Volume 4 Number 3 (2026)
July-September 2026
Page: 59-72

Tamilis Synex: Multidimensional Collaboration
https://edujavare.com/index.php/TLS/index
E-ISSN: 3026-3972
Doi: 10.70610/tls.v4i03.1556

Digital Education and Learning Innovation in Finland

Gunvor Hallström
University of Helsinki, Helsinki, Finland
Correspondence; hallstrom.gum@helsinki.fi

Article history Submitted: 2026/05/11; Revised: 2026/06/15; Accepted: 2026/08/13

Abstract

Digital education and learning innovation have become central pillars of Finland's globally renowned education system, reflecting a strategic commitment to preparing citizens for an increasingly digitised society while maintaining the student-centred pedagogical philosophy that distinguishes Finnish education. This study examines the implementation, evolution, and outcomes of digital education across Finland's early childhood, basic, and upper secondary education levels, drawing upon national curriculum frameworks, policy documents, and empirical evidence from teacher surveys and institutional practices. Finland's approach is distinguished by the 2014 competence-based core curriculum that integrated ICT as one of seven transversal competences, the innovative phenomenon-based learning model that leverages digital tools for interdisciplinary inquiry, the national tutor teacher network comprising approximately 2,300 educators, and the 2025 national AI guidelines for education. The research identifies four critical dimensions: the transversal competence framework for digital skills, the phenomenon-based learning approach enabled by digital technologies, the tutor teacher system for peer-to-peer professional development, and the persistent barriers to pedagogical digitalisation. Findings indicate that Finland has achieved remarkable success in infrastructure development, with 99% of schools having broadband access and widespread device availability, yet significant challenges remain, including the predominance of basic-level digital tool use, the gap between digitisation and genuine digital pedagogy, teacher confidence deficits, and regional disparities between urban and rural schools. The study concludes that Finland's model offers valuable insights for nations seeking to integrate digital education through curriculum-embedded competence development and teacher-led innovation, while highlighting the necessity of sustained investment in pedagogical transformation, equitable resource distribution, and systemic coordination to ensure that digital technologies enhance rather than merely replicate traditional learning.

Keywords digital education, learning innovation, Finland, transversal competences, phenomenon-based learning, tutor teacher network, AI in education, digital pedagogy, competence-based curriculum, educational equity

.

INTRODUCTION

Finland has long been celebrated as a global benchmark for educational excellence, with its student-centred approach, highly qualified teaching force, and equitable outcomes consistently ranking among the world's highest. In recent decades, this reputation has been extended to encompass digital education and learning innovation, as Finland has systematically integrated information and communication technology into its education system through comprehensive curriculum reform, infrastructure investment, and teacher professional development. This introduction provides a narrative overview of the theoretical foundations, policy developments, and implementation challenges that inform the study of digital education and learning innovation in Finland.

The theoretical foundations of digital education draw upon constructivist learning theory, which posits that learners actively construct knowledge through engagement with authentic problems rather than passively receiving information. In the Finnish context, this theoretical orientation is reflected in the concept of the active learner who uses ICT tools to develop thinking and learning skills, with digital technologies serving as means to support student agency, creativity, and collaborative inquiry. The Finnish National Core Curriculum explicitly states that pupils should be offered opportunities for creativity and for finding working approaches and learning paths suitable for them, with ICT providing tools for making thoughts and ideas visible in many ways. This constructivist foundation distinguishes Finland's approach from more technocentric models that prioritise equipment and connectivity over pedagogical purpose.

Finland's distinctive approach to digital education is rooted in a historical trajectory that intertwines educational philosophy with technological pragmatism. The Finnish education system is strongly based on a culture of school development and improvement, with curriculum reform cycles approximately every ten years that allow for gradual development and elaboration of local curricula. The 2014 renewal of the National Core Curriculum for Basic Education represented a critical inflection point, as ICT and mobile learning were integrated as a transversal competence present in all learning and teaching, rather than treated as a separate subject. This decision reflected both international trends and internal research evidence, positioning digital competence as essential for 21st-century citizenship alongside literacy, numeracy, and critical thinking.

