

Quo Vadis? School Principals' Educational Leadership in the Technological Era of the 21st Century

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Abstract

This article focuses on a case study of primary schools in the northern peripheral region in Israel. Its aim is acquiring insights into the influence of principals as educational leaders of meaningful use of information and communication technologies (ICT) in teaching and learning.

The data source in this study is qualitative based on personal interviews with 6 school principals and 9 teachers. The conclusion arising from these interviews was that school principals' areas of responsibility are anchored in leading teaching, educational and learning processes, molding schools' future image – vision and managing change, leading, and professionally developing staff, while concentrating on individuals, managing links between schools and communities.

School leaders do not need to be IT experts, but it is important they have the vision to adopt change reform in the technological era of the 21st century. Principals are role models for teachers when they provide them with support and training to encourage them to employ ICT in planning their lessons, which is likely to improve their teaching and students' learning.

Keywords:

School leadership; meaningful use of ICT; ICT vision.

Zusammenfassung

Dieser Artikel konzentriert sich auf eine Fallstudie von Grundschulen in der nördlichen Peripherie Israels. Ziel ist es, Einblicke in den Einfluss von Schulleitern als pädagogische Führungskräfte auf die sinnvolle Nutzung von Informations- und Kommunikationstechnologien (IKT) im Unterricht und beim Lernen zu gewinnen.

Die Datenquelle in dieser Studie ist qualitativ und basiert auf persönlichen Interviews mit 6 Schulleitern und 9 Lehrern. Die Schlussfolgerung, die sich aus diesen Interviews ergab, war, dass die Verantwortungsbereiche von Schulleitern in der Leitung von Lehr-, Bildungs- und Lernprozessen, der Gestaltung des zukunftsorientierten Erscheinungsbilds von Schulen - Visionen und Bewältigung von Veränderungen -, der Führung und professionellen Entwicklung des Personals verankert sind, während sie sich auf Einzelpersonen konzentrieren und die Verbindungen zwischen Schulen und Gemeinden verwalten.

Schulleiter müssen keine IT-Experten sein, aber es ist wichtig, dass sie die Vision haben, Reformen im technologischen Zeitalter des 21. Jahrhunderts umzusetzen. Schulleiter sind Vorbilder für Lehrer, indem sie ihnen Unterstützung und Schulungen anbieten, um sie zum Einsatz von IKT bei der Planung ihres Unterrichts zu ermutigen, was ihren Unterricht und das Lernen der Schüler verbessern dürfte.

Schlüsselworte:

Schulleitung; sinnvoller Einsatz von IKT; IKT-Vision.

1. Introduction

The appearance of a global society driven by technological and communication developments has moulded the younger generation as future world citizens in the guise of “global citizens” with a broad range of tools and knowledge skills adapted to a competitive and information-based society. These developments have changed the role of students and teachers and has created a paradigm transition from a traditional industrial society to a knowledge and information society (Chai & Lim, 2011).

Successful ICT assimilation in school education systems requires changing and rethinking the learning paradigm in teaching. Whereas many researchers have

emphasized the importance of teaching development and professionalism as important factors in ICT assimilation, many studies have confirmed the role of principals as educational leaders as a significant and essential factor driving teachers' motivation and commitment to efficient ICT integration into their teaching.

Stogdill (1974), presented several definitions of the leadership concept. Their common denominator is a person's ability to influence and motivate as well as concern for communication between all group members aspiring to reach its goal. Leadership creates suitable opportunities for members of an organization

to identify with it and its goals, and thus contributes to the effective success of organizations to which they belong. Therefore, schools' educational leadership plays an essential role in leading reforms in technological and pedagogical changes necessary for school ICT to succeed (Boulton, 2017; Japhet & Usman, 2018; Shin, 2015).

The theory behind the transformative leadership model was first developed by Burns (1977) and improved to a full range leadership model (FRLM) by Bass and Avolio (1993). School principals who adopt a transformative leadership style can influence the degree of technological integration at schools significantly. As creative leaders of school development, they must have qualifications and new technological qualifications in education because they fulfil a critical role in successful integration of school initiatives and serve as role models for those they lead (Scheppers, Wetzels & Ruyter, 2005).

