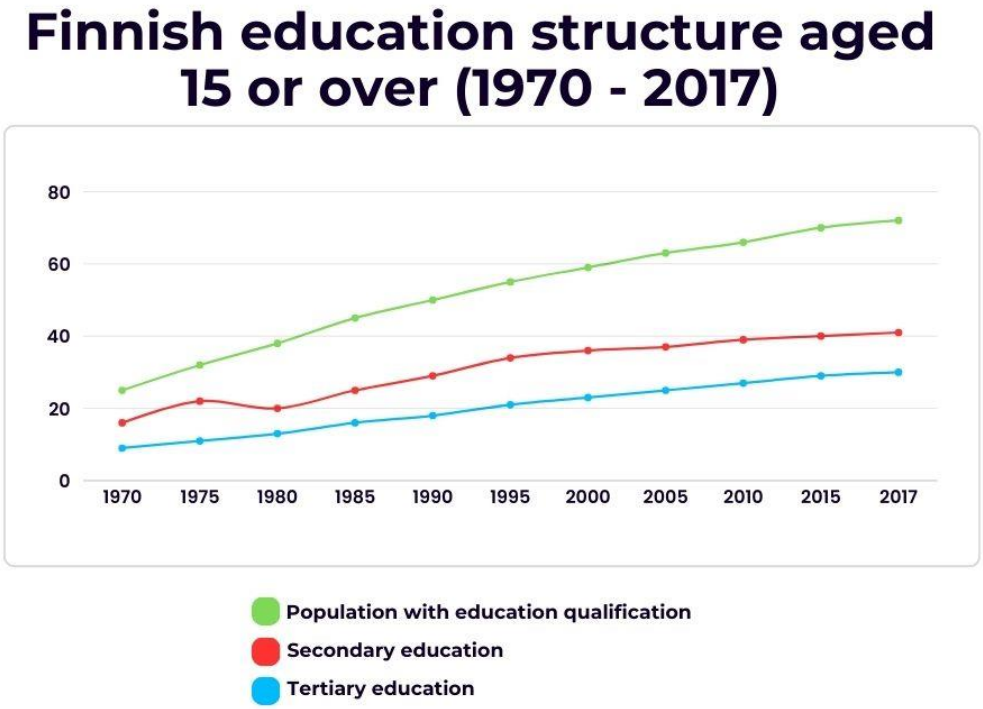

Figure 1. Finnish education structure aged 15 or over (1970-2017). (Source: Created with Canvas on November 4, 2024, based on data from Official Statistics of Finland, 2017.)

In the late 1970s, Finland was positioned toward the bottom of the OECD countries in terms of research and development expenditure. (Sahlberg, 2019, p. 3). The nine-year free comprehensive school system was implemented throughout Finland from 1972 to 1977. It applied to all children aged 7-15. (Eurydice 2024.)

After the establishment of the present Finnish comprehensive school system in the 1970s and early 1980s, the administration of comprehensive schools and the entire education system was centralised. Centralisation was regarded as a means of carrying out comprehensive school reform despite the opposition from right-wing parties and the association of secondary school teachers. In the late 1980s the school system was decentralised. Schools became more responsible for their own management and were to develop their own curricula under the guidelines set by the National Board of Education. Teachers chose their methods, which enhanced their professional expertise and status. (Antikainen, 2007)

The most popular computers used in high schools during these years were ABC80, Apple II, Nokia MikroMikko, and AMC-100, which the National Board of Education recommended. The machines usually operated with 32–128 kB memory and the most common operating system was CP/M, provided by Digital Research. Furthermore, the most typical computer system was AMC-100, manufactured by Finnish Auditek. (Saarikoski 2010.)

In Finland, the number of computer systems ordered by schools increased slowly, but in 1980 and 1981, computerization began to escalate, when more state aid was available. In 1979, one high school out of ten had purchased computers and associated peripherals, but in 1981, almost 33 percent of high schools had some sort of Computer Courses in Finnish Schools. Furthermore, in high schools, ADP-courses (Automatic Data Processing) were officially included in the curricula in 1982 and, during the autumn term of the same year, ADP courses were arranged in 320 high schools, which comprised almost 70 percent of all upper secondary schools. During the following spring term, almost 87 percent of all high schools could arrange ADP-courses. In the autumn term of 1983, ADP-teaching was offered in practically every Finnish high school. The National Board of Education calculated that about one third of upper secondary students took a computer course as a free elective. (Saarikoski 2010.)

During these years, the emergence of information networks began to increase. Already in the late 1980s, some pupils and students were also active users of information networks, such as BBS (Bulletin Board System) and several other systems. BBS networks were especially important in Finland before the country was connected to the Internet in the late 1980s. This tradition also

continued in the 1990s, when the culture of information networks began to spread. In universities and other institutions, local networks were important points of connection for hobbyists, students, and professionals of information technology. These socially constructed networks led to more benefits and more use. The short cultural history of this development includes the communal spirit and mutual support of USENET, BBS, and the early Internet, in general, and leads into the Open Source movement as its contemporary successor. (Saarikoski 2010.)

On April 23, 1999, the Ministry of Education released a new National Strategy for Education, Training, and Research in the Information Society for 2000-2004. A review of the previous strategy shows that Finland's progress in developing its information society has been favourable by international standards, especially in terms of technological infrastructure. However, the adoption of ICT in educational institutions has been inconsistent. Despite these challenges, funding for related education and research has risen, and Finland aims to be a leader in interactive knowledge societies by 2004. (Kivi, 2022.)

Extract from 2010's National Plan for Educational Use of Information and Communications Technology regarding the e-learning materials and applications:

New procedures are required for storage, modification and later utilisation of materials. E-learning materials are developed paying special attention to the design principles of material that supports meaningful and experiential learning. The fast development of tools and applications is constantly creating new opportunities for presenting and using materials in education. (Finnish National Board of Education 2010.)

Production should focus on experiential e-learning materials that develop thinking skills. Teaching and learning should make use of games and opportunities offered by augmented reality. The quality criteria for e-learning materials should be reformed and utilised in planning efforts. The aim is for at least half of the materials to be in electronic format by 2015. (Finnish National Board of Education 2010.)

E-learning materials should be compiled so as to make them accessible through a single search tool. The Edu.fi website should be developed to create a channel where teachers and pupils can find e-learning materials. Materials developed with public funds and those available free of charge should be collected to form a single service, which should also include links to commercial materials. (Finnish National Board of Education 2010.)

The 2010s National Plan for Educational Use of Information and Communications Technology in Finland is about making learning easy and accessible for everyone. They focused on creating e-learning materials and apps that make learning meaningful and exciting, learning through games

and augmented reality. They made it easy to find these materials by putting them all in one place on the Edu.fi website. (Finnish National Board of Education 2010.)

In 2015, the Finnish Ministry of Education and Culture launched a digitalisation project called the “digital leap”. The objective of this project was to help schools quickly modernise their information and communication technology (ICT) infrastructure and pedagogy (Kupiainen 2022, 287). The government also allocated funding to educational improvements during the years 2016–2020 (Lavonen & Salmela-Aro, 2022). The fund was used to increase teachers’ and students’ digital skills, to develop teachers’ pre-service education and digital tutor teacher models, and to support special education and the use of ICT (Lavonen & Salmela-Aro, 2022). Moreover, government funding will be allocated to teacher education and in-service training to encourage innovative uses of ICT in teaching. Allegedly, the digital leap will facilitate the design of collaborative learning environments and raise motivation among pupils, which will result both in better learning achievements and in the nation’s competitiveness in the global market economy. (Saari & Säntti, 2018.)

The digital leap was part of school reform to digitalise schools, that means to develop ICT use in teaching and learning, and it was not the first one. There have been six official national-level digital education and ICT strategies during the last 35 years, as well as hundreds of different, usually short-period, development projects. (Lavonen & Salmela-Aro, 2022.)

As a result of an increased emphasis on innovation, Finnish R&D expenditure, which in the 1970s had been among the lowest in the OECD countries, had risen to be among the highest in the world by 2010 decreasing drastically after 2010 but growing to its highest level in 2023. (See Figure 2)

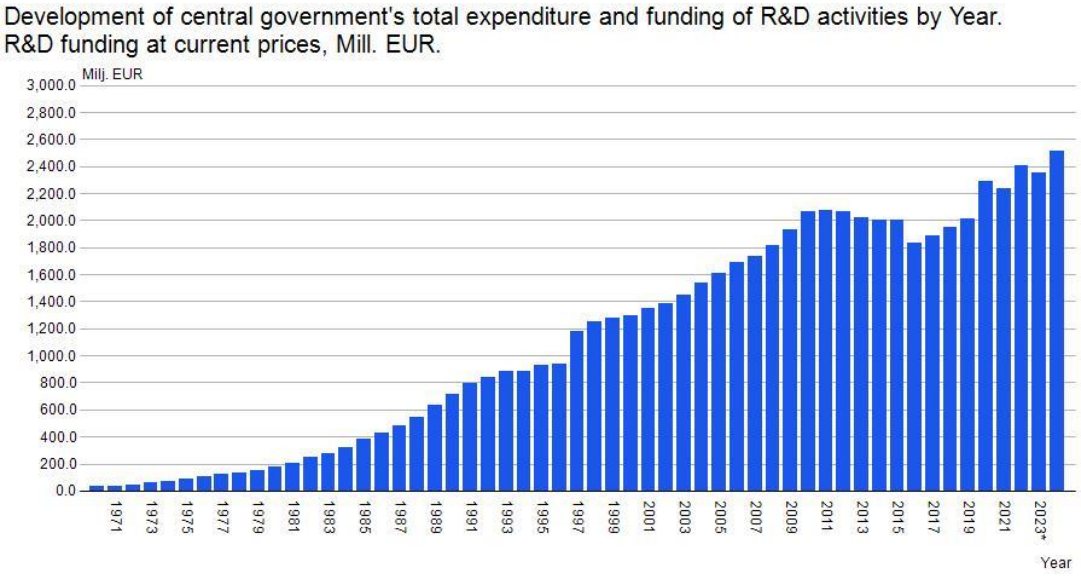

Figure 2. Research and Development Expenditure in Finland by Year (EUR Million).