The 2014 curriculum reform was preceded by significant infrastructure investment. Between 2011 and 2016, the Finnish National Agency for Education

(EDUFI) granted €20 million to local education providers for ICT equipment and internet connections, preparing schools for new ways of teaching and mobile learning. By 2018, 99% of Finnish schools had broadband internet connections available, with most equipped with stable Wi-Fi and students able to use laptops or tablets provided by the school, usually alongside their own devices. This infrastructure foundation enabled the pedagogical innovations that the curriculum reform envisioned, though the relationship between infrastructure and pedagogical transformation has proven more complex than anticipated.

The Finnish approach to digital competence development is structured around four main areas specified in the national curriculum: understanding the functional principles and user logic of ICT; safe and responsible use of ICT and ergonomically sound working methods; using ICT for managing information and inquiry-based and creative work; and using ICT for interaction and networking purposes. These areas are elaborated across grade levels, with specific expectations for grades 1-2, 3-6, and 7-9, ensuring progressive development from basic skills through advanced application. The curriculum emphasises that in all four areas, it is essential that pupils themselves are active, with opportunities for creativity and finding working approaches suitable for their personal learning styles.

The phenomenon-based learning (PhBL) approach, introduced through the 2014 curriculum reform, represents Finland's most distinctive pedagogical innovation enabled by digital technologies. PhBL requires each school to implement at least one annual multidisciplinary learning module that combines content from different subjects around a selected theme, with digital tools playing a vital role in planning, implementing, and evaluating these modules. Teachers from different subject areas collaborate to design learning experiences that integrate knowledge across traditional boundaries, while students participate in choosing or refining the focus. Digital tools support research, collaboration, creative expression, and connection to real-world contexts throughout the process. This approach exemplifies what the Finnish curriculum describes as the shift from subject-based teaching toward holistic development of students' competences.

The international context reveals that Finland's digital education model has generated substantial global interest. The UNESCO-Fazheng Project on Best Practices in Mobile Learning identified Finland as a case study for transforming schools to mobile learning environments with a competence-based core curriculum. The report highlighted how Finnish schools combine traditional teaching methods with modern tools, creating a balanced approach that supports student-centred learning while

.

developing essential digital competencies. UNICEF launched its new Digital Education Strategy in Helsinki in January 2026, with Finland as a key partner, reflecting the country's status as a hub for educational innovation. The strategy will scale AI-enabled teaching and learning programmes across 18 countries, building on Finland's experience with digital education and AI integration.

Finland's contemporary policy landscape for digital education is characterised by ambitious initiatives that extend beyond basic education. The 2025 national AI guidelines for education, published by the Ministry of Education and Culture and EDUFI, provide structured guidance across all education levels on legal obligations, pedagogical integration, and practical recommendations for safe AI use. The guidelines address EU and national legal frameworks, data protection, copyright legislation, and alignment with national core curricula objectives. The Digital Service Package for Continuous Learning aims to produce a customer-oriented service package that crosses administrative boundaries, supporting individuals in making education and career choices throughout their careers. The Competency Path service, launched in 2026, helps people understand their skills, explore opportunities, and make informed decisions about education and careers, integrating with Studyinfo, Job Market Finland, and Opin.fi to support lifelong learning.

Despite these comprehensive policy frameworks, empirical evidence reveals significant gaps between infrastructure development and pedagogical transformation. Research from the Universities of Tampere, Helsinki, and Turku found that students use digital tools at school mostly at a basic level, with advanced use such as programming and automation virtually non-existent. Digitalisation in schools has largely remained at the level of "digitisation"—converting analogue materials into digital form without genuine pedagogical transformation. Teacher attitudes and experience present barriers, with advanced use hindered by uncertainty about the benefits of technology. Digital self-efficacy, particularly among female teachers, limits both basic and advanced use. Subject-specific differences are pronounced, with foreign language teachers using digital technology the least and mathematics teachers using it more. These findings suggest that Finland's digital education success is more evident in infrastructure and policy than in classroom practice.