The International Society for Technology in Education (ISTE, 2014) proposed a range of teaching roles for school technology leaders: leadership with vision, culture, learning in a digital era, systemic improvement, and digital citizenship. These standards are the skills and knowledge school principals and leaders need to integrate technology successfully in schools. School principals are a central factor influencing the introduction of change. Principals provide the vision, direct teachers toward common goals and control resources required to progress change. How teachers teach, children learn, and principals manage their schools change as a result of ICT implementation. It appears that ICT can be efficient if school heads actively support it, learn it well, have appropriate knowledge, provide ongoing professional development, and support staff in this change process.

Therefore, the aim of this qualitative research is to identify the effect of leadership strategies on meaningful ICT use in schools.

2. Theoretical foundation

Electronic supply systems are widely used in today's education systems and expand access to education allowing learning to occur at any time in any place. ICT assimilation has turned education into an open system, which supplies global access to information, the internet, diverse data resources enabling borderless global communication (Arkorful & Abaidoo, 2014; Shan Fu, 2013). The purpose of

integrating ICT into education was to move teaching and the learning process from traditional teaching centres to an approach focusing on learners with the active participation of learners' instructors (Voogt & Pareja, 2010; Voogt & Petgrum, 2005).

Educational technology as a construction tool can help students present their ideas, express their knowledge, investigate, use, and process information in a shared learning environment.

Integrating ICT helps constructivist learning where students connect with other learners, teachers, information sources and technology. Such an atmosphere provides learners with direction and a framework to construct their knowledge and skills. Students are likely to demonstrate abilities when they know how to apply and use technology in a manner that makes their learning easier. Such an atmosphere provides shared, rich learning conditions and gives learners opportunities to reveal diverse viewpoints in addressing the ICT issue by choosing and employing tools to solve problems and assess outcomes (Pierce, 2013; Ramorola, 2013).

The need to adapt the Israeli education system to changing times has been at the centre of public debate for many years. Apparently, the education systems' conduct and growing gap between what is done within school walls and the external world have led, to ongoing dissatisfaction. Against this background the education system introduced many reforms at the end of the 20th and beginning of the 21st centuries, which aspired, at least according to declarations, to instil in students' competences and skills relevant to the 21st century. Most reforms emphasized 'profound' pedagogical methods encouraging high level thinking, some sought to assimilate digital applications in schools, others focused on improving skills measure in internal comparative tests and there were those that widely addressed schools' autonomy and flexibility (Nir et al., 2016).

In the same context, several core leadership qualities were identified in the final report of the ICT educational and training plan in the European Unions' ICT cluster (EU ICT Cluster, 2010). First tangible support for digital education is required among all decision-makers in education. Second, visions of digital education must be accompanied by assimilation plans suiting existing reforms and management systems. Third, innovation leaders require administrative support to supervise adapting changes in education styles they intend to activate. Fourth,

opportunities to cooperate and reciprocal contacts among people as well as organizations can encourage motivation and disseminate recommended working methods. Fifth, every technological assimilation and application process requires continuous supervision and assessment to produce rapid feedback loops allowing immediate integration of the program. The last point on the issue of assessing policy of digital education plans, is expressed in the literature time and again (Condie & Munro, 2007; Fullan & Donnelly, 2013; FELTAG, 2013; Luckin et al., 2012).

School principals' leadership constitutes another central factor influencing the introduction of change. Principals provide the vision, direct teachers to common goals and control resources needed to progress change. Bodies that have reciprocal relationships with schools, such as local authorities and the Ministry of Education also influence ICT integration in schools. The abundance of bodies involved in change processes produces increased complexity and not once is the outcome shows demands that are not adapted to actual reality, simplistic solutions, and inconsistency in performance.

3. Research methodology

Semi-structured interviews in this study served as a technique to gather information from individual teachers and principals in face-to-face interviews. The purpose of interviews was to examine the current state of ICT use in teaching and learning from the viewpoint of 9 teachers and 6 principals and vice principals from four primary school in the northern peripheries of Israel. These interviews provided the main source of data for this study. To protect interviewees' identities and privacy, the researcher gave them pseudo-codes.

