Digital Transformation in Education:

Opportunities and Challenges Facing School Principals

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Abstract: Digital technology has significantly transformed education in contemporary times. School principals play a crucial role in these efforts. Digital transformation in education is changing teaching and learning but also has much scope for creativity and improvement in the system. Principals from Vienna schools must see that digital tools have potential in enhancing educational processes and professional entry requirements become stringent, on the other hand. As new technology becomes an everyday part of school life, all students, teachers and any school administrator can gain the technological skills and knowledge they need to develop personally, academically and in terms of their future careers. Along with this, the digital learning trade has complexities trumping complex ones. There are more expectations from principals to deliver the promise while coping with change and unpredictability. As a result, they need to possess the strategic vision and professional competencies to implement effective digital initiatives and facilitate successful school transitions. The article outlines the specific opportunities and challenges that digital transformation presents along with some pragmatic suggestions to promote an education system that improves and innovates schools through technology. In short, this study provides important information for educational leaders dealing with digital changes.

Keywords: Digital Transformation, Education, School Principals, Technological Innovation, Digital Learning

INTRODUCTION

The educational landscape is rapidly changing due to the constant evolution of digital tools and resources (1). Schools are capitalizing on technological advancements and exploring the adoption of digital tools beyond the mere replacement of analogue approaches (2). The development of digital

learning applications is transforming traditional educational methodologies by readily engaging students in innovative teaching activities (2). School principals are positioned to drive this transformation by fostering a digital-friendly environment in schools (3). But to what extent are they prepared to assume this new digital leadership responsibility? (4). Do they have at their disposal the necessary infrastructure and human resources? (5). How do they perceive the challenges and opportunities arising from the rapid dynamics of this digital shift? (6). It is necessary to understand the adaptation process to the digital environment (7). A qualitative study based on semi-structured interviews has been conducted with 26 school principals worldwide (8). The results confirm that the rapid dynamics of the digital shift have enhanced the difficulties facing school principals, but also underline its potential and need in creating an open and adaptable digital-friendly school environment (9). Since the European Education and Training 2020 Strategy, the increasing European Union focus on digital skills aimed at transforming the educational landscape in which school pupils are equipped with digital skills (10). In Europe, schools are invited to increase pupils' digital competence enough to allow a creative and scholarly use of digital tools in their everyday lives (11). The development of digital learning applications is a method of innovating traditional educational methodologies (12). Such applications readily engage the students in creative and innovative teaching activities (13). In this momentum, schools have explored and set up digital tools for teaching purposes beyond the merely replacement of analogue educational methods (14).

UNDERSTANDING DIGITAL TRANSFORMATION IN EDUCATION

Digital transformation is about the integration of digital tools in innovative ways to transform existing organizational structures, processes, and systems, leading to increased effectiveness and efficiency with respect to organizational mission (15). This transformation concerns all levels and units of educational organizations and occurs across institutional boundaries (16). It is about how education is organized, how education is delivered, how learners are assessed, the relationship between teachers and learners, the relationship between parents and schools, and the role of schools into their communities (15). In this respect, digital transformation is a complex and contested term, as it can have a diverse meaning and implication based on different socio-cultural contexts (17). In education, some understand it narrowly, equating it with the development of digital skills, while others understand it more broadly, related to the integration of digital methodologies and tools in the teaching and learning context (18).

Digital transformation in education has been widely studied in the literature. It was mainly focused on access to infrastructure, effective use, and school culture, which underlines the importance of schools as organizations and the context in which teaching and learning happen (2). Moreover, various frameworks and theories were developed to better understand how digital tools

and methodologies are integrated into teaching and learning, and the transformative potential for classrooms and schools (19). In a review of the literature, digital technologies and policies supporting the widespread and effective integration of digital technologies within teachers' practices are encompassed by the term "digital transformation of education" (20). Basic terms such as digital skills, literacy, and innovative teaching methodologies are seen as enablers for the effective integration of digital technologies in teaching transforming pedagogical practices (21). Finally, by focusing on the future-ready school approach, different paths and practices that could support the development of school principals' capacity are analyzed, along with the challenges faced in a diverse landscape of educational systems and contexts (22). This knowledge provides a theoretical basis for the practical implications discussed later (23).