Source: Sotarauta, Kolehmainen & Laasonen, 2022. Figure created with Canvas by author on April 24, 2024.

3.2 Current Landscape of Digital Education in Finland

Finland is known for its progressive education system, which has adapted effectively to the demands of digitalization. The integration of digital tools and platforms has become central to Finnish education, from early childhood to higher education. The country's education system emphasizes decentralization, where municipalities and schools enjoy considerable autonomy in choosing and implementing digital solutions. These tools not only support teaching and learning but also enable the efficient management of educational institutions. The following sections will explore the structure of the Finnish education system, the ecosystem of digital education, and the role of platforms like Learning Management Systems (LMS) in facilitating e-learning and cross-institutional collaboration.

3.2.1 The Finnish education system

The Finnish education system is structured across several key stages:

- early childhood care
- pre-primary
- basic education (primary and lower secondary)
- general upper secondary
- vocational training
- higher education
- adult education (Opetushallitus 2024.)

Compulsory education in Finland, covering ages 6 to 18, includes pre-primary, primary, lower secondary, and upper secondary levels. After completing nine years of basic education, students choose between general upper secondary (leading to the matriculation exam) and vocational upper secondary education, which grants vocational qualifications. (Opetushallitus 2024.)

The Finnish higher education system consists of universities and universities of applied sciences (UAS). Universities focus on both education and research and have the authority to grant doctoral degrees. UAS institutions provide professional higher education, engaging in applied research and development across multiple fields. (Opetushallitus 2024.)

In Finland, higher education uses a credit system to measure the workload of studies, with credits reflecting the amount of work required to complete a course or program. Typically, one academic year equals 60 ECTS (European Credit Transfer and Accumulation System) credits, with bachelor's, master's, and doctoral degrees requiring different total credits based on their level and focus area. This system is consistent with the European standards, enabling credit transfer and comparability across countries. (Opetushallitus 2024.)

leaIn Finland, higher education qualifications are classified into three levels: 6, 7, and 8, as defined by both the National Qualifications Framework and the European Qualifications Framework. These levels help standardize educational qualifications, ensuring they are recognized across different countries and sectors. Level 6 typically corresponds to bachelor's degrees, Level 7 to master's degrees, and Level 8 to doctoral degrees. This system aligns with international frameworks for easier comparison and mobility within the global education system. (Opetushallitus, 2024.)

In Finland, the Ministry of Education and Culture is responsible for determining the policies and direction of the Finnish education system. It outlines the general education strategy, manages all operations financed with state budget, and prepares legislation and governmental decisions regarding education. The Finnish National Agency for Education oversees the development and execution of education policy. However, in Finland as in the other Nordic countries, the central government devolves certain responsibilities to municipalities (sometimes groups of municipalities in upper secondary education) that it guides with central legislation.1 Schools in Finland operate partly with central government funding but draw the majority of their budget (about two-thirds, depending on educational levels) from local taxes. This share is slightly lower than it is Sweden or Norway. (OECD Library 2023.)

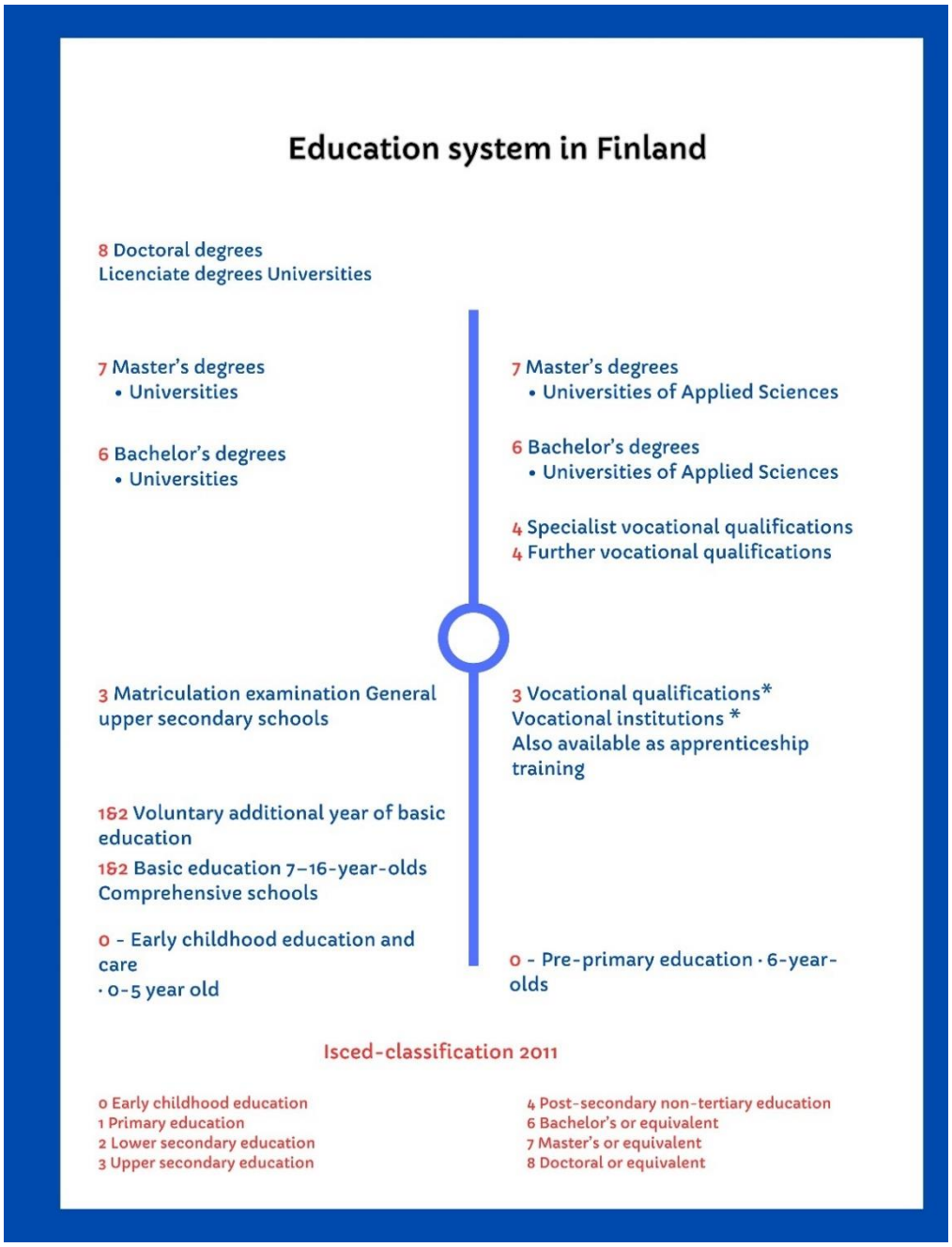

Figure 3. Education System in Finland. (Source: Created with Canvas on May 25, 2024, based on a diagram from the Ministry of Education and Culture website(OKM), 2024.)

3.2.2 Digital Education Ecosystem

Finland enjoys one of the most advanced and expansive applications of digital technology in education, starting from the first grade of primary school throughout the education system, and consisting of formal as well as extracurricular learning through technology.

The ministry provides schools across all levels of education with access to digital tools designed for system management, whose use is often compulsory; but providing access to tools designed for institutional management or for teaching and learning purposes is devolved to the municipalities and to schools themselves – resources that they can acquire, use and complement at their discretion. The regulation around the access to and use of digital tools and resources in education in Finland is more centralised than their provision, as it revolves around a curriculum set at the national level. In general, the Finnish ministry is the authority that sets the national rules and guidelines in a more top-down manner than in neighbouring countries. Finnish municipalities and schools have a large degree of autonomy in decision-making and further guidelines may exist at the local level, but their power of governance is limited. (OECD Library 2023.)

As a result of the decentralisation of public responsibility in education, the digital tools and resources that Finnish schools have access to are not solely provided by the central government. Municipalities share public responsibilities for providing and maintaining a digital infrastructure for education; and schools can add to their digital ecosystem by acquiring tools from private EdTech companies and publishers (sometimes in a “freemium model” where basic features are provided free of charge while more advanced features must be paid for), or by using free materials from external stakeholders such as philanthropists, education publishers, universities, and teachers. (OECD Library 2023.)

The cornerstone of the Finnish digital infrastructure for system management is KOSKI, the student information system owned and used at the national level. The National Agency for Education launched KOSKI in 2018 to serve both as a national registry for primary and secondary education (including VET), and as a platform for sharing student data. KOSKI centralises the collection of various types of information (student attendance, progress, diplomas, certificates, study records, teacher-given grades, etc.) in a single data warehouse. The database, fed with data from schools’ student admission registers and from the national registry of matriculation examination, assigns a unique and longitudinal identifier to every student. (OECD Library 2023.)

KOSKI data inform the central government’s transfer of funding to municipalities, as school funding is primarily calculated based on the number of students enrolled in each school. In that sense, KOSKI also serves the functionalities of an administrative function system (See Figure 4). Further to that, KOSKI data are aggregated and displayed on Vipunen, the government’s public dashboard of educational statistics, and made readily available for download or consultation to any interested party. In the coming years, the National Agency for Education plans on providing analytics dashboards to school principals across all levels of education, for instance to allow them to better forecast and adjust their operations in comparison with other schools. (OECD Library 2023.)