To analyse data acquired from semi-structured interviews, content analysis was employed, which was intended to inductively reach conclusions from 'text units', meaning from transcribed interviews, about their social context. An analysis unit was a word, expression or sentence affiliated to research aims, questions and examined issues. The analysis process began with an initial mapping stage, during which comparisons were made between interviewees' statements to find similarities and differences inductively. Similar statements were joined together under the same category by their congruence with the program (Shkedi, 2011).

Content analysis conducted on data collected from interviews provided three main themes and associated categories, described below:

- **Theme 1:** School culture contained two categories: (1) teachers' and principals' views about assimilating ICT in education. (2) Teachers and principals' views towards traditional teaching at school.
- **Theme 2:** School principals' leadership role and responsibility for assimilating ICT contained three categories: (1) School principals' level of assimilating ICT skills; (2) Formulating school vision and policy; (3) Creating an attractive school environment for ICT use.
- **Theme 3:** ICT policy and educational strategies contained two categories: (1) Teachers' and principals' perceptions of Ministry of Education's ICT policy; (2) Teachers' and principals' perception of school ICT policy (translating policy into action).

Table 1. Interview Guide – Principals and Teachers

Interview Guide –Principals and Teachers
In your daily life, do you use a computer? For what purpose?
Have you received ICT training in your work?
What do you think are the challenges and barriers that prevent or hinder the assimilation of ICTs in your school? Are they related to equipment and technical infrastructure, time, financial problems, lack of training or other problems?
Do you use a computer as a teacher in class? For what purpose?
Since we are in the technological age, tell me, how do you as a principal promote the integration of ICT into school teaching?
What are the difficulties and challenges you are experiencing or facing regarding the use of ICT in teaching at your school?
Can you please describe the current state of ICT use in your school teaching and education? (e.g. accessibility of computers, technological equipment and infrastructure, hardware and software, teacher and student use of these technologies etc.)
What are the computer skills you use in your managerial work?
How do you think a principal should act to promote the assimilation of school ICTs?
What role do you think teachers play in assimilating ICT in school teaching?
What do you think about the Ministry of Education's policy of assimilating ICT in teaching? Does the Ministry of Education provide you with support and guidance in achieving the goals and objectives? How?
Is there a school policy regarding the assimilation of technology in your school? How is it expressed?

4. Findings

4.1. Results and discussion of findings emerging from research question

How do the characteristics of formative leadership of school principals as pedagogical leaders influence the assimilation of ICT technologies in the teaching of teachers and students?

4.1.1. School culture - principals' and teachers' views about the importance of ICT assimilation in education

Qualitative research findings revealed that principals' views regarding employing the range of ICT currently available to them, enables improving and promoting students' learning skills and teachers' teaching. In the same context, principals' views of traditional teaching indicated the need to change this form of teaching. They expressed understanding and agreement that in fact educational technology was everywhere, at schools, home, market, work and entertainment, and modern education must include and even be based on using ICT tools and mentioned that both veteran and young teachers must use ICT, for example: *"Teachers need to change when they teach digital children... use diverse ways of teaching ... Our ways of teaching must change. We cannot ignore the technological changes in our world"* (Pa). *"Many children with high technological skills who must get a chance to develop these skills for learning important subjects ..."* (Pc).

Teachers reinforced the principals' approach about the important need to change traditional teaching and adjust to the technological age. T9 argued, *"We should use other teaching methods so that these children do not get bored They are connected to the Internet all day and know all kinds of sites and materials no less than us ... even more"*.

In contrast, T6 explained her difficulties in changing her traditional teaching habits and employing ICT teaching, *"I believe in traditional teaching; that is what I have been used to for many years ... I have a hard time adjusting to these changes with computers ... I have no confidence in dealing with it ... I'm not sure I will be able to cope with these innovations ... However, I think we should assimilate the two methods in the right dosage to give students the best"*.