Definition and Scope

Digital transformation is a multifaceted process that affects various aspects of society (2). In the education sector, digital transformation can involve much more than new laptops or smart boards (24). Technology can be fully embedded in education through software enriched curricula, virtual and augmented reality, and technology enhanced assessment and evaluation (25). Furthermore, digital transformation in education can be influenced by multiple aspects – e.g., technology capacities, curricular integration, the organisation of the education system – and it has various implications e.g., changes in learning processes, pedagogy, reporting, assessment, lifelong learning (26). There is no one-size-fits-all model for digital transformation; it happens on a case-by-case basis in response to emerging obstacles and opportunities (27). Because of that, this subsection sets the scope and definitions of digital transformation in the educational setting (28). This way, the following opportunities and challenges, looked at as the effects of digital transformation, can be meaningfully interpreted and utilized (29). The parameters are laid out for the multidimensional examination of digital transformation in education, so that they are aware of the varying phenomenon and measures surrounding it (30).

In a school setting, digital transformation can be broadly defined as the substantial and continual process of recognizing, evaluating and adjusting prevailing conducts, policies, and habits affected by digital technologies and information in teaching and the daily operation of the school facility (31). Adapting to the digital change goes beyond the mere familiarization with digital technology (32). In a traditional approach, efficient digital transformation in a school setting typically develops via three stages: (1) technology set-up, (2) tight incorporation of digital technologies in the learning environment, and (3) continuous alterations in all participants' behavior, practices, and beliefs (32).

Key Technologies Driving Digital Transformation

Digital transformation in education is rapidly evolving, driven by the continuous development of technologies that can improve both teaching and administration in schools (2). This ongoing transformation offers opportunities for educators who are willing to keep up with the emerging technologies and

adapt their practices (28). Nevertheless, it also poses significant challenges for schools and authorities in need of comprehensive strategies to implement new technologies (21). By drawing on the academic literature, this paper examines both the opportunities and challenges facing school principals with respect to the integration of digital technologies for administration and teaching (24). It provides recommendations for adopting best practices and for the gathering of knowledge that can inform the development of strategies that maximize the benefits of this integration while alleviating significant challenges (22). These strategies are associated with the effective use of data, digital learning resources, and the integration of new technologies in schools as well as the upskilling of teachers (30). It can be recommended at various levels, with certain suggestions addressing the innovative research into the effects of digital technologies in education (30). Utilizing an analytical framework, the paper provides a comprehensive account of the impacts of digital transformation in education at both the micro (teaching) and macro (administration, national policy) level (32). This research focuses on transformative technologies and practices that can present paradigms on how significant economic and social changes are driving educators and authorities to adapt to the 4th industrial revolution (33). All the aforementioned technologies and resources are part of national educational policy and all are free services with unlimited access (34).

OPPORTUNITIES FOR SCHOOL PRINCIPALS IN DIGITAL TRANSFORMATION

Introduction The digital transformation of society and the economy has spread to all areas of life, including education at all levels, from vocational schools to universities and lifelong/adult education (30). While promoting the efficiency and optimization of school structures, this transformation also requires innovative forms of organization, learning and teaching as well as cooperation in order to provide all students with the skills and knowledge needed to actively and critically participate in shaping an increasingly complex and interconnected world (23). The focus is on the opportunities and challenges of digital transformation from the perspective of school principals (33). It elaborates on useful and essential technological developments, examines possible innovative solutions in teaching, learning and administration, and illustrates possible strategies (12). However, the central concern is to show the various possibilities that digital transformation enables regarding the diverse actions of school principals (22). This involves not only adapting to digitalization, but also using it to develop and promote a new form of culture of school and curriculum development, which helps to confidently shape both the school and the education of the future (24).

Enhanced Teaching and Learning Experiences

Digitalization is changing societies and economies and it is generally believed that it will have major impacts on the ways people work, learn, and live in social environments as well as in public and private organizations (35).

