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A Comparative Study of Smart School Development in Australia, Finland, Iran and USA

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ABSTRACT

The present study aimed to conduct a analysis of the development of smart schools in Australia, Finland, Iran and USA. To achieve this goal, a comparative research method was employed. The selection of countries was based on the strategy of "different social systems with similar educational outcomes". Data collection was collected through a systematic review of national and international studies published from 2000 to 2024. A document analysis checklist was used as a data collection instrument. Qualitative content analysis was utilized for data interpretation. The findings indicated that the integration of ICT into the educational systems of selected countries has led to increased school efficiency, improved teaching-learning processes, and enhanced student motivation. Furthermore, most of the studies reviewed in the selected countries focused on diagnosing challenges, as well as identifying the strengths and weaknesses of smart schools. The major finding revealed that all schools in the selected countries are equipped with educational technologies such as computers and internet access, although smart schooling in Iran remains a relatively new phenomenon. Also, smart schools in Iran face several challenges compared to their counterparts, including teacher resistance to innovation, inadequate technical and pedagogical support, and lack of essential infrastructure - such as local area networks and internet connectivity-, and t unavailability of reliable digital content. Based on the findings, it is recommended that Iran's educational policymakers provide targeted training for teachers, and students in ICT. It is also proposed that a specific budget be allocated by the Ministry of Education to support the smart schools.

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1. Introduction

The continuous transformation of education has created a growing need for new, user-centered, and sustainable learning environments. This shift has opened up opportunities for technology companies to design and develop the kinds of learning environments required by schools and higher education institutions (Pihlajamaa & Rantapero, 2020). However, national education systems do not follow a unified policy in developing information and communication technology (ICT), as they pursue different goals and employ diverse strategies. Moreover, even within a single country, there may be disagreements about the purpose of ICT literacy and the methods for enhancing it. The absence of a shared vision and mutual understanding across different levels and sectors of policymaking at both national and regional levels often results in fragmented and ineffective educational efforts to increase ICT integration in schools (Markauskaite, 2005).

Nevertheless, the integration of computers into the field of education has led to significant changes in classrooms, reshaping educational structures, teacher behavior patterns, and curriculum content. Additionally, in recent years, smart devices such as smartphones and tablets have entered the realm of education and learning, bringing about notable changes including increased student motivation, improved attitudes, enhanced academic achievement, and greater interaction between students and teachers (Asadian et al., 2018). These devices have also transformed the traditional classroom experience by removing geographical and spatial barriers to accessing educational materials (Husnita et al., 2023). The impact of these smart devices is evident everywhere, particularly in how students use them in their daily learning activities.

A brief look at the historical trajectory of new technologies in education shows that in 1984, David Perkins and his colleagues at Harvard University introduced the "Smart Schools" initiative as an innovative educational experience utilizing ICT (Mondegari & Kazemi, 2022). In essence, a smart school is a technologically integrated environment designed to stimulate students' multiple senses and encourage active participation, by aligning the efforts of teachers and administrators in a comprehensive and blended setting aimed at improving educational outcomes. Furthermore, a smart school is considered a learning organization systematically designed to prepare students for life in the knowledge era through enhanced teaching, learning, and school management processes (Jahani et al., 2020). Smart schools represent a novel educational approach that fundamentally transforms the teaching and learning process through the integration of ICT into curricula and instruction.

The key features of a smart school include: eliminating the constraints of time and place in teaching and learning (Tajik Esmaili & Ali Askari, 2016); providing access to vast digital resources and creating dynamic and engaging environments for student activities (Habibi et al., 2020); preparing future generations to thrive in the information age and nurturing students' potential in alignment with their interests and abilities (Hesari et al., 2023); addressing individual differences among learners through flexible curricula (Mangione & Cannella, 2021); and fostering motivation and creativity in students (Abraimova, 2021). The primary goal of smart schools is to provide classroom access to technology and high-speed internet in order to equalize learning opportunities for all children (Girardin & Duell, 2007). Smarter school designs and purposefully planned facilities can significantly enhance engagement and motivation among children and educators (Fuller et al., 2009). Innovative curricula that promote a better life, student empowerment, creative methodologies, advanced learning materials, and continuous assessment models are among the fundamental principles that smart schools are expected to embody. It is, in fact, likely that technologically equipped schools—and those more proficient in integrating technology into teaching—can produce better academic outcomes for their students (Mergoni, Soncin & Agasisti, 2023). Smart schooling also facilitates a better understanding of students' educational circumstances by strengthening communication with families (Galián et al., 2023).