The tutor teacher network represents Finland's distinctive mechanism for addressing the professional development challenge. Approximately 2,300 tutor teachers in comprehensive schools serve as peer mentors who introduce colleagues to best practices in harnessing digitisation, embrace new pedagogical approaches,

and promote the digitalisation of teaching and learning. This network, supported by EDUFI with approximately €17 million in grants to local education providers, has improved teachers' attitudes toward ICT integration and deepened cooperation between teachers. The tutor teacher model exemplifies Finland's trust-based approach to educational improvement, wherein teachers are treated as professionals capable of leading innovation rather than as implementers of top-down directives.

In conclusion, Finland's digital education and learning innovation represent a case of strong policy ambition, substantial infrastructure investment, and innovative pedagogical design confronting the persistent challenge of transforming classroom practice. This study examines the mechanisms through which Finland's digital education is implemented, the outcomes it produces for students and educators, and the areas where further development is needed to ensure that digital technologies realise their transformative potential for learning.

METHODS

This study employed a mixed-methods research design to investigate digital education and learning innovation in Finland, combining quantitative analysis of survey data with qualitative examination of curriculum implementation, teacher practices, and policy mechanisms. The methodological approach was informed by the pragmatic paradigm, which recognises that complex educational phenomena are best understood through the integration of multiple data sources and analytical perspectives. Given the multi-layered nature of digital education—encompassing national policy, municipal implementation, school-level practices, and individual teacher decisions—a mixed-methods design was deemed most appropriate for capturing the full scope of Finland's educational approach.

The research was structured as a convergent parallel design, wherein quantitative and qualitative data were collected simultaneously, analysed separately, and then integrated during the interpretation phase. The quantitative component examined teacher digital competence and technology use patterns, while the qualitative component explored the lived experiences of teachers, students, and school leaders in navigating Finland's digital education landscape.

The quantitative data were drawn from multiple sources. The "Comprehensive Schools in the Digital Age" study, conducted by the Universities of Tampere, Helsinki, and Turku, provided extensive survey data on teacher and student digital competence, technology use patterns, and perceptions of digital resources. This study measured device and content skills, pedagogical use of ICT, and attitudes toward technology across large samples of Finnish teachers and students. The ICT Skill

.

Testing Service developed by the Research Unit for the Sociology of Education (RUSE) at the University of Turku provided standardised assessment data on teachers' and pupils' digital skills, generating personal competence profiles and organisational summary reports. Additionally, the TRIM self-assessment tools (Tampere Research Center for Information and Media) provided data on headmasters', teachers', and students' self-perceived digital competence.

The qualitative component involved case studies of four Finnish schools purposively selected to represent diversity in geographic location, school type, and digital maturity. The cases comprised a primary school in the Helsinki metropolitan area with advanced digital infrastructure; a lower secondary school in a mid-sized city implementing phenomenon-based learning with digital tools; a rural school in northern Finland facing connectivity and resource challenges; and an upper secondary school participating in the Digabi digital matriculation examination project. This selection enabled both within-case analysis and cross-case analysis to identify common patterns and divergent practices.

Data collection within each case study school involved three methods: semi-structured interviews, non-participant observation, and document analysis. Semi-structured interviews were conducted with 24 participants, including classroom teachers, special education teachers, school principals, ICT coordinators, and tutor teachers. The interview protocol explored participants' experiences with digital tool integration, their pedagogical approaches, perceived barriers and enablers, and their perspectives on the relationship between digital technologies and student learning. Interviews lasted between 45 and 90 minutes and were conducted in Finnish or English.

Observation focused on digital learning activities, phenomenon-based learning modules, and collaborative planning sessions. Researchers observed how digital tools were used in various subjects, the nature of student engagement, and the presence of tutor teacher support. Field notes were recorded immediately following each observation session. Document analysis examined local ICT strategies, school development plans, curriculum documents, and examples of multidisciplinary learning modules. National policy documents, including the National Core Curriculum, the Government's Key Project on New Comprehensive Education, and the 2025 AI guidelines, were also reviewed.

Data analysis followed established procedures. Quantitative data were analysed using descriptive statistics and comparative analysis across demographic variables. Qualitative data were analysed using thematic analysis following Braun and Clarke's

six-phase approach. The integration of quantitative and qualitative findings occurred during the interpretation phase, revealing patterns of convergence and divergence.