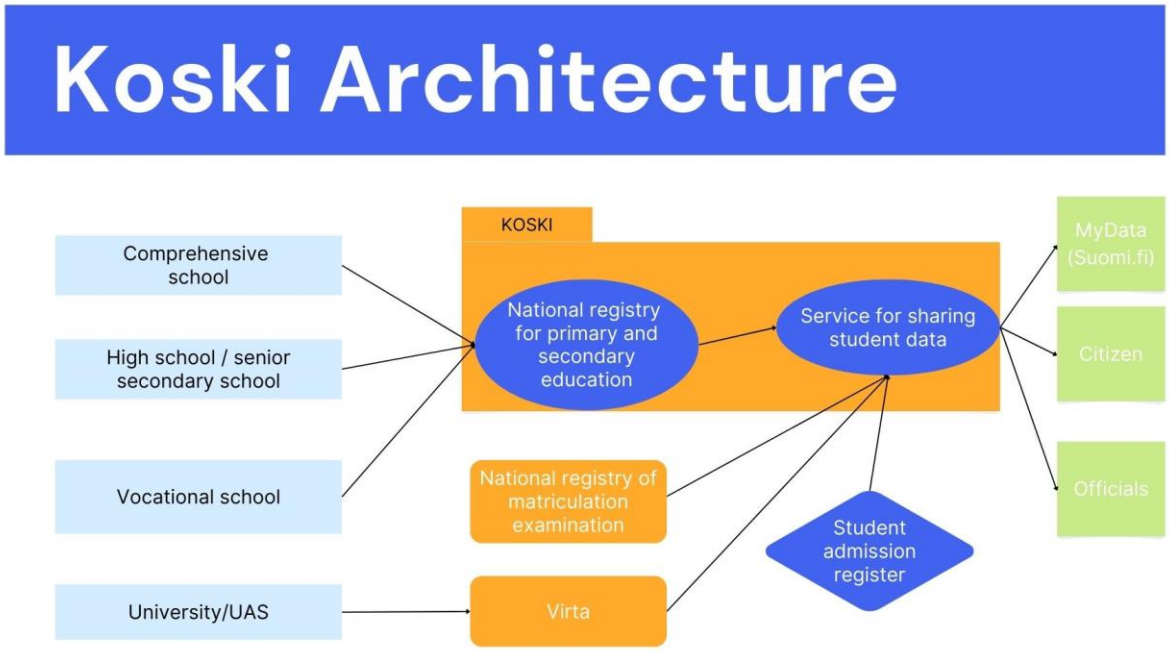

Figure 4. Koski Architecture. (Source: Created with Canva on May 10, 2024, based on a diagram from Opetushallitus, 2021.)

3.2.3 E-Learning and Learning Management System(LMS)

E-learning is a mode of learning that takes place electronically, often via the Internet. It requires students to use electronic devices such as computers, tablets and cell phones—usually their own, although often students use institutional devices too.

A learning management system (LMS), the basic description is a software application that automates the administration, tracking, and reporting of training events (Ellis, Ryann K 2024).

In March 2020, Finnish universities of applied sciences transitioned to online teaching. The eAMK project and the CampusOnline portal were key initiatives in this process, offering shared online courses across 23 UASs. This enabled students to take courses fully online, with options available for degree and exchange students. The CampusOnline.fi portal gathered these courses, making them accessible to everyone, either for free or through the Open University of Applied Sciences. (SAMK, 2020.)

The recent agreement between universities and UASs in Finland aims to broaden opportunities for cross-sectoral studies, allowing for more flexible academic pathways. This initiative is supported by partnerships with secondary-level institutions, which streamline the process for students to have their cross-sectoral studies automatically recognized. Furthermore, the implementation of Recognition of Prior Learning (RPL) at universities enhances students' learning experiences, while personal study plans (PSPs) are highlighted as an effective tool for guiding students' academic choices, although they require proactive updates from students. (Moitus 2020.)

Finland has made significant progress in developing flexible learning pathways (FLPs) in higher education, enhancing cross-disciplinary and cross-sectoral studies. However, further potential exists within the FLP concept. A more strategic, competency-based approach could address challenges such as demographic changes, workforce skill upgrades, and the promotion of equal educational opportunities. By aligning FLP policies with equity measures, Finland can ensure access and success in higher education for all students, meeting the nation's broader educational goals. (Moitus 2020.)

3.3 Future Directions of Digital Education in Finland

Finland is shaping the future of its education system with a strong focus on digitalization. By 2027, the goal is to become a global leader in using sustainable digital solutions in teaching, learning, and training. In recent years, significant progress has been made in developing digital learning environments, thanks to collaborative efforts between national bodies and local educators. International and national policies are pushing this transformation forward, with an emphasis on making education more accessible and inclusive through the use of technology.

The future of education in Finland is not just about integrating new tools—it’s about creating equal opportunities for all learners. Digital solutions will play a crucial role in supporting individual learning needs and ensuring that education is available to everyone, regardless of their circumstances. The focus on cooperation, innovation, and ethical use of technology will help build a system that benefits both students and educators, supporting lifelong learning and enhancing overall well-being.

3.3.1 Vision

The vision for Finland is to become the world's leading developer and user of sustainable digitalisation in teaching and education and training by 2027.

In recent years, digital solutions and learning environments for education, teaching and training have been developed in a determined manner at the national level as well as by individual education and training actors and their cooperation networks.

International and national strategies set ambitious targets for the digital transformation of education and training, which has developed rapidly in recent years. Determined cooperation is needed to meet the objectives and development needs. Digitalisation promotes equal opportunities for everyone to learn and develop. Digital tools and environments support the individual needs of learners and promote equality and the accessibility of education. Digitalisation supports cooperation between actors and learning at different stages of life. The promotion of digitalisation will be based on knowledge and follow the principles of sustainable development. The realisation of these policies will mean increasing the competence of individuals and advancing equality, long-term, innovative and systematic development of digital solutions in the sector, strengthening the knowledge base of education policy and education management, and improving wellbeing extensively through active digital citizenship. The policies are shared by the sector and apply to the entire education system. (Valtioneuvosto 2023.)

The Education Policy Report made in Finland by Sanna Marin's government (2019-2023) outlines the 2040 target (Valtioneuvosto 2023.):

"New technologies are used extensively and innovatively to support learning. The digital learning environment is highly evolved, and the data repositories for education are available to both people and society to promote learning and pedagogical development. Digital education, learning platforms and solutions enable independent learning, regardless of time and place."

This vision emphasizes promoting equal learning opportunities, supporting individual learner needs, and ensuring accessibility to education through advanced digital tools and environments. The Ministry's approach is grounded in knowledge-based development, adhering to principles of sustainable development, and prioritizing ethical sustainability and individual wellbeing. This comprehensive strategy aims to increase individual competence and equality, encourage innovative digital solutions, and improve overall wellbeing through active digital citizenship.

3.3.2 Main goals

Everyone's ability to learn and develop their competence is improved through digitalisation.

All learners have equal access to the opportunities brought by digitalisation and are skilled to make use of them. This is a prerequisite for active citizenship. The learning path forms a life-long continuum for the learners, enabling them to develop their competence to a high level. All education,

teaching and training professionals have first-class digital competence and capabilities for utilising digital solutions in a pedagogically sustainable way. Learners and teaching and guidance personnel play an active role in developing user-driven digital solutions in the sector. (Valtioneuvosto 2023.)

Digital solutions constitute a high-quality, interoperable digital operating environment supporting cooperation between actors

A high-quality and interoperable digital operating environment comprehensively supports the sector's strategic objectives and promotes the implementation of cooperation across levels of education and sectoral boundaries. Digital solutions are developed in cooperation nationally and locally. The services offered at the national level and services provided by different service providers are interoperable. All the education and training actors have a shared, maintained situational picture of the digital environments and services as a whole and related development needs. The roles of national and local services have been defined and their data flow descriptions are up-to date. The division of responsibilities between actors and the development paths of national services and definitions is clear to all actors. (Valtioneuvosto 2023.)

Learners and personnel have access to telecommunications connections and devices that enable the high-quality implementation of the objectives of education, teaching and training. The use of digital technology is based on research knowledge and responds to the needs of learning and teaching. ECEC and education providers have the ability to make procurements and maintain a secure digital operating environment that is based on pedagogical criteria while ensuring the data protection of individuals. (Valtioneuvosto 2023.)

Finland's digital infrastructure and services set an international standard of excellence. They are developed and maintained as a whole that includes the entire education path, supporting the needs of learners, personnel, early childhood education and care and education providers. The management of digital solutions and anticipation of development needs are based on a joint situation picture of everyone involved and a clear division of responsibilities. (Valtioneuvosto 2023.)

The implementation of digital services for teaching and learning are based on research and best practices, and the services are user-oriented and easy to implement. The range of digital services and learning materials is versatile, accessible, user-oriented and easily available. The culture of the utilisation of open learning materials is highly advanced and active on a global scale. (Valtioneuvosto 2023.)

Digital development in the field of education, teaching and training is open, and its results are available for everyone to utilise as extensively as possible. The use of open source code and licences

supports the development and progress of education, teaching and training technologies. (Valtioneuvosto 2023.)

Digitalisation supports knowledge-based development.