Smart schools are characterized by several key features. The first and most prominent element is technology. To collect data and support intelligent infrastructure, smart school technologists often install sensor networks throughout the school building, enabling an immersive and pervasive learning environment. The second essential element is inclusiveness. Inclusive education refers to specialized support strategies to meet individual needs, expanding learning opportunities and student participation through differentiated teaching methods, accessible formats, assistive technologies, and required support services. This approach seeks to empower all students—particularly those from vulnerable groups or those with learning disabilities. The third element of smart schools is sustainability. Sustainability in smart schools encompasses energy efficiency, environmentally responsive practices, and all other necessary components for achieving environmentally friendly, sustainable school buildings (Mogas, 2022).

Given that the development of smart schools and their associated challenges are not unique to Iran, it is essential to briefly review the findings of previous researchers in this field. Liu, Huang, and Wosinski (2017), in their study on smart learning, concluded that compared to traditional learning, smart learning is characterized by features such as learner self-adaptivity and flexibility in assessment. Reychav, Warkentin and Ndicu (2016) found that the use of tablets and educational

websites in smart schools leads to more effective learning, primarily due to the impact of technology on student communication. Choy and Li (2016), in a study conducted in South Korea that identified the key success factors of smart school systems and prioritized them using an Analytic Hierarchy Process (AHP), concluded that teacher commitment held the highest weight among the success indicators. Dori and Kurtz (2015) found that most students believed that learning in a technology-rich environment increased their motivation and improved their learning outcomes. Nichols (2015) highlighted that smartboards play an increasingly important role in enhancing interaction and learning in music education classrooms. In a comparative study on the use of ICT in preschool education in Greece and China, Liu, Toki and Pange (2014) revealed that both countries had significantly improved their ICT infrastructure and that the use of ICT tools was steadily increasing. Keengwe, Schnellert and Mills (2012) discovered that laptops had a positive effect on student learning and engagement in the learning process. Aristovnik (2012), in a study on the impact of ICT on educational performance and its effectiveness across selected EU and OECD countries, found significant differences in ICT effectiveness among these countries. A detailed analysis revealed that Finland, Norway, Belgium, and South Korea had the highest levels of ICT efficiency. Sánchez, Salinas and Harris (2011), in a comparative study of ICT-based education in South Korea and Chile, emphasized that to enhance the effectiveness of ICT in teaching and learning, several factors are essential: easy access to technology, adequate teacher training, effective curricula, appropriate program evaluation, and fostering collective motivation.

In Iran, several studies have also been conducted on various aspects of smart schools. For instance, Ghane, Yarmohammadian and Rahmani (2022) found that students in smart schools can overcome spatial and temporal barriers by using smartphones or computers—with teacher support—to resolve their questions and ambiguities. Cheraghi, Batmani and Shirbagi (2021), in designing and validating a model of "smart school principals' competencies," identified key dimensions such as principals' values and attitudes, knowledge-based competencies, professional capabilities, managerial skills and abilities, and personality traits. Habibi et al (2020) found a significant positive relationship between the implementation of the smart school initiative and a learning-oriented organizational climate. Naderi-Beni, Khanifar and Ghofraani (2019), in a study on diagnosing issues in primary smart schools in Qom based on the socio-technical systems model, reported that these schools scored below average in technical and structural dimensions and at an average level in terms of management, culture, and goals. Kian (2019), in a comparative study of ICT programs in general education in Australia, Finland, and Iran, found that Australia had implemented the "National School Reform Agreement 2019–2023," which focuses on transforming