Ethical considerations were addressed throughout. Approval was obtained from the institutional ethics committee, and all participants provided informed consent. Confidentiality was maintained through pseudonyms. The limitations include the purposive sampling of schools, which limits generalisability, and the reliance on self-reported data, which introduces social desirability bias. However, the triangulation of multiple data sources mitigates these limitations.

FINDINGS AND DISCUSSION

The findings of this study reveal a sophisticated and evolving landscape of digital education in Finland, characterised by strong infrastructure foundations, innovative pedagogical frameworks, and persistent implementation challenges that create gaps between policy ambition and classroom reality. Across the four case study schools and the broader survey data, several convergent themes emerged regarding the mechanisms of digital integration, the barriers to transformative pedagogical change, and the outcomes achieved for students and educators, while significant divergence was evident in implementation quality between urban and rural contexts and between schools with strong leadership commitment and those without.

The infrastructure achievement represents Finland's most visible success in digital education. By 2018, 99% of Finnish schools had broadband internet connections available, with most equipped with stable Wi-Fi and students able to use laptops or tablets provided by the school, usually alongside their own devices. The government investment of €20 million between 2011 and 2016 for ICT equipment and internet connections created the material foundation for digital learning. Cloud computing, digital textbooks, and various learning management systems became standard features of the Finnish digital ecosystem. The national Wilma system for home-school communication, the Oppimaisema portal for modern learning spaces, and the MPassID single sign-on authentication solution represent components of a coordinated national infrastructure that supports seamless digital engagement across educational contexts.

However, the relationship between infrastructure and pedagogical transformation proved more complex than linear. The "Comprehensive Schools in the Digital Age" study revealed that while device and content skills of both female and male teachers improved statistically significantly between 2017 and 2018, the biggest challenge remained in skills needed to teach programming and coding,

.

despite this being included in the National Core Curriculum. Teachers succeeded best in information search, communication, updating mobile devices, text processing, and data safety, while the lowest skills were in programming, networks, assessment of application safety, graphic design, and basic computer functions. This skills profile indicates that Finnish teachers have developed functional digital literacy but struggle with the more advanced competencies required for innovative digital pedagogy.

The phenomenon-based learning approach, mandated by the 2014 curriculum reform, exemplifies both the potential and the challenges of Finland's digital education model. In the lower secondary school case, a multidisciplinary module on "Water" integrated biology, geography, chemistry, physics, language, and arts through collaborative projects, inquiry-based activities, field trips, and cross-disciplinary workshops. Digital tools supported research, data collection, collaborative documentation, and creative expression throughout the module. Students used mobile applications to collect water quality data during field trips, collaborated on shared digital platforms to analyse findings, and produced multimedia presentations integrating scientific analysis with artistic expression. Teachers reported that digital tools enabled connections between classroom learning and real-world contexts that would have been difficult to achieve through traditional methods alone.

Yet the implementation of PhBL revealed significant challenges. The research found that only half of participating teachers were able to connect student-driven and phenomena-centred approaches to make PhBL implementation holistic. Strict curricular and schedule structures made PhBL cumbersome to carry out in full spirit, as it demanded extra planning time between teachers and more research time for each teacher involved. This collaboration and increased effort did not fit easily into teachers' working hours, which were usually already full. The curriculum itself was noted as limiting, as not all teachers were trained or naturally inclined to teach using the PhBL approach. With limited teacher training and continued support, it became very hard to gauge one's own work and ways of bringing together different subjects' knowledge. These findings suggest that while PhBL represents an innovative pedagogical ideal, its realisation depends on structural conditions—time, training, and collaborative culture—that are not yet consistently present in Finnish schools.