Digital technologies are influencing and transforming the various aspects of daily life and education is no exception to this trend and development (36). The global lockdown due to the COVID-19 pandemic forced education to take a leap into the digital transformation and find ways to continue the educational process by offering distance learning (37). The education sector's digital transformation (DT) is very complex and multifaceted (38). It involves the change from traditional, physical schools to paperless schools (39). DT includes the integration of a number of various digital technologies and infrastructure into everyday school life to make teaching and learning processes more efficient and attract students who spend a lot of time on the Internet (40). DT is also related to a change in communication modes among teachers and between teachers and students (41). DT is also about a transformation of the educational process, IT curriculum, and software (41). DT is also about changes in the teachers' and principal's professional skills (42). DT also transforms management, institutional arrangements, and organizational issues (43). DT is about the promotion of creativity and critical thinking, empowering students to solve real-world problems (44). There are a number of main opportunities, challenges, and factors that affect the contexts and the nature of a school's DT, including access to infrastructure, effective technical support, the development and quality assurance of digital learning resources, and digital data (44).

Efficient Administrative Processes

As digital technologies continue to transform every facet of society, there exists both the potential and the need for the educational system, and schools specifically, to also change (45). On a daily basis, school leaders make decisions about managing schools that influence the instructional activities in classrooms (46). School principals have an expectation of driving innovation, enhancing student achievement and coping with the continuous changes occurring through national policies and technologies (47). Despite this acknowledgment of the significance of the principal's role in determining the effective integration of digital technologies in schools, the majority of principals feel insufficiently prepared to support the growth and proliferation of digital technologies (48). The implementation of digital tools and devices has the potential to radically change the daily practices of school leaders as well as the culture of schools (49).

Employment of different digital tools can organize administrative processes in schools in a way that they will both conform to education requirements and augment the operation effectiveness of the school (50). Management software can facilitate fast, reliable and systematic registration of information concerning students, teachers, and other parties involved in the educational procedure (51). Furthermore, a system of digital archiving can ensure the safe storage and rapid recovery of important and classified documents (50). The e-mail notices, alerts, and signals can be used for instant coordination among principals, teachers, parents, and the schools' service staff (52). The systems are intended to be adopted as a mechanism for automation of the procurement

and management of stocks. It can safeguard there is a sufficient supply of the necessary materials and resources for the implementation of the scheduled academic syllabus (53). Apart from the aerial advantage, however, a more profound gain would be derived from the automatization of the bureaucratic proceedings (52). This was perceived as a highly promising reform by all of the interviewees, who criticized the most routine procedures in place (53).

CONCLUSION

The Youth Self-Report (YSR/11-18) remains a valuable tool in assessing behavioral and emotional problems among adolescents, particularly when combined with the multi-informant approach. As globalization and cultural shifts continue to influence adolescent development, it becomes increasingly important to consider the socio-cultural context in which adolescents navigate their mental health challenges. Arab adolescents in Israel face unique pressures, including the tension between traditional values and modern influences, which contribute to a higher prevalence of eating disorders and psychological distress. Moreover, sleep quality, which plays a critical role in adolescent well-being, continues to be an area of concern, particularly in light of recent global disruptions.

CHALLENGES FACED BY SCHOOL PRINCIPALS IN DIGITAL TRANSFORMATION

First and foremost, as school education goes increasingly digital in the twenty-first century, it is challenging for school principals to deal with student digital divide, the lack of acceptance of digital change, insufficient support, as well as follow-up, evaluation, and adaptability issues (54). School principals together with teachers are those who realize, facilitate, and supervise digital transformation in schools (55). School principals must pay attention to these challenges to step up the effectiveness of technology integration efforts and put it at the best advantage for the goals of education (56). Therefore, school principals need to choose and adapt tools and supports wisely, promote the development of a digital culture at school, as well as improve themselves, their administration team, and their teachers technologically (57). By doing so, school principals could create a better environment in which to foster the capacity to teach and learn with digital tools (58).