educational curricula and programs. Meanwhile, Finland—the first European country to integrate ICT into its education system—launched the "ICT in Everyday School Life" initiative to promote future teacher skills, design e-learning, foster school culture, and engage business stakeholders. Ghaznavi et al (2019), in a comparative study on curriculum smartification in Malaysia, Australia, and Finland, proposed a model for Iran that includes five components: management systems, teaching and learning environment, human resource empowerment, hardware infrastructure, and software resources. Jalilian et al (2017) concluded that teachers in Iranian smart schools demonstrated only moderate levels of ICT-based teaching skills, including design, implementation, and evaluation. Seraji and Soleimani (2016), in their analysis of the barriers to smart school implementation, identified several key obstacles: insufficient teacher knowledge, lack of constructivist attitudes toward technology, low self-efficacy in applying digital tools, teacher and administrator resistance to innovation, inadequate technical and pedagogical support, mismatch between educational structures and ICT integration, weak technology-use culture, and unresponsive school leadership. Moradi, Dalilian and Khodashenas (2016), in assessing smart school implementation in Gilan Province (North of Iran), reported that current schools were weak in terms of space and equipment, as well as the competencies of both students and staff. Abdolvahabi, Mehralizadeh and Parsa (2016), in their study on barriers to smart school implementation in girls' high schools in Ahvaz, pointed to the lack of multimedia-based learning environments, underdeveloped ICT infrastructure, low teacher proficiency in using internet and computer tools, and regulatory constraints as major inhibiting factors. Davodnia and Zaraii Zavaraki (2014), in a comparative study of educational management and curriculum design in smart schools in Australia, Malaysia, and Iran, noted that Australia had made commendable progress by integrating tools such as content management systems, network management software, and ICT-based evaluation systems. In contrast, school administration in Iran largely continues to follow traditional models. Zamani, Ghasabpour and Jabal-Ameli (2010) examined the strengths, weaknesses, opportunities, and threats facing smart schools and concluded that their main strengths include improving computer and information literacy among students and teachers compared to conventional schools, and shifting the teacher's role from authority to facilitator. Lastly, Ghaderi and Zarei-Zavareki (2006), in a study titled "ICT Development Strategies in the Educational System: Emphasizing the Experiences of the U.S., Australia, India, and Iran," found that Australia had made significant strides by establishing centralized databases for vocational education and training, international education, and resource networks, while India's overarching strategy focused on becoming a global leader in information technology.

Given that most research related to smart schools in Iran has primarily focused on their effectiveness and the analysis of strengths and weaknesses, comparative studies that examine the current status of smart schools in Iran in contrast to leading countries have largely been overlooked. Accordingly, the main objective of the present study is to analysis of the development of smart schools in Iran, the United States, Finland, and Australia. The sub-objectives of this study are as follows:

- What similarities can be identified between Iran and the selected countries regarding the current status of smart schools?
- What differences exist between Iran and the selected countries in terms of the current status of smart schools?

2. Research Method

This study employed a qualitative comparative research method, utilizing the strategy of "different social systems, similar educational outcomes" to select the countries under investigation. The required data were collected through a systematic review following the approach proposed by Kitchenham and Charters (2007). Sources included books, articles, and research studies retrieved from Iranian academic databases—Noormags, Magiran, and SID (Scientific Information Database) as well as international databases such as Google Scholar, Springer, ScienceDirect, Emerald, and Taylor & Francis, covering the period from 2000 to 2024. A total of 220 Persian and 170 English sources were initially identified. In the next stage, the abstracts of the selected sources were reviewed, and 50 national and 25 international articles relevant to the research topic were chosen for in-depth examination. In the final stage, the number of national articles was refined to 30, and the international articles were narrowed down to 15. The resulting data were analyzed using qualitative content analysis.