The joint data resources, statistical data, archive data and up-to-date analysis results and research findings of the education, teaching and training sector constitute an information infrastructure. Digital solutions used for the utilisation of research and data have developed around this infrastructure. The datasets and results have been described in a compiled, comprehensive and uniform manner, and are easily available and easy to utilise. The data generated in national services and collected in joint data repositories are easy to examine and analyse using shared digital solutions. The solutions meet the needs of the actors that need the data and are based on joint public administration standards, practices and recommendations. Decisions made in the sector are founded on knowledge and a situational picture based on up-to-date and high-quality data. Education and training actors have improved their competence in knowledge management, and know how to utilise a common knowledge base and develop their activities based on comparable data. The impacts of knowledge-based decision-making and digitalisation are studied and assessed as a part of knowledge-based development. (Valtioneuvosto 2023.)

In summary, Finland's vision for digitalising education by 2027, led by the Ministry of Education and Culture, is a bold commitment to equal learning opportunities, individualized support, and enhanced accessibility through digital tools. Grounded in sustainable development principles and prioritizing individual wellbeing, this vision emphasizes the importance of a knowledge-based approach. To realize this vision, Finland focuses on systematically developing digital competence, fostering a high-quality, interoperable digital environment, and leveraging data-driven insights for informed decision-making. This comprehensive strategy aims to elevate competence levels, drive innovation, and promote wellbeing through active digital engagement. By achieving these objectives, Finland also sets a global standard for digital education, characterized by cutting-edge technologies, sophisticated learning environments, and accessible data resources facilitating continuous learning and pedagogical advancement.

3.3.3 AI in education

AI-driven educational tools serve various roles for educators, learners, and school management, enhancing teaching efficiency, personalizing learning, and streamlining administrative processes. Many educators are exploring AI tools to enhance teaching and learning, seeking technology that addresses unmet priorities in education. As they experience AI in their everyday lives—such as using voice assistants or automated planning—they are curious about how these tools can be safely,

effectively, and scalable applied in education. Many are actively testing new AI tools as they are released, hoping to leverage technology to improve education outcomes. (Walton Family Foundation 2023.)

Matthew Lynch, a leading voice on the role of artificial intelligence in education, addresses both its benefits and potential challenges in his book *My Vision for the Future of Artificial Intelligence in Education*. He underscores the value of AI in educational contexts while cautioning that it requires careful monitoring to mitigate risks and ensure its positive development in society (University of San Diego 2024).

The ethical considerations surrounding AI are complex, given that AI lacks an inherent moral compass. It's argued that AI programming's ethical value mirrors its developers' values. As AI becomes increasingly integrated into technology, experts stress the importance of embedding ethics into the design and use of AI systems. Monitoring the outcomes of AI is vital to ensuring it adheres to human moral standards. This ongoing debate is prompting universities to incorporate AI ethics into curricula, highlighting the growing importance of these issues in the education sector (University of San Diego 2024.)

Let's focus on the benefits of AI in educational system:

AI-driven educational tools, including games, adaptive platforms, chatbots, and intelligent tutoring systems, offer personalized support for students. At the same time, automated grading, feedback, and planning systems assist educators in streamlining their tasks, allowing them to focus more on student engagement and teaching. These innovations help optimize both the learning and teaching process, enhancing educational efficiency and experience (Forbes 2024).

AI-Powered Educational Games

Educational computer games like *The Oregon Trail* have been used in schools since the 1970s to enhance learning through play. Today, AI-powered games take this a step further, offering tailored learning experiences based on user responses. These games adapt to the learner's needs, providing more personalized educational support (Forbes 2024).

Adaptive Learning Platforms

Carnegie Learning and Knewton are prominent players in adaptive learning, offering platforms that personalize learning activities and content in real-time. These systems continuously assess students, providing immediate feedback and adjusting learning paths. Their approaches range from

rule-based systems to complex machine learning algorithms, enhancing educational experiences by responding dynamically to student needs (Forbes, 2024).

Chatbots for Student Support

At many higher education institutions, chatbots assist students by answering admissions questions, providing course details, and sending reminders. Additionally, these bots support students by helping them brainstorm, improve writing, and optimize study routines, offering personalized learning experiences (Forbes 2024).

Automated Grading and Feedback Systems

Artificial intelligence systems can streamline grading, planning, and administrative tasks, allowing educators to focus more on student interaction. This time-saving benefit is one of the key advantages cited for incorporating AI into educational settings, enhancing both teaching effectiveness and student engagement (Forbes 2024).

Intelligent Tutoring Systems

Intelligent tutoring systems, such as Duolingo and Khan Academy's Khanmigo, are designed to provide personalized learning experiences for specific subjects, like math or languages. These systems simulate the one-on-one interaction typically found with human tutors, offering tailored instruction that adapts to the learner's pace and progress, improving educational outcomes (Forbes 2024.)

Matthew Lynch discusses how AI is transforming education by addressing concerns raised by critics. He emphasizes the potential benefits of AI, such as personalized learning and efficient administration, while advocating for responsible integration to ensure its positive impact. He explores various ways AI is enhancing educational experiences, addressing both its potential and limitations in improving learning .(University of San Diego 2024.)

Here are a few examples:

Adaptive Learning: Adaptive learning systems are designed to tailor instructional experiences to students' current skill levels, helping them master both basic and advanced concepts. By continuously assessing learners' progress, these systems adjust the content and teaching methods to ensure proficiency. Such technologies offer a personalized learning path for students. (University of San Diego 2024.)

Assistive Technology: AI assistive technology can offer significant support to students with special needs by providing tools such as text-to-speech programs, which can read passages aloud to visually impaired students. This creates a more inclusive and equitable learning environment by addressing diverse needs. (University of San Diego 2024.)

Early Childhood Education: AI is currently enhancing early childhood education by powering interactive games that teach young children basic academic skills. These games are designed to engage children while helping them build foundational knowledge in a fun and effective way. This application of AI can be a valuable tool in early learning settings. (University of San Diego 2024.)

Data and Learning Analytics: AI is being used in education to analyse and interpret student data, helping educators and administrators make more informed decisions. This can lead to improved student outcomes, as AI identifies trends, patterns, and areas where students may need additional support, enabling more personalized learning experiences. Data and learning analytics powered by AI also help in optimizing teaching strategies and enhancing educational planning. (University of San Diego 2024.)

Scheduling: AI is used to help administrators efficiently schedule courses and assist individuals in managing their personal and professional schedules. It optimizes planning, reduces conflicts, and improves time management across various academic and administrative tasks. (University of San Diego 2024.)

Facilities Management: AI helps manage facilities by monitoring essential services like power, Wi-Fi, and water. It alerts facilities management teams when issues arise, ensuring prompt action and preventing service disruptions. (University of San Diego 2024.)

Overall School Management: AI is increasingly used in managing various aspects of school operations, including student records, transportation, IT, maintenance, and budgeting. These systems help streamline administrative tasks, allowing for more efficient management of resources and services. (University of San Diego 2024.)

Writing: Lynch highlights the growing role of AI in helping students improve their writing skills, and he shares his personal experience of using a grammar app while writing his article. This showcases how AI tools can assist both students and professionals in refining their writing. (University of San Diego 2024.)

Lynch's list includes numerous areas where AI is currently utilized in education. These span classroom management, lesson planning, audio-visual tools, communication between parents and teachers, language learning, test preparation, assessments, and learning management systems.

Additionally, AI is applied to gamification for student engagement, staff scheduling, transportation, maintenance, finance, cybersecurity, and school safety. (University of San Diego 2024.)

Artificial intelligence is currently applied in higher education across various domains, including plagiarism detection, exam integrity, and chatbots for enrolment and retention. AI also enhances learning management systems, transcribes faculty lectures, and improves online discussions. Additionally, AI is used to analyse student success metrics, assist with academic research, and connect campuses for better collaboration and operational efficiency. (University of San Diego 2024.)

AI in education is expected to support educators in addressing various factors affecting student learning, including physical, cognitive, social, and emotional elements. By providing tailored support, AI aims to ensure equal educational opportunities for all students, irrespective of their backgrounds, disabilities, or personal characteristics. (University of San Diego 2024.)

There is optimism about AI's potential to enhance individualized learning. As AI becomes more embedded in classrooms, it is expected to help teachers tailor learning experiences to meet the unique needs of each student, improving engagement and outcomes for diverse learners. (University of San Diego 2024.)

3.3.4 AI education in Finland:

A recent study involving over 200 Finnish 4th and 7th graders found that hands-on activities and educational technology significantly improved their understanding of AI. The research, conducted by the University of Eastern Finland, examined how collaborative AI app design helped students grasp AI concepts while addressing ethical considerations. This approach emphasizes the importance of interactive learning in teaching emerging technologies. (University of Eastern Finland 2024).

AI technologies influence daily life, from personalized recommendations to targeted ads, but many schools have yet to teach students about AI’s use, functionality, and impact. This gap in education is a concern, especially as AI becomes increasingly integrated into various aspects of society. The University of Eastern Finland highlights the need for more comprehensive AI education. (University of Eastern Finland, 2024).

The Generation AI project, led by the University of Eastern Finland in collaboration with several universities and partners, aims to address the gap in AI education. By developing research-based pedagogical models, educational technologies, and curriculum materials, the project launched its first AI education sessions in schools in Joensuu, Finland, in spring 2023. These sessions also served as a foundation for further research. (University of Eastern Finland, 2024).

In three workshops, children were introduced to the basics of AI, with a focus on algorithmic bias. Researchers observed how the children's explanations of bias evolved over the course of the sessions. The findings showed that their understanding of the data-driven causes of algorithmic bias became more sophisticated as the workshops progressed. (University of Eastern Finland 2024).