However, principals' negative perceptions and views about the importance of assimilating ICT in

schools, low awareness of the benefits of its integration into teaching and inappropriate decisions concerning ICT infrastructure, allow teachers to return to their previous teaching strategies and learning methods and can even undermine teachers' capability and commitment to employ ICT in teaching (Fullan, 2007)

These findings support research literature pertaining to integrating ICT in teaching, introducing ICT to schools and learning processes driven by global powers over and above school-based decision making (Oluwagbemi & Oluwaranti, 2010; Voogt, 2013).

Therefore, it is important for school leaders to encourage and enable ICT use among students born in this digital and global age (National Education Technology Plan (NETP), Update, 2017).

4.1.2. School principals' leadership role and responsibility for assimilating ICT

4.1.3 Level of school principals' and teachers' ICT skills

Research findings showed that most principals today use ICT tools, mainly to manage daily school tasks, for ongoing administrative matters and communication both within and outside school. Many principals had not received any training in ICT and its possibilities. *"I have not completely mastered ICT skills. I work with the basic tools for reporting purposes, records of staff and students... a lot of emails with teachers and the Ministry of Education"* (Pd). *"Almost 70% of my management work is done electronically. I use ICT in completing daily reports, and communicating with the Ministry, teachers and sometimes parents via e-mail"* (Pe). Pf also testified to lack of training: *"I know how to surf the Internet, build PowerPoint presentations, but my skills are limited. ... I really have no idea about other types of ICT, and I really think I need training"*

Likewise, findings regarding teachers' ICT levels revealed diversity. Most only had limited basic skills. Principals mentioned the difference between young and veteran teachers with regard to their motivation to use ICT in teaching. It also appeared that young teachers had not received suitable training to use their skills prior to their entry to work.

Teachers described the low level of their ICT skills. T3 admitted, *"I know there are many skills that need to be learned more comprehensively ... I have not really mastered them all ... I can use e-mails,*

Office... Google ... opening files ... for example. Excel is really out of the question ...". T4 stated, "I have only basic skills I do not know how to operate the computer for learning as required ... I have not had the appropriate training ... I know some office applications ... presentations, videos from YouTube but it is not enough.

The explanation for these findings is that school principals serve as role models for teachers they manage. Although most principals use ICT tools in their daily tasks, it appears that an absence of training and ICT skills development projects negatively on leading and assimilating ICT.

These findings correspond with various studies that have shown that principals' leadership in developing a vision helps assimilate a digital culture, contributing to promoting teachers' and educators' professionalism and improving learning processes. Accordingly, principals must have appropriate technological skills in the education field and ability to support teachers understand diverse possible technological uses in teaching processes (ISTE, 2014; NETP Update, 2017; Northouse, 2013; Robbin & Judge, 2013, Yuki, 2013).

Hence educational leadership in relation to ICT assimilation in educational system in a global world is characterized by a high level of computer literacy that constitutes a role model for teachers and students in applying ICT skills at schools.

4.1.4. Formulating school vision and policy

Research findings revealed that even though principals recognized the importance of educational policy and its contribution to everything related to integrating ICT in teaching and learning, no practical evidence was found of the leadership expected of them as leading ICT use and application. Most principals reported that they had not formulated school vision and policy expressing values and norms of action and defining goals, shared with teachers, to advance ICT application and assimilation.

Regarding the structured ICT curriculum, principals placed responsibility on the Ministry of Education. Pb described, *"Every teacher ... has to adhere to the curriculum... there are a lot of programs developed by the Ministry of Education ... I do not follow-up ... I am busy with the school system management and student achievements."* Pd admitted, *"I am not really familiar with all the compulsory ICT programs ... there is no real Ministry of Education*

enforcement or control ..." Pf complained, *"The Ministry of Education is up there ... lands programs on schools and expects them to do what is required it does not work that way ... There are no clear guidelines whether it is a duty or a right ... we teach what is needed at the same time a clear ICT leadership plan should be part of the school ... but when there is no support from the Ministry of Education for basic computer equipment and problems of untrained teachers how will I lead the school in this way?"*

Teachers explained their personal views with regard to principals' lack of leadership in integrating ICT in school. On the one hand, principals' heavy workload, and on the other, lack of ICT skills. T2 said, *"Our principal does not really follow what is happening with computers, but she receives all the information we pass on to her. I have no complaints ... because I know she is extremely busy ..."*

An absence of school principal leadership to build a vision to realize a defined school policy in relation to ICT testifies to a lack of a systemic view and awareness of the future developments of diverse technologies likely to integrate into teaching and learning. ISTE (2014) presented standards for skills and knowledge that school principals and leaders require to successfully integrate technology into schools. These include leadership based on vision – developing a digital learning culture referring all students and teachers to excellence in professional undertakings and managing ongoing systemic improvement in their organizations through efficient use of ICT resources.