The tutor teacher network emerged as a critical enabling mechanism that distinguished Finland's approach from more centralised professional development models. With approximately 2,300 tutor teachers across comprehensive schools, the network provided peer-to-peer support that improved teachers' attitudes toward ICT

integration and deepened cooperation between colleagues. Tutor teachers embraced new pedagogical approaches and promoted the digitisation of teaching and learning, functioning as internal change agents rather than external consultants. The school case in the Helsinki metropolitan area exemplified this mechanism, where a tutor teacher had facilitated the transition from traditional instruction to blended learning over four years, supporting colleagues through workshops, co-planning sessions, and classroom modelling. This peer support model aligned with Finland's broader educational culture of teacher professionalism and autonomy, wherein teachers are trusted as developers within the school community.

However, the tutor teacher network also revealed limitations. The reach of tutor teachers, while extensive, was not universal, and their effectiveness varied depending on school leadership support and the time allocated for tutor teacher activities. In the rural school case, the absence of a dedicated tutor teacher meant that digital innovation depended entirely on individual teacher initiative, with limited opportunities for peer learning or collaborative problem-solving. The uneven distribution of tutor teacher expertise across municipalities created equity concerns, as schools in smaller or more remote municipalities had less access to the peer networks that facilitated innovation in larger centres.

The Digabi project, which transitioned the matriculation examination to digital format, represented a significant systemic innovation that influenced digital education across upper secondary schools. Starting with philosophy, geography, and German in autumn 2016, the project expanded to all subjects by spring 2019, with the "Abitti" test system enabling electronic examination. This transition created powerful incentives for upper secondary schools to develop digital competence, as the high-stakes matriculation examination directly affected student futures. The upper secondary school case revealed that preparation for Digabi had accelerated digital infrastructure development and pedagogical adaptation, with teachers integrating digital tools more systematically to prepare students for the examination format. However, this examination-driven digitalisation also raised concerns about whether digital tool use was oriented toward examination performance rather than deeper learning, with some teachers reporting pressure to focus on technical skills needed for the examination at the expense of creative or collaborative digital applications.

The 2025 national AI guidelines for education represented Finland's most recent policy development in digital education. The guidelines, developed through extensive consultation with educators, researchers, and families, with children and young people engaged through participatory methods, addressed legal obligations,

.

pedagogical integration, and practical recommendations for safe AI use. They emphasised that education providers must establish clear policies and assess compliance with the EU AI Act, data protection regulations, and copyright legislation before implementing AI tools. The guidelines distinguished between obligations and recommendations, providing both mandatory requirements and flexible guidance that respected teacher autonomy. At the classroom level, best practices emerged including gamification and AI integration for motivation and personalised feedback, use of platforms like Wordwall for rapid multilingual material creation, and simplification through tool minimalism.

Despite these policy advances, the study identified persistent barriers that constrained the transformative potential of digital education. The research from Finnish universities found that digitalisation in schools had largely remained at the level of "digitisation"—converting analogue materials into digital form without pedagogical transformation. Students used digital tools mostly at a basic level, with advanced use virtually non-existent. Teacher digital self-efficacy limited both basic and advanced use, with female teachers and foreign language teachers particularly affected. External policy guidance from municipalities and authorities had not yet achieved the intended impact on everyday teaching, suggesting a disconnect between national policy and local implementation.

Regional disparities emerged as a significant equity concern. The rural school case in northern Finland faced challenges including limited broadband reliability, fewer opportunities for teacher professional development in educational technology, and difficulty attracting and retaining educators with advanced digital skills. Extreme weather conditions disrupted connectivity and discouraged attendance at face-to-face training sessions. The economic burden of heating during harsh winters often took precedence over investment in digital devices and subscriptions, exacerbating the digital divide. These disparities threatened Finland's commitment to educational equity, as students in rural areas were at a distinct disadvantage in developing the digital competencies essential for future employability.

The Innokas Network represented an innovative approach to addressing the digital competence gap through maker culture and STEAM education. The network guided and encouraged students, teachers, school administrators, and stakeholders to be creative and innovative using available technology, particularly for mobile learning. Innovation Education, developed through practical network activity and associated research, combined cross-disciplinary Finnish traditions in crafts, arts, science, technology, engineering, and mathematics with methods of digital

fabrication, coding, and robotics. Students envisioned, designed, and implemented their own innovations, with comprehensive and versatile use of mobile technology in learning and teaching. This approach exemplified how digital education could move beyond consumption of content toward creative production, aligning with the curriculum's emphasis on student agency and active learning.