Senior Researcher Henriikka Vartiainen from the University of Eastern Finland noted that the workshops helped children improve their conceptual understanding of AI, including its ethical implications. The sessions also encouraged the students to critically assess AI technologies, emphasizing the importance of responsible AI usage. (University of Eastern Finland 2024).

Henriikka Vartiainen emphasized the importance of well-structured AI education in schools. She noted that educational technologies and curriculum activities can enhance children’s understanding, critical thinking, and ethical awareness of AI, preparing them to navigate and critically engage with AI systems. (University of Eastern Finland, 2024).

The workshops used practical examples from children's everyday lives, where they created their own AI apps using educational technology designed for beginners. By building an image classifier app and testing others' creations, the children gained a better understanding of how AI works. This hands-on approach helped enhance their grasp of AI and its functionality. (University of Eastern Finland 2024).

The final workshop in the study addressed the societal and ethical implications of AI. Children created images using generative AI, examined biases, and discussed the ethical and societal impacts of AI. The hands-on experience of co-designing AI apps with peers and connecting the technology to their daily lives made the learning process both engaging and meaningful for the children. (University of Eastern Finland 2024).

We understand that the findings from the Generation AI project underscore the importance of integrating AI education into school curricula through engaging, hands-on activities that connect with students' everyday experiences. By involving children in the creation and critical analysis of AI technologies, the project not only enhanced their understanding of how AI works but also deepened their awareness of its ethical and societal implications. This approach demonstrates that well-designed educational interventions can effectively prepare young learners to navigate and critically engage with the increasingly AI-driven world around them.

Ministry of Education and Culture - Recommendations for artificial intelligence:

AI competence is increasingly vital as AI and learning analytics transform education, impacting both the learning process and perceptions of teaching and knowledge. This rapid rise in AI-driven applications underscores a global educational challenge, emphasizing the need for systems to adapt to these emerging technological shifts. (The Ministry of Education and Culture 2024.)

AI is increasingly integrated into teaching and learning, with educators requesting guidance on how to effectively use it. These efforts align with Finland’s digital goals, including enhancing digital skills and supporting digitalisation in early childhood, basic, and adult education. The recommendations contribute to shaping the future of education in Finland, ensuring a digitalized educational landscape. (The Ministry of Education and Culture 2024.)

The Ministry of Education and Culture, in collaboration with the Finnish National Agency for Education, is developing recommendations for AI in education. These guidelines, set for release in stages throughout 2024, will be translated into Swedish and English. A broad group of stakeholders, including educators, students, and researchers, is contributing to the development of these recommendations to help guide AI integration in educational settings. (The Ministry of Education and Culture 2024.)

The recommendations for AI in education emphasize key themes such as AI literacy, legal, and ethical considerations. They aim to support educational providers in ensuring equal opportunities for all learners, helping them develop skills to navigate and benefit from emerging technologies. The guidelines also stress the importance of fostering an inclusive approach to AI integration across educational settings. (The Ministry of Education and Culture, 2024.)

In summary, the Ministry of Education and Culture's recommendations for artificial intelligence emphasize the growing importance of AI in education and the need for comprehensive guidance on its use. These recommendations aim to ensure that all learners have equal opportunities to develop AI-related skills and understanding, while addressing critical themes like AI literacy, legal, and ethical considerations. As part of Finland's broader digitalization efforts, these guidelines will support the integration of AI into education at all levels, with recommendations to be rolled out throughout 2024.

4 Empirical part

4.1 Research methodology

This study adopts a qualitative research design to explore the evolution of digital education in Finland, focusing on the historical context, current practices, influential factors, challenges, and future directions. Given the exploratory nature of the research questions, qualitative methods are most appropriate, as they allow for an in-depth understanding of complex phenomena through the perspectives of various stakeholders.

In qualitative research, semi-structured interviews are a common method for gathering in-depth information from participants. This approach allows the researcher to ask open-ended questions while still guiding the discussion toward relevant themes (Kvale & Brinkmann, 2015). Semi-structured interviews are particularly effective when the aim is to explore complex, context-specific phenomena, such as the evolution of digital education in Finland. This method allows for flexibility and adaptability during the interview, encouraging participants to share their experiences and insights in a more natural manner (Cohen, Manion, & Morrison, 2018).

Qualitative research is generally exploratory and seeks to understand phenomena from the perspective of participants. According to Creswell (2013), qualitative research design is most suitable for studies where the aim is to gain deep insights into individual or group experiences, particularly in areas that are evolving or have significant social, historical, and political context. In this case, the qualitative design will allow the researcher to examine how digital education has evolved in Finland and how emerging technologies, such as AI, are influencing future directions.

While the primary data collection method is qualitative (interviews), the study might incorporate elements of document analysis (e.g., reviewing policy documents, historical records, statistics and other articles related to this subject) to provide additional context and triangulate the findings. However, the core approach remains qualitative, emphasizing the detailed, context-rich understanding of the phenomena under study.

The research design is aligned with the study's objectives to:

Explore the History of Digital Education: Look into the important milestones in Finland's digital education journey.

Understand Current Perspectives: Collect and summarize the views of teachers to get picture of how digital education is working today and how it impacts student learning.

Address Challenges in Digital Education: Investigate the barriers that students, especially those from immigrant backgrounds, face in accessing and benefiting from digital education, including language support and social integration issues.

Look at Future Trends: Examine how new technologies, like artificial intelligence, can enhance digital education and how they can be used to improve learning outcomes for all students, particularly those from diverse backgrounds. This objective also involves considering the potential downsides of increased technology use.

Promote Inclusive Practices: Stress the importance of creating an inclusive learning environment that supports language learning and social integration for immigrant-background students, ensuring they can succeed and contribute to society.

Provide Recommendations for Improvement: Based on the research findings, suggest practical steps for policymakers and educational institutions to enhance digital education, making sure it meets the needs of all students and promotes equity and access.

By focusing on these areas, the research aims to provide a comprehensive overview of digital education's past, present, and potential future in Finland.

4.2 Interview protocol

An interview protocol is a structured guide that ensures consistency in the way interviews are conducted, helping to maintain reliability and validity (Jacob & Furgerson, 2012). The protocol typically includes an introduction to the research, an outline of key topics, and pre-determined questions, as well as room for flexibility to allow for follow-up or probing questions (Turner, 2010). This approach helps gather rich, nuanced data that is essential for qualitative analysis.

When conducting semi-structured interviews, researchers must also be mindful of ethical considerations, such as informed consent and confidentiality. These protocols ensure that participants understand their rights and the scope of the study (King & Horrocks, 2010). In this study, a purposive sampling strategy will be employed to select participants who have experience in the Finnish education system, ensuring that the interviewees are well-positioned to provide relevant and insightful data.

Participant Selection

Participants for this study were selected using a purposive sampling method, which is widely utilized in qualitative research to ensure that individuals with specific expertise are included in the study. Purposive sampling is especially effective when the research aims to gain rich, in-depth

insights from participants with relevant experience and knowledge (Patton 2015). This method was chosen to focus on teachers with over 10 years of experience in education, particularly those who have integrated digital technologies into their teaching practices.

A total of six participants were selected. Five of these participants were from the field of software engineering and development, providing perspectives that are closely tied to the technical aspects of digital education. One additional participant, from a different area—innovation, project work, and business operations—was included to offer a broader view on how digital tools impact various educational and operational settings.

This diverse participant group was selected to gather well-rounded insights into both the benefits and challenges posed by digital tools in education, with an emphasis on how students engage with and adapt to these technologies.

The following table summarizes the key characteristics of the selected participants:

Participant	Years of Experience	Area of Expertise	Familiarity with Digital Tools	Institution Level
Teacher 1	22	Software engineering and development	Extensive	University
Teacher 2	25	Innovation, project work, business operations	Moderate	University
Teacher 3	25	Software engineering and development	Extensive	University
Teacher 4	10	Software engineering and development	Moderate	Vocational School
Teacher 5	25	Software engineering and development	Extensive	University
Teacher 6	>10	Software engineering and development	Extensive	University

Figure 5. Key Characteristics of Participants. (Source: Created by the author.)

Interview Structure

The interviews will be semi-structured, allowing for a guided conversation that covers predetermined topics while also providing the flexibility to explore new avenues that arise during the discussion. The primary interview question will explore the evolution of digital education in Finland, with secondary questions designed to delve into specific aspects such as historical developments, current practices, influential factors, challenges, and future trends.

Each interview will follow a consistent structure:

Introduction: The interviewer will explain the purpose of the study, assure confidentiality, and obtain informed consent.

Warm-up Questions: Simple, open-ended questions to build rapport and ease the participant into the conversation.

Core Questions: These will focus on the main research areas:

Historical evolution of digital education in Finland.

Current state and perceptions of digital education.

Influential factors driving digital education.

Challenges and barriers in digital education.

Future directions, especially concerning AI.

Probing Questions: Follow-up questions to clarify responses or explore interesting points in more depth.

Closing: The interview will conclude with a summary of key points discussed, and the participant will be asked if they have any additional comments or questions.

Interviews are expected to last between 45 minutes to 1 hour, depending on the depth of the discussion.

Data Collection

The interviews were conducted using a mixed approach, with two of the six interviews held via video conferencing platforms such as Teams and four conducted in person. This combination of methods allowed flexibility while still capturing a diverse range of participant responses. Audio

recordings were made during all interviews, with the participants' consent, to ensure accurate transcription and analysis. In addition to audio recordings, detailed notes were taken to document non-verbal cues and other contextual factors observed during the in-person interviews.

After each interview, the recordings will be transcribed verbatim, and the transcripts will be sent to participants for member checking—a process where participants can review and confirm the accuracy of their statements. This step helps to enhance the credibility of the data.