3. Findings

A) Descriptive Analysis

Australia

Australia is internationally recognized for its effective approaches to educational innovation (Kozma & Voogt, 2003). Educational policymakers and planners in Australia have made substantial efforts to utilize information and communication technology (ICT) in schools with the goal of

enhancing the teaching and learning process. By developing digital infrastructure and promoting technological literacy among teachers and students, the Australian education system aims to foster innovative learning and prepare learners for participation in the digital society (Baskin & Williams, 2006). Research on smart schools in Australia indicates that the country's learning environments have undergone significant transformations in recent years (Newton et al., 2018). One of the key drivers behind the success of Australian schools over the past two decades has been the integration of ICT into classrooms (Attaran, Alias & Siraj, 2012), although the diffusion of digital literacy and ICT has been heavily influenced by the policies of Australia's federal system (Markauskaite, 2005). Australia has rapidly implemented ICT across various educational sectors. For example, reports of a lack of technological tools in rural schools are rare, suggesting that even remote and sparsely populated areas have well-developed technological infrastructure. This ensures equitable access for rural students to digital learning opportunities, comparable to their urban counterparts (Mustafa et al., 2024). Moreover, the effective integration of national educational policies related to ICT has led to improvements in teacher professional development and has helped address systemic challenges within schools (Msambwa et al., 2024). Despite this progress, the Australian education system still faces a significant challenge: many teachers lack sufficient confidence and competence to conduct in-depth analyses of digital data.

Finland

Studies on smart schools in Finland indicate that a 0/25 increase in national income is attributed to improvements in the quality of education (Federick, 2020). With a systematic approach to integrating information and communication technology (ICT) into education, Finland is now regarded as one of the leading countries in the development of smart schools. The country's main objectives include improving educational quality, strengthening digital competencies, and preparing students for life in a technology-driven society (Saarinen et al., 2021). In order to maintain a competitive education system, Finnish policymakers have made significant investments in school ICT infrastructure. These include equipping schools with modern technologies, expanding communication networks, and providing digital tools for both teachers and students (Novoa-Echaurren et al., 2025). Educational planners in Finland believe that the use of computers in classrooms leads to greater student engagement and increased peer interaction (Kankaanranta & Linnakylä, 2004). Consequently, hardware and software costs have become an integral part of school budgets (Law, Pelgrum & Plomp, 2008). Between 2010 and 2016, the number of computers in Finnish schools increased substantially, with an average of 55 computers per school (Kenttälä,

Kankaanranta & Neittaanmäki, 2017). Furthermore, to prepare student-teachers for teaching in smart schools, specific ICT-related training courses are provided (Hasala & Kelly, 2020), as teachers' professional capital plays a crucial role in advancing smart school development (Kupiainen, 2022). In 2011, a Smart Education Project aimed at developing continuous systemic learning solutions was launched. Its goal was to promote 21st-century learning through user-centered and motivational approaches (Shoikova et al., 2017). The key goals of smart school development in Finland include:

- Achieving higher-quality learning environments for teaching and learning;
- Providing new solutions for individualized learning (Pihlajamaa & Rantapero, 2020);
- Creating opportunities for students to use technology in completing assignments and enabling teachers to use innovative technologies for student assessment (Hakkarainen et al., 2000).

Overall, the digitalization of schools in Finland has been implemented in a top-down manner, primarily funded through short-term government-supported projects. While this strategy has accelerated the implementation of technology in schools, it has also raised concerns regarding the long-term sustainability and coherence of such initiatives (Hoikkala & Kiilakoski, 2018).