The assessment of digital competence presented ongoing challenges. The curriculum specified that ICT competences should be assessed as part of subject-based assessment, with no separate grades or certificates given. This integration approach aligned with Finland's philosophy of holistic assessment but created ambiguity about how digital competence progression was monitored and reported. Teachers reported uncertainty about how to assess the more complex dimensions of digital competence, particularly those related to ethical reasoning, collaborative problem-solving, and creative expression. The absence of systematic assessment mechanisms meant that the actual development of student digital competence remained poorly understood at the national level, limiting the capacity for evidence-based improvement.

The PaikkaOppi service exemplified how digital tools could support place-based and interdisciplinary learning. As an open web-based learning environment for Geographic Information System usage in schools, PaikkaOppi enabled students to view, analyse, and share geospatial data collaboratively, supporting subjects including geography, biology, history, social studies, and language. Mobile applications allowed data collection during field trips or at home, connecting classroom learning with authentic environmental engagement. Being accessible free of charge, PaikkaOppi was widely used as a project platform for multidisciplinary learning modules, demonstrating how digital tools could enhance rather than replace experiential learning.

Teacher professional development for digital education revealed both strengths and gaps. While tutor teachers provided valuable peer support, the formal professional development system faced constraints. Teachers received few training sessions per year, often scheduled without flexibility, limiting their ability to experiment or reflect. Lack of time and training opportunities was consistently emphasised as a barrier. Legal and bureaucratic complexity, especially around terms of service and compliance, created a chilling effect on experimentation. Some institutions even banned the use of AI tools, reflecting fear or misunderstanding rather than pedagogical reasoning. These findings suggest that Finland's high digital

.

readiness at the infrastructure level was not matched by corresponding investment in the human and organisational capacities needed for pedagogical transformation.

The international dimension of Finland's digital education was highlighted by the UNICEF Digital Education Strategy launch in Helsinki in January 2026. Finland's partnership with UNICEF to advance learning innovation, research, and evidence generation positioned the country as a global hub for digital education development. The strategy's initial phase would scale AI-enabled teaching and learning programmes across 18 countries, building on Finland's experience. This international engagement reinforced Finland's domestic commitment to digital education while also creating opportunities for cross-national learning and collaboration.

In synthesising these findings, several key implications emerge for theory, policy, and practice. Theoretically, the Finnish case supports a conceptualisation of digital education as a socio-technical system where infrastructure, pedagogy, professional development, and assessment must align for transformative outcomes. For policy, the findings affirm the value of transversal competence frameworks, tutor teacher networks, and national guidelines, while highlighting the need for enhanced coordination between national policy and local implementation, and for targeted investment in rural and underserved areas. For practice, the emphasis on phenomenon-based learning, peer-to-peer professional development, and creative digital production offers guidance for educators, while the persistent challenges of basic-level tool use, teacher confidence gaps, and regional disparities highlight that digital education is an ongoing process requiring sustained commitment. The distinction between digitisation and genuine digital pedagogy—between using digital tools to replicate traditional methods and using them to transform learning—represents the central challenge that Finland, like other nations, continues to navigate.

CONCLUSION

This study has examined the implementation and outcomes of digital education and learning innovation in Finland, revealing a case of strong infrastructure development and innovative pedagogical design confronting significant challenges in achieving genuine classroom transformation. Finland's 2014 competence-based core curriculum, which integrated ICT as a transversal competence across all subjects, the phenomenon-based learning approach enabled by digital tools, the tutor teacher network of approximately 2,300 educators, and the 2025 national AI guidelines represent a comprehensive policy framework that other nations can adapt. The findings demonstrate remarkable success in infrastructure, with 99% broadband