Ethical Considerations

Several measures will be taken to protect participants' rights and ensure the integrity of the research:

Informed Consent: Participants will be informed about the study's objectives, their roles, and their rights, including the right to withdraw at any time. Before starting the interview, written consent will be obtained to ensure that participants fully understand the process and their involvement.

Confidentiality: All data collected will be kept confidential. Participants' names and any identifiable information will be anonymized in the transcripts and subsequent reports to protect their privacy.

Data Security: Interview recordings and transcripts will be securely stored on encrypted devices. Only the researcher and authorized personnel will have access to the data.

Debriefing: After the interview, participants will be debriefed, given the opportunity to ask questions, and provided with information on how the research findings will be used.

4.3 Data analysis

Data analysis in this qualitative study involves systematically interpreting interview data to identify patterns and insights relevant to the evolution of digital education in Finland. The data collected from the qualitative interviews will be analysed using thematic analysis, as outlined by Braun and Clarke (2006), which provides a structured approach to identifying key themes related to the research questions. This method allows for a nuanced understanding of participants' experiences and perspectives, enabling the researcher to draw meaningful conclusions about the current landscape and future directions of digital education in Finland.

Throughout the analysis, the author will integrate direct quotes to illustrate and support the findings, interpreting these themes within the context of digital education in Finland. To enhance the credibility of my findings, it will also employ data triangulation, comparing the interview insights with existing literature and relevant policy documents. The results will be presented in a narrative format

that highlights the voices of the participants, providing a comprehensive understanding of the challenges, opportunities, and future directions of digital education.

As the interview might include open questions, the author will include them in discussion. The other observations as a result of the interview will be also presented.

4.4 Results

The landscape of digital education in Finland is evolving rapidly, especially with the growing influence of technology and artificial intelligence (AI). Six educators shared their insights on various aspects of this evolution, covering historical perspectives, current challenges, and thoughts on the future.

Historical Context and Evolution of Digital Education

Several educators reflected on their early experiences with computers. One mentioned, “I remember using 286 computers and starting with programming languages like Pascal and Q Basic.” This nostalgic view highlights how far technology has come, contrasting sharply with today’s more advanced digital landscape. Another educator pointed out, “We are experiencing a revolution with AI that is transforming everything.” This remark captures the excitement surrounding new technologies and their potential to reshape education.

Despite the enthusiasm, some expressed that the changes have been gradual. One educator said, “The evolution of digital education has been steady and exponential.” This suggests that while we see significant advancements, the shift in educational practices has not been sudden.

Current State of Digital Education

Today, the implementation of digital education varies greatly among institutions. One educator noted, “Most schools use platforms like Moodle, but the way they’re used can differ a lot.” This observation highlights inconsistencies in how digital tools are adopted across different educational settings. Another added, “I’ve seen that students from various backgrounds adapt differently to the Finnish digital environment.” This insight underscores the diverse experiences of students and the challenges that come with ensuring everyone has equal access to digital resources.

Concerns about students’ ability to effectively engage with these digital tools were a common theme. One educator shared, “There’s been a noticeable drop in exam results for programming courses, and it seems to be getting worse each semester.” This decline is attributed to students bypassing essential steps in their learning process. “The issue is that students often skip important

parts because they rely too heavily on digital tools," they explained. This concern points to a growing issue regarding educational quality.

Another educator emphasized the importance of understanding content rather than just using tools, saying, "I encourage students to utilize AI, but they need to grasp the material instead of just generating code." This highlights the necessity for a balanced approach, where technology enhances learning without overshadowing the core educational principles.

In the context of the discussion on the impact of digitalization in education, one educator shared a personal observation regarding his son, who is currently in high school. He noted that the curriculum has shifted away from traditional methods, with students rarely using pen and paper and relying heavily on electronic calculators for mathematical operations. This reliance on technology raises concerns about foundational skills, as students may struggle to perform basic calculations without digital assistance. To combat this trend and ensure that students truly understand the material, the educator has implemented oral exams, emphasizing the importance of verbal communication and critical thinking. By assessing students' knowledge in a more direct manner, he aims to foster a deeper comprehension of the subject matter, highlighting the need for a balanced approach that values both digital tools and traditional learning techniques.

Challenges and Concerns

Several interviewees expressed worries about AI's impact on learning and academic integrity. One educator expressed a rather bleak outlook, stating, "After listening to a podcast between two AI generated participants, I thought, 'we are doomed'; AI will do everything in the future." This sentiment reflects a fear that advancements in technology could compromise traditional learning methods.

Another educator raised alarms about the integrity of academic work, stating, "I'm concerned that we'll see graduates with little real knowledge." This remark speaks to the potential for students to submit work generated by AI without truly understanding the content, raising questions about the value of their qualifications.

Language barriers also emerged as a significant challenge, particularly for international students navigating the Finnish education system. One educator mentioned, "The teaching environment, the platforms don't offer full support in English, nor the same informational content as in Finnish." This highlights the need for better support systems for non-Finnish speakers to ensure fair access to educational materials.

The Future of Digital Education

Looking ahead, the role of educators in a digital world was a key topic of discussion. One educator mentioned, “I think many teaching jobs will be replaced by machines, but I’m not worried about it; people will still be paid doing something else, even if they will work less.” This viewpoint suggests a level of acceptance regarding the changes brought on by digitalization, framing it as an opportunity rather than a threat.

In contrast, another educator emphasized the importance of personal interaction in education, saying, “Face-to-face engagement is still crucial for university students; digital interaction can’t replace personal connections.” This statement underscores the ongoing need for traditional teaching methods, even as technology continues to advance.

The need to foster a sense of community among students was also highlighted. One educator noted, “The decrease in human interaction due to digitalization is concerning. We need structured in-person meetings and social activities to build community.” This focus on social engagement indicates that as education becomes more digital, personal connections remain essential for student success.

Pros and Cons of Digital Education

The integration of digital tools and technologies in education has transformed the learning landscape, bringing both opportunities and challenges. Insights from interviews with educators reveal a complex interplay between the benefits and drawbacks of digital education. While the adoption of digital platforms and artificial intelligence (AI) enhances accessibility and flexibility, concerns about educational quality, loss of fundamental skills, and diminished human interaction persist. This table summarizes the key advantages and disadvantages identified by interviewees, providing a comprehensive overview of the current state of digital education and its implications for students and educators alike.

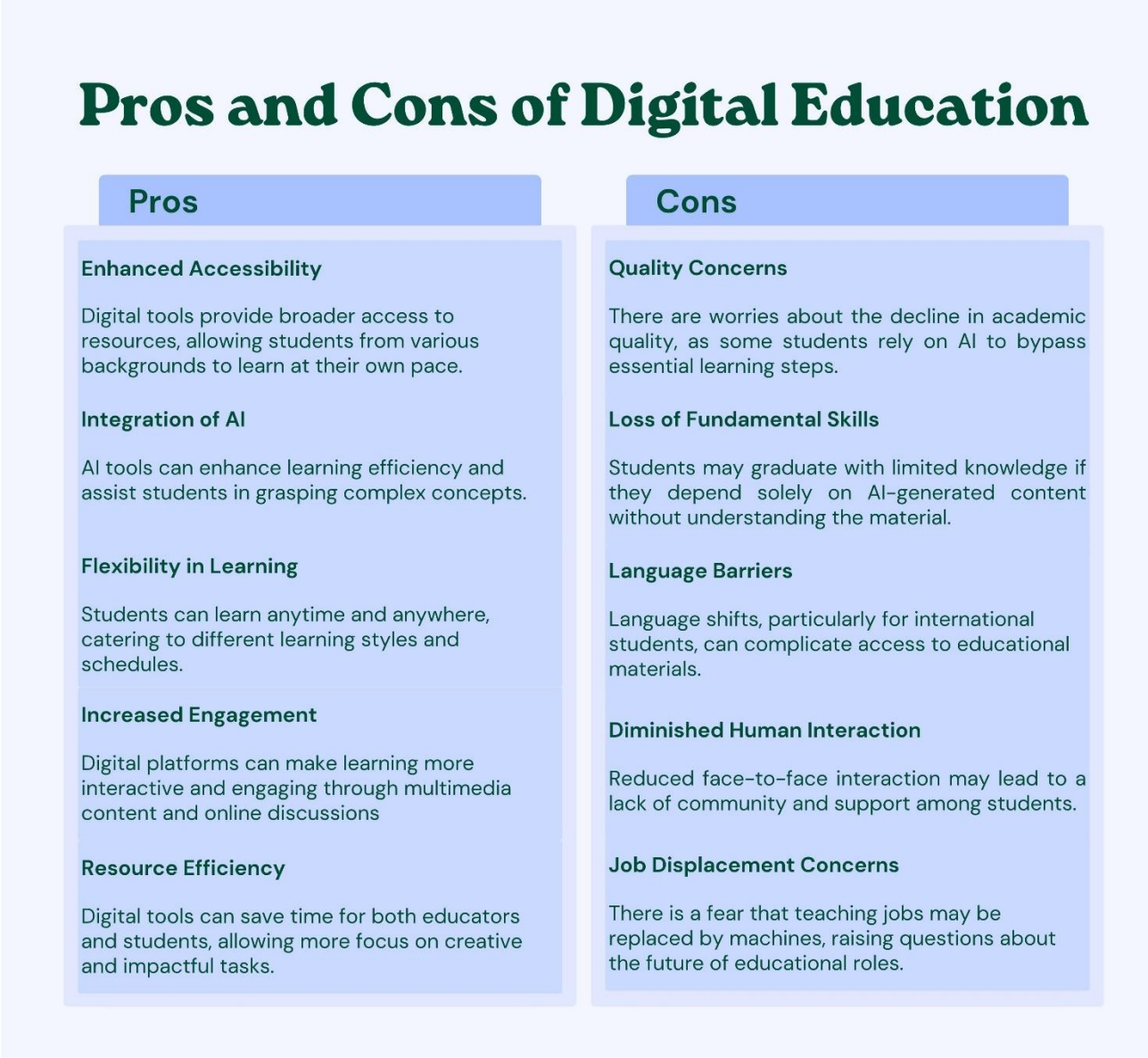

Figure 6. Pros and Cons of Digital Education. (Source: Created with Canvas based on qualitative interview data.)