Research literature has shown that school principals who used strategies integrating management and leadership aspects, based on the transformative leadership model of FRLM (Bass & Avolio, 1993) were more successful at achieving the goal of optimal ICT assimilation in school's ongoing functioning and raising teachers' commitment and motivation to achieve goals and objectives to realize the positive potential of ICT. Therefore, schools' educational leadership has an essential role leading to reforms required in technological and pedagogical changes for ICT to succeed in schools (Boulton, 2017; Japhet & Usman, 2018; Leong, Chua & Sathiamoorthy, 2016; Mitchell et al., 2011; Shin, 2015; Stewart et al., 2009).

Many studies in the last decade have confirmed that principals' transformative leadership influences

teachers' willingness and commitment to technological changes needed in teaching and leading to excellence in students' learning outcomes (Arafteh, 2014; Fisher & Waller, 2013; Handford & Leithwood, 2013; Haynes et al., 2014; Papa, 2011; Richardson et al., 2012).

Hence educational leadership in relation to ICT assimilation in educational systems in the global world necessitates the development of a vision and policy with regard to ICT assimilation in educational systems.

4.1.5. *Creating an attractive school environment to use ICT*

Research findings showed an absence of principals' involvement in creating a collaborative learning environment. In addition, principals' control over ICT usage is expressed mainly in maintaining protected and controlled access to the internet and online information, in the context of protecting students' safety from dangerous internet and computer use, at an educational and social level.

Principals pointed to existing possibilities and means for a collaborative learning environment for teachers but also an absence of their involvement in this learning. Moreover, principals left collaborative learning to teachers' choice and judgment. However, teachers reported that in these actions there was no cooperation among teachers, and only some adopted this way.

"I encourage teachers to use existing ICTs ... in their teaching. Some teachers are really into it, and I write letters of appreciation and gratitude to them" (Pb). This approach derived from not introducing a school educational policy, which also affects this aspect. Pc supported the idea of encouraging ICT use, *"We have a school website ... Teachers can upload shared ICT materials that were taught in the lessons ... Teachers can enter the site and learn how to upgrade their lessons ... Involving teachers in ICT lessons is very important You can learn a lot together"*. Pd expressed awareness of the need to use ICT, saying, *"Every teacher and educator must have his own laptop so that he can communicate online, solve problems and use the many knowledge materials available on the Internet"*.

These findings can be explained by the absence of schools' educational vision and policy led by school principals. These include principals' lack of basic skills and training, low awareness of the benefits of

technology in teaching that affect their lack of motivation to assimilate ICT in schools. As teachers' role-models, principals influence teachers' lack of motivation to participate in training exercises and implement ICT in their work.

Learning environments with positive and consistent principals' support for teachers is likely to promote assimilation of efficient teaching and learning strategies, including making collective decisions to build structured programs to teach ICT and provide opportunities for collegial learning which will ignite teachers' motivation to assimilate ICT into their class teaching.

These findings tally with studies that have shown that learning environment with principals' positive and consistent support for teachers are likely to promote the assimilation of efficient teaching and learning strategies, including making collective decisions to build structured programs to teach ICT and provide opportunities for collegial learning (Busher, 2006; Chang, 2018; Schert, 2009; Seyoum, 2004; Southworth, 2005; Talerico, 2005).

Hence, school principals' realizing ICT use for educational purposes demonstrates to teachers how to follow them. Principals must be certified in all aspects of ICT assimilation, understand the potential in using new technologies, be skilled in their use, promote school ICT culture encouraging new teaching, learning and administrative techniques. All these are likely to make ICT assimilation easier in learning environments supporting teachers' continuous work and leading to desired change promising computerized learning and teaching methods. In addition, principals must develop spaces suitable for learning environments equipped with ICT infrastructure, cautiously guaranteeing the health and safety of teachers and students.