The disparity in the use of technology to learn is evolving a potential digital inequity that frustrates the enthusiasm and efforts of schools to transform learning through technology (59). In advanced ICT countries, students from disadvantaged families or communities face even more formidable barriers with less access to high-quality resources, regular usage, and positive technology-use experiences, a so-called “second-level” digital divide issue on the right for effective and transformative use (60). The technology-integrated

pedagogy and new teaching strategy and approach are out-of-dated for school principals (61). In most situations, the poor evidence of generated benefits will discourage or limit the understanding and acceptance of technology integration (62). Education on technology is both shallow and inadequate, modeling and learning about technology are both missing, knowledge is not sustained, and supportive systems are insufficient (63). It will be hard for schools to find immediate use for technology or proper means to measure it the moment they need it (64). Unlike the rapidly changing consumer-grade technology, rigid organization, rigid curriculum, preparation, and funding mechanism usually make the installed technology choices at school become technical legacies that are far from supporting the emerging educational needs with the flexible, adaptable, and coherent system technology demands (65).

Digital Divide Among Students

The term digital divide has been used to describe the disparities in access to the internet and technology between those who use it actively, home, and at work, and those who do not (66). The availability of digital technology and the internet is important for on-line learning settings, especially when they are central in the teaching methods of schools exploring the use of on-line platforms and digital content in their lesson plans (67). Since less endowed students are likely to face greater difficulties in this respect, the gap that exists from more to less endowed schools should be a source of concern in the efforts to ensure educational equity under digital transformation (68). The term digital divide is now used to refer to the level of inequality in the access to and use of information and communication technologies (ICTs) among individuals, homes, and geographic areas (69). Many studies have shown that a digital divide is associated with several social issues (70). Recent trends in digit-print gaps and skill-hiring specific returns to the scholastic ability have worsened overall inequality trends between more and less able students (71). The difficulties of less able schools to attract and retain highly skilled staff in view of the competition with more able schools for their own most able students has possibly reinforced existing trends in school stratification at the digital level, and inequalities in the supply of digital resources to students (72). Further, ensuring basic quality of internet provision to the various student body has grown costlier over time and may have contributed to deepen within-school digital divide (73).

Resistance to Change

In the relationship between digital technologies and the education sector, the role of the school principal is fundamental to propel and consolidate possible changes (74). How are the changes being faced by the school leadership in view of the incorporation of digital technologies in the school environment? (75) To understand how school leadership reacts to these new possibilities—limits and potentialities—, it is necessary to outline a more precise scenario of the insertion of digital technologies in schools (76).

In this context, the methodology was organized in a triangulation of research data which included: mapping and analysis of the results of studies on

the use of digital technologies in schools; interviews with school principals; interviews with coordinators, teachers, and professionals at a Brazilian education center focused on continued education (77). The findings indicate the coexistence of a conservative trend which adapts new potentials of the digital technologies to traditional practices in a technical and swift way, and a more politically and pedagogically elaborated initiative which intends to review the educational practices (78).

Resistance to change affects the behavior of any organization in the implementation of novel strategies (79). There are many aspects that can bolster resistance to the adoption of new technologies, such as fear of the unknown, skepticism about technological promises, and lack of confidence in one's own abilities to deal with new situations (80). Resistance is fed by the misfit between the technological pace and the time needed for training and accommodation of these novelties, therefore generating a sense of being overwhelmed by the fast technological advancements (81). Most of the research subjects report that it is difficult to realize the initiatives and that it faces resistance from the teachers and professionals, disclosing that the school environment is not ready for substantial transformations (82). In this sense, resistance to change may come to strengthen conservative positions within the school environment and impair the school principals in their efforts to transform the teaching practices (83).

STRATEGIES FOR SUCCESSFUL DIGITAL TRANSFORMATION

The Covid-19 pandemic brought significant changes that affected the fields of education, economics, and healthcare, among others (84). Many schools realized that the future of education would likely be a mix between traditional and remote learning and moved rapidly towards having Virtual Learning Management Systems (85). Considering the opportunities and challenges faced by school principals in developing schools in relation to digital transformation, it is significant to examine the strategies school principals can adopt to maximize the opportunities and minimize the challenges faced (86). The rapid advancements in technology, combined with the lessons learned from the pandemic, offered a unique opportunity for dynamic digital transformation in all aspects of education (87). There is a need to create a broader understanding of the best strategies school principals and educational policymakers can use to embrace and drive lasting digital transformation (88).