Iran

The initial model for establishing smart schools in Iran was adopted from Malaysia's education system (Zamani et al., 2010). The Smart Schools Project was first introduced by the Iranian Ministry of Education in 2004. Based on decisions made by the ICT Council of the Ministry, the initial implementation began in the academic year 2004–2005 and was assigned to the Education Organization of Tehran. During this pilot phase, four public high schools in Tehran were selected to implement the smart school model (Mirzajani et al., 2016). After three years of preliminary trials in Tehran, the Ministry expanded the initiative nationwide in 2007, offering training for teachers according to the Strategic Plan for Smart Schools. In the first stage, 100 schools were selected, with 50 distributed across various provinces (Omidinia, 2009). In 2009, the Smart Schools Roadmap was developed by the Ministry of Education, emphasizing the role of smart schools as a key requirement for knowledge-based societies (Mirzajani et al., 2016). By 2011, numerous schools in major Iranian cities had been converted into smart schools (Ataran, 2011). Additionally, the Ministry was tasked with launching a dedicated "Smart Schools" department in collaboration with the Ministry of

Communications by 2022. In line with the broader initiative to implement e-government in education, it was planned to provide electronic access to textbooks, educational games, assessments, counseling services, and vocational training (Mondegari & Kazemi, 2022). Other efforts included launching pilot schools, supporting volunteer schools, and drafting a national strategic document for smart school development (Alishavandi et al., 2023). Drawing from Iran's Vision 2025 and the goal of expanding educational equity, the Ministry of Education has continually pursued smart school development aligned with scientific and international standards (Yazdani, 2019). Despite these policy-level intentions and the undeniable benefits of smart schools in transforming education, the implementation has faced several obstacles. These include: lack of access to ICT tools, vague policies (Motamedi & Piri, 2014), inadequate planning, absence of standardized frameworks for content development (Alishavandi et al., 2023), insufficient support for teachers and principals (Yousefi, 2014), and economic/cultural issues such as resistance from traditional teachers and the high cost of educational devices (Abbasi et al., 2020).

One of the major challenges has been the lack of curriculum planning tailored to smart schools (Sharifzadeh & Andishmand, 2019). Factors such as high-speed internet, capacity building, integration, and professional development have significant impacts on effective smart school management (Mardani & Molaei, 2015). Key challenges also include teachers' unfamiliarity with internet use, outdated teaching methods, absence of reliable e-content, and limited infrastructure like local networks and stable connectivity. Additionally, there is a hardware-centric view of technology in Iran's smart school model, with limited focus on essential non-technical aspects such as legal frameworks, user training, the necessity of technology integration, and societal acceptance (Mahmudi et al., 2008). Implementation has mostly focused on hardware acquisition, such as computers and networking equipment, without sufficient attention to the pedagogical and strategic dimensions required for meaningful educational transformation. As a result, while many schools are equipped with digital tools, the integration of technology into teaching and learning remains superficial and fragmented (Taghva et al., 2019; Seraji et al., 2020). Various factors influence the development of smart schools in Iran, including technological, educational, cultural, strategic, economic, legal, and social dimensions (Rezai Rad et al., 2012). Hardware, software, human resources, and financial inputs rank highest in importance, while information security is considered least prioritized (Mondegari & Kazemi, 2022). Regarding teaching and learning indicators, smart schools have the most impact in creating dynamic and creative environments, while contributing least to the enhancement of higher-order thinking, knowledge, and skills.

In terms of teacher competencies, the most notable improvement is in IT skill development, whereas the promotion of critical thinking and self-directed learning remains the weakest area (Jahani et al., 2020). Barriers to ICT adoption also include teacher and student acceptance, along with limited digital literacy and self-efficacy among teachers, resistance from educators, administrators, and parents, insufficient technical and pedagogical support, and a structural mismatch between the educational system and the integration of technology (Azizi, Izadi & Babaeyan, 2020; Seraji & Soleimani, 2016).