5 Discussion

The evolution of digital education in Finland reveals a complex interplay between educational practices, student outcomes, and socio-economic factors, particularly concerning immigrant-background pupils. This discussion synthesizes the insights from the qualitative interviews, the findings from recent studies, and observations about the current educational landscape.

5.1 Achievement Gaps Among Immigrant-Background Pupils

Recent studies, including one conducted by the University of Jyväskylä, indicate significant achievement gaps between immigrant-background students and their peers from the majority population. For instance, it was found that 61% of first-generation immigrant-background pupils struggle with reading skills essential for engaging fully in Finnish society (Yle News, 2024). These gaps have persisted despite some narrowing over the past decade, highlighting the challenges that remain in integrating immigrant students into the educational system. In interviews, educators expressed concern about the impact of inadequate language skills on these students' academic performance and social integration.

This raises critical questions about whether the Finnish educational system is adequately designed to meet the needs of a diverse student population. While the focus on traditional educational methods—such as returning to textbooks—aims to enhance concentration and learning outcomes (Riihimäki.fi, 2024), it may inadvertently neglect the necessity for tailored support for immigrant-background pupils. The results from the interviews with educators revealed a consensus on the need for more human interaction and language practice within the curriculum, emphasizing that mere access to educational resources is insufficient without effective language support and social integration strategies.

5.2 Implications for the Future Workforce

The implications of these educational challenges extend beyond individual student experiences; they pose significant risks for the future workforce and economy of Finland. If the educational system fails to equip immigrant-background pupils with the necessary language and social skills, we may face a growing population of unemployed or underemployed youth in the coming years. As emphasized by Education Minister Anders Adlercreutz, addressing these gaps is critical to ensuring that all students can pursue further education and meaningful employment opportunities (Yle News, 2024).

Moreover, a well-educated immigrant population is crucial for developing a skilled workforce capable of meeting the demands of the future economy. Integrating immigrant students successfully not

only benefits the individuals involved but also contributes to the overall economic health of the country. Research indicates that a diverse workforce enhances creativity and innovation, leading to economic growth and a robust consumer base (González, 2017). Therefore, investing in the education of immigrant-background pupils is not merely a social responsibility but also an economic imperative.

5.3 Socio-Economic Considerations

Socioeconomic status plays a pivotal role in educational outcomes. The findings from recent studies suggest that when socioeconomic factors are considered, the differences in academic performance between immigrant-background students and those from the majority population decrease significantly (Yle News, 2024). This highlights the interconnectedness of education, social equity, and economic opportunity. Effective interventions should consider these broader socioeconomic contexts to create a more inclusive educational framework.

The qualitative interviews further supported the need for addressing these socio-economic barriers. Educators noted that students from immigrant background often faced additional challenges that hindered their academic success, including limited access to resources and support systems. By understanding and addressing these socioeconomic factors, the education system can better serve all students, fostering a more equitable environment for learning.

5.4 Demographic Trends and Long-Term Economic Effects

The long-term economic implications of an education system that effectively supports immigrant-background students are profound. A skilled and integrated workforce can lead to increased productivity, lower dependency on social services, and greater contributions to local economies. As identified in the results chapter, the focus on human interaction and language practice is essential for cultivating a workforce that is not only skilled but also socially integrated.

Moreover, the demographic trends in Finland highlight the growing importance of integrating immigrant families into society. In 2023, out of 43,383 children born in Finland, approximately 8,700 (around 20%) were born to mothers with foreign backgrounds (Tilastokeskus, 2024). Additionally, fertility rates reveal that the total fertility rate (TFR) for women with foreign backgrounds was 1.66, compared to 1.43 for Finnish women in 2021 (Tilastokeskus, 2024). This demographic shift underscores the importance of integrating immigrant families into the educational system to foster a more inclusive society that can leverage its diverse population for future growth.

Finally, the potential for brain drain exists if Finland fails to provide adequate educational opportunities for immigrant students. As talented individuals seek better prospects in other countries,

Finland risks losing valuable skills and innovation, which could hinder its economic growth (Borjas, 2016). Therefore, addressing these educational challenges is vital for maintaining a competitive and dynamic economy.

5.5 Challenges and Risks in Digital Education

As Finland navigates the digital education landscape, several challenges and risks must be addressed. Key issues include equity in access to technology, privacy concerns, and the widening digital divide. Ensuring all students have equal access to the necessary tools and resources is crucial to prevent exacerbating existing inequalities.

To mitigate these challenges, strategies must be proposed that emphasize the importance of human interaction and face-to-face learning, even in a digital context. Schools could implement blended learning models that combine traditional and digital approaches, ensuring that technology enhances rather than replaces critical interpersonal skills. This comprehensive approach can help prepare students for the complexities of the modern world while fostering a supportive learning environment.

6 Conclusion

Reflecting on the journey through this research, it becomes clear that the landscape of digital education in Finland has both challenges and opportunities. The integration of digital tools and artificial intelligence in education holds immense potential to enhance learning experiences, yet it also raises concerns about whether students are fully prepared for the complexities of this new environment.

From the qualitative interviews, it's evident that educators feel a deep responsibility to navigate these changes thoughtfully. They recognize the need for a balanced approach that embraces technological advancements while maintaining the core values of education—critical thinking, creativity, and personal interaction. The conversations revealed a common thread: the importance of ensuring that digital education does not come at the expense of academic integrity or the foundational skills that students need to thrive.

Particularly concerning immigrant-background students, the findings emphasize the urgent need for educational reform that considers their unique challenges. With around 20% of children born in Finland in 2023 coming from immigrant families, fostering an inclusive environment becomes not just a moral imperative but a practical necessity for the future of the society. It's crucial that the educational system actively supports language acquisition and social integration for these students, enabling them to contribute fully to the community.

Moreover, the methods used to educate immigrant-background pupils should adopt a mixed approach, combining traditional teaching practices with digital resources. This approach can cater to various learning styles and address the specific needs of these students, ensuring they receive the support necessary to succeed in their education and future activities.

As Finland faces a shrinking population, with a total fertility rate (TFR) lower for Finnish women and higher for women with foreign backgrounds, it becomes even more important to focus on the integration and education of those already in the country rather than solely attracting new immigrants. By investing in education and providing access to resources for immigrant-background individuals, Finland can exploit the potential of this demographic to mitigate the impacts of declining birth rates and support economic stability.

Looking ahead, the economic future of Finland is closely linked to the success of its education system. A well-educated and integrated workforce is essential for driving innovation, productivity, and economic growth. The historical context of Finland's education system underscores the importance of adaptability. As the landscape continues to evolve, educators must reflect on past practices

while embracing new methodologies that promote engagement and understanding. The emphasis on human interaction and language practice is vital, especially in a digital age where screen time can easily overshadow personal connections.

Moreover, the potential economic contributions of immigrant-background students cannot be overstated. By investing in their education and fostering their integration, Finland stands to benefit from a diverse workforce that can drive creativity and entrepreneurship. The future economic landscape will require adaptability and resilience, and the role of education in preparing students for these demands is crucial.

In essence, the future of education in Finland hinges on the ability to address these pressing challenges while leveraging the benefits of digital innovation. By prioritizing an inclusive educational approach and fostering a culture of critical thinking and collaboration, we can ensure that all students—regardless of their background—are equipped to succeed in an increasingly complex world. Ultimately, the commitment to reforming education will shape not only the lives of individual students but also the economic future and social cohesion of society as a whole.

Personal Learning Insights and Recommendations

Working on this thesis has been both challenging and rewarding. One of the most valuable lessons I've taken away is the importance of adaptability in research. Initially, I had a clear outline and goals, but as I progressed with interviews and data analysis, I realized that some of my assumptions didn't quite align with the reality. This made me understand the significance of staying flexible and open-minded, even if it means adjusting the initial plan.

Another major insight was the depth of understanding needed in the field of digital education. I've realized that the needs of learners are very different and how important is designing an educational system that is not only effective but also accessible and inclusive. This journey has made me more aware of how rapidly evolving technology shapes education and inspired me to continue exploring how these tools can address current gaps, particularly for marginalized communities.

Recommendations for Future Research

I believe it is essential to further explore the emotional and social impacts of digital education on students. Throughout my research, I found that while digital platforms can provide access to information very quickly and it saves a lot of time, it also has an social impact considering the reduced human interaction. Many participants shared feelings of emotional and social disconnection, which highlighted how reliance on technology can exacerbate issues related to language and integration, particularly for students from diverse backgrounds. Future studies could delve into how digital tools

affect not only academic performance but also social skills and emotional well-being.

I would also recommend conducting research that includes the perspectives of both parents and students. Understanding the experiences and challenges that families encounter with digital education can provide valuable insights into how these factors influence student engagement and overall success. Integrating these viewpoints would create a more comprehensive understanding of the effects of digital education and guide the development of more balanced, empathetic educational solutions. By addressing these emotional and social dimensions, future research can contribute to a more inclusive educational landscape.