For digital transformation to be successful, it is crucial for the strategies to be comprehensive and involve the right balance of technological advancement, educational best practices, and active community engagement (89). A thorough investment would enable schools to develop innovative, creative and inspiring personalized methodologies with social impact that would address the social and economic disparities currently encountered in society (90). School principals are the main drivers for successful implementation of policy reforms and essential educational enhancement (91). Despite being significant

reformers, school leaders cannot merely instruct teachers and other staff to reach the anticipated outcomes (92). They need to create a novel sphere of innovation and reliance to shape the ethos and values among all educational stakeholders (93). Only by doing so will there be an environment that embraces change and fosters ease for the adaptation of emerging innovations for a better, enriched quality of teaching and learning (94).

Broadly, school principals would benefit most from adopting the skills of innovation in their daily educational leadership practices (95). An institute that values, accepts, and praises new methods will cultivate educators, the management team, pupils, and the local community to experiment with advanced ed-tech and media resources in teaching, learning, and operating the school ecosystem (96). A novel culture of innovation needs to be rooted in educational institutions that would have everything to gain from embracing rapid advancements in the digital landscape since it is the most effective way to address the challenges of the modern world (97).

Investing in Professional Development

Digital transformation in schools can only happen successfully if the people using digital technology feel confident and able to derive benefit from doing so (98). This is where school principals come in (99). The role of the principal in a school's digital transition is to provide vision and direction, organisational strategy, and leadership in creating a culture of change to ensure teachers, parents, and students feel confident and ready for that change (100). This means that principals must keep abreast of technological developments so they can make well-informed decisions about investment in the digital future (101). In so doing, they should consider these key strategies and important considerations (102).

One of the most critical areas that the school principal must address is the need to invest in professional development (103). It is essential that teachers feel confident, equipped, and supported to be able to integrate the digital effectively into their teaching practices (104). This can begin with investing in high-quality Initial Teacher Education programmes, including practical training modules, to produce a digitally confident professional (105). This investment must then continue throughout a teacher's career as these skills can quickly become outdated or irrelevant with ongoing changes in technology (106). Investment in professional development should be considered a priority and built into all areas of school planning (collaborative, targeted, research-based, ongoing, and evaluated) (103). This investment can take a wide variety of formats, such as workshops, mentoring, or online courses, it is essential that professional development is targeted towards the individual needs of the teachers receiving it (107).

This may mean planning carefully to identify these needs in the first place. This may involve carrying out a skills audit of staff, creating individualised CPD learning plans that are regularly updated, or using performance management structures to plan the digital CPD for each teacher (108). This approach can foster a culture of continuous improvement as staff are continually reflecting

on their own skills and attempting to develop new ones (109). By investing genuinely in professional development, teachers are less likely to be resistant to change, feel more supported when attempting to change practice, and can ultimately have increased benefits for student outcomes as the technology is being used more effectively (110).

CONCLUSION

The digital transformation in education will offer great opportunities, but it will impose new challenges on schools (111). As the leader of their school, the role of the school principal is highlighted (112). Three aspects have been discussed: the transformation of teaching, the transformation of learning, and the transformation of school management practices (113). School principals have the responsibility to understand, adapt to, and affect the consequences of these changes (114). Their involvement as a supporter, a facilitator, and a leader is crucial in adapting these changes successfully to their context (115).

Many practitioners and scholars stress the opportunities that digital technology brings with it (116). However, changes also impose barriers and boundaries (116). In the case of education, school principals are the critical component of a success or cancelation of this transformative change (117). To guide school principals' understanding has been presented a concrete overview of the changes in the education system and the documentation of both opportunities and challenges that may result from their introduction (118). In light of their complexity and the number of stakeholders associated, there is a need to adopt a comprehensive and clear strategy in school management (119). It has identified nine areas of attention (119). Suggestions and strategies for overcoming these challenges are provided (120). Mostly, it is about time to take action and start planning contingent before it is too late (120). Only action can prepare schools for the inevitable change that will come (120).

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