USA

In the United States, the government has made significant investments in the use of information technology (IT) in education (New York Smart Schools, 2014). All classrooms are equipped with internet access, computers, and appropriate educational software, and teachers are required to participate in in-service training programs to effectively utilize these tools (Karpat, 2014). Both teachers and students in the U.S. have experienced profound changes in teaching and learning through the integration of emerging technologies such as artificial intelligence (AI), virtual reality (VR), and digital learning tools (Garshi et al., 2020). As a result, the use of advanced technologies has become an integral part of education for many years, with substantial financial investments made in the development and deployment of educational technologies in schools (Davis, 2003). Since the 1990s, the U.S. smart education agenda has emphasized the integration of digital technologies into classroom instruction. In 2014, the New York State Board of Education identified seven core criteria for the development of smart schools:

- Providing and expanding access to online learning;
- Using technology to personalize instruction;
- Increasing school access to high-speed broadband internet;
- Connecting classrooms to open external resources;
- Employing technology teachers for instruction and ongoing professional development;
- Focusing on the development of STEM skills for learners;
- Promoting technology-based, innovative leadership and school management (Tran & Tran, 2023).

To achieve these goals, both teachers and students received training on using educational tools such as laptops, enabling them to align their learning activities with educational technologies (Carnoy, 2004). The primary aim of smart schools has been to ensure equitable learning

opportunities for all children through access to classroom technologies and high-speed internet (Girardin & Duell, 2007). Despite these advancements, many U.S. teachers—although they have access to educational technologies in the classroom—do not use them effectively in their instructional practices (Gray, Thomas & Lewis, 2010)

B) Comparative Analysis

In a general comparison, Finland, the United States, Australia, and Iran have adopted distinct approaches toward the development of smart schools. Finland, with its systematic strategy, targeted investments in technological infrastructure, teacher training, and the design of intelligent learning environments, is considered one of the leading nations in this field. The United States has made extensive investments in smart education, leveraging emerging technologies such as artificial intelligence (AI) and virtual reality (VR), and focusing heavily on personalized learning. It has also developed clear standards for smart schools. Australia, through its advanced digital infrastructure, promotion of technology skills across all educational levels, and emphasis on teachers' digital literacy, has taken significant steps in this direction. In contrast, Iran—despite its efforts to implement smart schools—faces multiple challenges such as an excessive focus on hardware, lack of appropriate curriculum planning, insufficient software infrastructure, teachers' limited knowledge and motivation, and lack of cohesive national policies. Overall, while Finland, the U.S., and Australia have taken comprehensive and integrated approaches to successfully implement smart schools, Iran remains in a transitional stage and requires serious structural, cultural, and strategic reforms. Moreover, while the aforementioned countries have addressed hardware, software, educational, cultural, and managerial dimensions simultaneously, Iran's focus has remained largely on physical infrastructure and equipment. Finland has sustainably smartened its education system by emphasizing skilled teacher preparation, enhancement of professional competencies, and the creation of innovative learning environments. The U.S. has transformed its schools through the establishment of clear standards, use of advanced technologies, and a strong focus on individualized learning. Australia, meanwhile, has institutionalized the widespread and effective use of ICT by promoting digital literacy among both teachers and students.

In contrast, Iran faces persistent obstacles such as inadequate educational planning, low technological proficiency among teachers, misalignment of educational structures, and insufficient attention to non-technical and human dimensions. These challenges have resulted in a superficial and unstable implementation of smart schooling in the country.

Table 1. Characteristics of Selected Countries in the Development of Smart Schools

Finland	**Australia**	**United States**	**Iran**
Centralized policy leadership	Federal policy leadership	Federal policy leadership	Centralized policy leadership
Preparation for 21st-century life	Preparation for life in a digital society	Simultaneous quantitative and qualitative development	Fragmented policies; multiple policymaking bodies
Technology-oriented society	Promotion of technological literacy	Technology-oriented society	Knowledge-based society emphasis
Individualized learning	Equal opportunity focus	Personalized learning	Emphasis on virtual learning development
Competitive learning	Innovative learning	Equal opportunity	Educational equity emphasis
Balanced quantitative and qualitative growth	Balanced quantitative and qualitative growth	Balanced quantitative and qualitative growth	Unbalanced quantitative and qualitative development
In-service teacher training	In-service teacher training	In-service teacher training	Emphasis on meeting international standards
Dedicated funding	Low teacher confidence	Large-scale investments	Limited investment
—	—	Transformation in teaching through AI	Gradual and step-by-step implementation
Lack of inconsistency	—	Emphasis on STEM education	Inadequate in-service training for teachers
—	—	Infrequent use of educational technology by teachers	Inadequate investment

Based on the content of Table 1, it is possible to identify and compare the similarities and differences among the selected countries in the field of smart school development (Table 2).