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8 Appendices

8.1 Interview questions

Primary Question:

How has the digital education landscape in Finland evolved over time, and is the heavy reliance on digital tools in education beneficial for students?

- Understand the historical progression of digital education in Finland and explore the drivers that will shape its future trajectory.
- Gather insights into the effectiveness, challenges, and opportunities associated with the integration of digital technologies in Finnish education, particularly focusing on the balance between digital and traditional methods.
- Examine the inclusivity and adaptability of educational resources for students from diverse backgrounds, ensuring that the digital education approach meets the needs of immigrant students and supports their integration into the Finnish educational system.

Secondary questions:

To address the primary research problem, the following sub-problems need to be explored:

1. **Historical Evolution:**

    - *What have been the key milestones and developments in the history of digital education in Finland?*

      Focuses on identifying and analyzing the significant events, policies, and technological advancements that have shaped digital education in Finland over the years.

2. **Current State of Digital Education:**

    - *How is digital education currently implemented in Finnish schools, and what are the perceptions of educators, students, and policymakers?*

      Examines the present-day practices, tools, and pedagogical approaches in Finnish digital education, as well as the perspectives of different stakeholders on its effectiveness and challenges.

3. **Influential Factors:**

    - *What factors—such as policy decisions, technological innovations, and societal changes—have driven the adoption and evolution of digital education in Finland?*

      Investigates the external and internal factors that have influenced the integration and growth of digital education in Finland, including policy frameworks, educational reforms, and societal needs.

4. **Challenges and Barriers:**

    - *What are the major challenges and barriers faced by educators and institutions in implementing digital education in Finland?*
    - *How are students with different backgrounds adapting to the technology?*

      Explores the obstacles that hinder the effective use of digital technologies in education, including issues related to infrastructure, training, accessibility, and resistance to change.

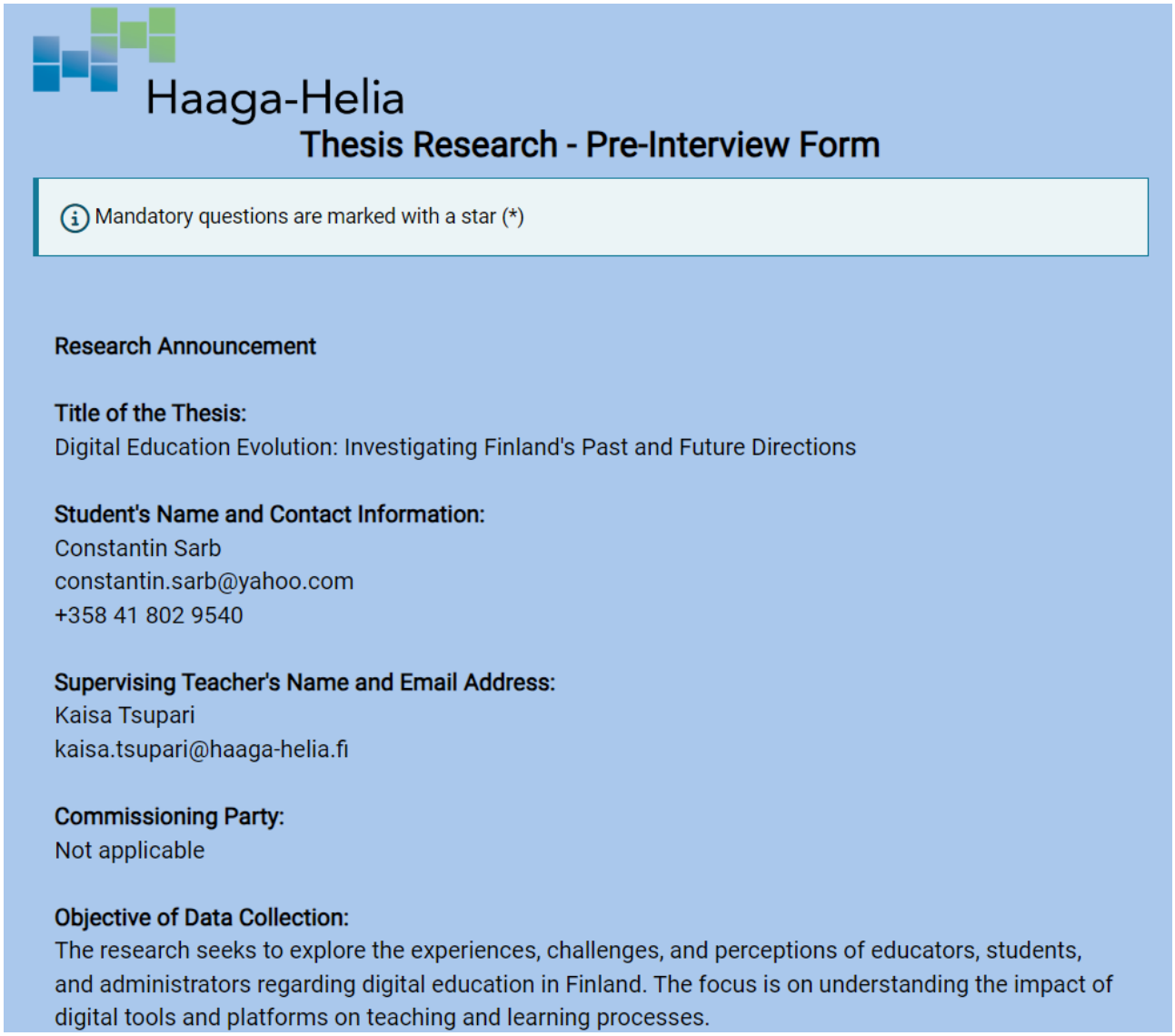
5. **Future Directions:**

    - *What are the emerging trends and future possibilities for digital education in Finland, particularly in the context of new technologies such as AI?*
    - *How has AI influenced the teaching and learning process in classrooms?*
    - *What concerns do you have about the use of AI in education?*

      Seeks to understand the potential future developments in digital education, including how emerging technologies might shape educational practices and policies in Finland. We also want to discover issues regarding plagiarism, reduced human interaction, data privacy and security and possible job displacement for the teachers.

8.2 Template for Research Announcement and Template for Consent Form

These templates were sent by author to the participants. The author used “Webpropol” tool for the templates, a link was sent before the interview to the participants. Below is the complete Pre-Interview Form.



Haaga-Helia

Thesis Research - Pre-Interview Form

Mandatory questions are marked with a star (*)

Research Announcement

Title of the Thesis:
Digital Education Evolution: Investigating Finland's Past and Future Directions

Student's Name and Contact Information:
Constantin Sarb
constantin.sarb@yahoo.com
+358 41 802 9540

Supervising Teacher's Name and Email Address:
Kaisa Tsupari
kaisa.tsupari@haaga-helia.fi

Commissioning Party:
Not applicable

Objective of Data Collection:
The research seeks to explore the experiences, challenges, and perceptions of educators, students, and administrators regarding digital education in Finland. The focus is on understanding the impact of digital tools and platforms on teaching and learning processes.

Method and Phases of Data Collection:
Data will be collected through qualitative interviews. The interviews will be conducted either in person, via video call, or over the phone, depending on the participant's preference. The interviews will be recorded (with participant consent) and transcribed for analysis.

Duration of Participation:
Each interview is expected to last approximately 45-60 minutes.

Preparation Prior to Participation:
Participants do not need to prepare anything in advance. The interview will focus on their personal experiences and insights related to digital education.

Benefits of Participation for the Participant or their Represented Organization:
By participating, individuals and their organizations will contribute valuable insights that can help shape future digital education strategies in Finland. The findings may be useful for improving educational practices and policies.

Handling, Storage, Recipients, Potential Disposal, and Future Use of Data:
Interview recordings and transcripts will be stored securely using the storage services provided by Haaga-Helia University of Applied Sciences. Personal data will not be stored on external devices such as USB drives, hard drives, or phones. The data will be used solely for this thesis project and will be handled in accordance with the EU General Data Protection Regulation (GDPR 679/2016) and relevant national regulations. After the thesis is completed, the data will be disposed of according to Haaga-Helia's data management policies.

Dissemination of Results:
The thesis report will be published in the Theseus online library, making the results publicly accessible.

Funding and Potential Conflicts of Interest:
There are no conflicts of interest to declare.

Additional Information:
For more information about the research, please contact:
Constantin Sarb
constantin.sarb@yahoo.com
+358 41 802 9540

1. Personal info

Age *

Gender *

Experience (Years) *

2. Educational level at which you are currently employed

Select

3. Prefered interview method *

- ◯ In person
- ◯ Video call (via Teams)
- ◯ Over the phone

Consent form

I hereby give my consent to participate in the research on the topic of **Digital Education Evolution: Investigating Finland's Past and Future Directions** according to the research announcement provided as an attachment.
The content of the aforementioned research announcement has been explained to me, and I understand the nature of the study, what participation entails for me, how the data I provide will be used, and how it will be stored. I have had the opportunity to ask questions and have received satisfactory answers to all my inquiries.
I understand that participation in the research is voluntary and anonymous. I am aware that I can withdraw this consent at any time without giving a reason, and for instance, I can discontinue the interview if I so desire.
Consent can be withdrawn by contacting the thesis author via the provided contact information..
Please note that once the research results have been analyzed, the contribution of a single participant cannot be retrospectively removed.
For additional information about the research, the thesis author (Constantin Sarb, Email: constantin.sarb@yahoo.com, Mobile: +358 41 802 9540) can be contacted.

4. I have reviewed the research announcement and the content of the consent form, and I give my consent to participate in the research. *

◯ YES
◯ NO

Submit