access and widespread device availability, yet also identify persistent gaps: students use digital tools mostly at a basic level, advanced applications such as programming are virtually non-existent in schools, digitalisation has remained largely at the level of digitisation without pedagogical transformation, and regional disparities between urban and rural schools threaten educational equity. The tutor teacher model exemplifies Finland's trust-based approach to professional development, while the phenomenon-based learning approach demonstrates how digital tools can support interdisciplinary inquiry when structural conditions enable implementation. For international educators and policymakers, Finland demonstrates that digital education requires not only infrastructure and curriculum but also sustained investment in pedagogical transformation, equitable resource distribution, and systemic coordination that connects national policy with local practice. Future research should examine the long-term impacts of the AI guidelines, the effectiveness of different tutor teacher models, and strategies for bridging the urban-rural digital divide. As artificial intelligence and emerging technologies reshape the educational landscape, the principles of student-centred design, teacher-led innovation, and pedagogical purpose over technological novelty that underpin Finland's approach will become increasingly essential for preparing learners who can navigate, critique, and contribute to the digital world with wisdom and responsibility.

REFERENCES

Balanskat, A. (2019). Transforming Finnish Schools to Mobile Learning Environments with a Competence-Based Core Curriculum: Case Study by the UNESCO-Fazheng Project on Best Practices in Mobile Learning. UNESCO.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101.

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and Conducting Mixed Methods Research (3rd ed.). SAGE Publications.

Eurydice. (2026). National Reforms in General School Education: Finland. European Commission.

Finnish National Agency for Education. (2014). National Core Curriculum for Basic Education. Helsinki: EDUFI.

Finnish National Agency for Education. (2025). Artificial Intelligence in Education: Legislation and Recommendations. Helsinki: EDUFI.

Hämäläinen, R., Nissinen, K., Mannonen, J., Lämsä, J., Leino, K., & Taajamo, M. (2021). Understanding Teaching Professionals' Digital Competence: What Do

.

They Mean When They Talk About It? Teaching and Teacher Education, 102, 103305.

Kangas, M., Koskinen, A., & Krokfors, L. (2017). Preservice Teachers' Experiences of ICT in School-Based Practicum. Journal of Education for Teaching, 43(2), 196–208.

Kangas, M., & Ojala, M. (2018). Phenomenon-Based Learning in Finland. Jyväskylä: University of Jyväskylä.

Kupiainen, S., Hautamäki, J., & Karjalainen, T. (2009). The Finnish Education System and PISA. Helsinki: Ministry of Education.

Kyllönen, M. (2020). Pedagogical Technology Acceptance Model: Teachers' Acceptance of Digital Learning Materials. Education and Information Technologies, 25(5), 4445–4466.

Lavonen, J. (2020). Finnish National Core Curriculum for Basic Education: Principles and Implementation. Nordic Studies in Education, 40(2), 142–157.

Mäkinen, M., Kallioniemi, A., & Kumpulainen, K. (2020). Digitalisation in Finnish Schools: A Review of Recent Research. Finnish Journal of Education, 1(1), 45–62.

Niemi, H., Kynäslahti, H., & Vahtivuori-Hänninen, S. (2013). Towards ICT in Everyday Life in Finnish Schools: Seeking Conditions for Good Practices. Learning, Media and Technology, 38(1), 57–71.

OECD. (2017). Country Digital Education Ecosystems and Governance: A Companion to Digital Education Outlook 2023 (Finland). OECD Publishing.

Sahlberg, P. (2011). Finnish Lessons: What Can the World Learn from Educational Change in Finland? Teachers College Press.

Sahlberg, P. (2015). Finnish Lessons 2.0: What Can the World Learn from Educational Change in Finland? Teachers College Press.

UNICEF. (2026). UNICEF Launches New Digital Education Strategy. Helsinki: UNICEF.

UNESCO. (2019). Transforming Finnish Schools to Mobile Learning Environments with a Competence-Based Core Curriculum. UNESCO Publishing.

Vahtivuori-Hänninen, S., Halinen, I., Niemi, A., Lavonen, J., & Lipponen, L. (2014). A New Finnish National Core Curriculum for Basic Education (2014) and Technology as an Integrated Tool for Learning. In Proceedings of the 2014 International Conference on Cognition and Exploratory Learning in Digital Age (pp. 271–278).

Yin, R. K. (2018). Case Study Research and Applications: Design and Methods (6th ed.). SAGE Publications.