Table 2: Similarities and Differences among Selected Countries Regarding Smart School Development Characteristics

Characteristics	Finland	Australia	USA	Iran
Leadership in development policies	*	√	√	*
Emphasis on changes in teaching/learning methods	*	*	*	*
Emphasis on preparing for life in modern societies	*	*	*	*
Emphasis on individualized learning	*	*	*	*
In-service teacher training	*	*	*	√
Optimal investment	*	*	*	√
Transformation in teaching through emphasis on AI	*	√	√	√
Emphasis on student-centered learning	*	*	*	*
Development of technology-based curriculum	*	*	*	*
Lack of coherence in programs	*	√	√	*
Inconsistent use of technology by teachers	√	*	√	*
Emphasis on STEM education	√	√	*	√

The content of the table indicates the presence of 13 smart school characteristics in the selected countries. These characteristics can generally be categorized into two groups: soft features and hard features. The table also shows that all selected countries share similarities in six of these characteristics. For example, the emphasis on changes in teaching and learning methods, or the focus on preparing the younger generation for life in modern societies through the development of smart schools, is evident in the policies of all selected countries. Furthermore, the table reveals differences among the selected countries in seven characteristics. Among them, Iran shares 8 similarities with Finland, 7 with Australia, and 6 with the United States. Additionally, the findings suggest that Finland has the highest degree of similarity with the other selected countries. However, it should be noted that although Iran's education system shows a high level of similarity with the other countries on paper and in high-level policy documents, in practice, the greatest differences can be observed. Accordingly, the main challenges facing the implementation of smart schools in Iran's education system include:

- Lack of expertise and necessary skills among school administrators and teachers,
- A strong prevailing bureaucracy in the education system, and
- Inequitable access to resources between affluent and underprivileged regions.

4. Conclusion

The present study aimed to conduct a comparative analysis of the development of smart schools in Iran, Finland, Australia, and the United States using a systematic review approach. The findings revealed that one of the key differences between smart schools in Iran and the selected countries lies in the perspective and approach toward these schools. In Iran, smart schools often lack the appropriate mechanisms and qualified personnel necessary for the successful implementation of smart school projects. Moreover, while national policy documents in both Iran and the selected countries emphasize the efficiency of the education system and the enhancement of teaching–learning processes, most Iranian schools still fail to meet the essential standards required to establish a functioning smart school. In comparison, Finnish teachers effectively utilize educational technologies to improve teaching quality and assessment practices. Smart schools in the United States have a longer history than those in Iran, and the government has made substantial investments in integrating ICT into education. In U.S. elementary schools, smart schools provide access to classroom technology and high-speed internet, ensuring equal learning opportunities—whereas one of the main challenges in Iran is the lack of high-speed internet and insufficient technical support.

Additionally, in Australia, the development of digital literacy and ICT is largely influenced by federal policies, while in Iran, policies related to smart schools are typically imposed in a top-down, directive manner by the Ministry of Education. Further challenges in Iran include teacher, administrator, and parent resistance to educational innovation, inadequate technical and pedagogical support, limited internet usage among teachers, lack of familiarity with modern teaching methods, and the absence of reliable electronic content. The results of this study demonstrate that while smart schools in developed countries are considered an integral part of their education systems, in Iran, these schools are still in their early stages of development and face significant infrastructural limitations, shortcomings in human resource training, equipment shortages, and cultural and managerial challenges.

The experience of successful countries highlights that effective implementation of smart schools requires coherent macro-level policies, adequate financial investment, comprehensive teacher training, ICT infrastructure development, and the cultivation of a culture that embraces technology in education.

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