4.2 *Teachers' and principals' perceptions of the Ministry of Education's ICT policy*

Most principals and teachers pointed to a large gap between the Ministry of Education's stated goals ensuring ICT assimilation in schools and what is actually happening in school reality. Ministry of Education requirements are given top-down without supervision or activation of factors adapted to effective ICT assimilation in teaching and learning.

Ambiguity regarding Ministry of Education ICT policy invites principals and teachers' personal interpretation and assimilation. Pd described the gap

between needs for effective ICT assimilation and Ministry of Education declarations and goals, *"The Ministry of Education should be more actively involved in setting their policy, and especially in preparing future teachers, and they must ensure that teachers know the policy and act on it."* T9 stated *"There is a huge gap between the statements and goals of the Ministry of Education and their actions to be carried out in school ... they are up there, talking and writing all sorts of unclear instructions they do not understand that this is not the way they achieve the goals"*

Teachers and principals reported lack of clarity in Ministry of Education goals and strategies regarding assimilation and application of ICT in schools. Principals placed responsibility on the Ministry of Education and teachers placed the responsibility on principals. There appears to be a shared irresponsibility on all sides, when in practice the lack of clarity creates many gaps that hinder the realization of the educational vision for ICT assimilation in teaching.

The findings suggested that teachers and principals believed the Ministry of Education did not provide a clear strategy and necessary steps to ensure teachers' awareness of the importance and contribution of ICT assimilation in their work.

4.2.1. Teachers' and principals' perceptions of school ICT policy (translating policy into action)

All principals recognized the importance of educational policy in all subjects of study in schools. Principals and teachers reported that there is, in fact, no school policy regarding ICT integration into teaching. This was expressed by Pb, *"We do not really have a defined school ICT policy ... Our school policy includes social and educational curricula ... I encourage teachers to use ICT tools ... I also cannot force them because their skills are basic and they have not received proper training"*.

Teachers' statements about school policy reflected those of principals. Teachers considered themselves as educators for students' values, achievements, and social skills, when the use of ICT in teaching has not been the focus of their work.

T5 described the ICT situation at school *"If principals are convinced of the benefits and roles of ICT tools in education, they will be able to lead and persuade teachers to take action for more successful and effective assimilation in school..."* T6 observed,

"There is no school policy with really clear guidelines on this subject..."

The gaps in clarity of and understanding Ministry of Education's policy regarding the assimilation and application of ICT in teaching and what is actually happening in schools also seemed to affect the lack of assimilation of this educational policy. The lack of ICT policy at school level indicated that ICT integration in teaching is carried out mainly by teachers who are interested and active, whereas other teachers are exempt from ICT integration in their teaching subjects

The absence of a school ICT policy means no systemic vision and a disregard for the important responsibility for enhancing the quality of education, which results in ICT use in schools not being considered mandatory and not being part of a school's vision.

5. Discussion

Research findings revealed that educational leadership in relation to assimilating ICT in educational systems in a global world were characterized by positive views about the importance of ICT assimilation in educational systems. Findings also revealed that educational leadership in relation to ICT assimilation in educational systems in a global world necessitated formulating a vision and policy in relation to ICT assimilation in educational systems. In addition, the findings showed that educational leadership striving to lead ICT assimilation in educational systems in a global world were characterized by high computer literacy skills, serving as role models for teachers and students in implementing ICT skills in schools.

Furthermore, findings revealed that educational leadership in relation to ICT assimilation in educational systems in a global world referred to skills and competences principals needed, including technical skills alongside social skills. In other words, school principals' areas of responsibility are anchored in leading teaching, educational and learning processes, moulding future school image – vision and managing changes, leading, and professionally developing staff, while focusing on individual people, managing relationships between schools and communities.

This view of principals' educational leadership combines management and leadership aspects. However, practically, this refers to two different

dimensions: management includes a critical aspect of school maintenance and daily activities, whereas the leadership emphasis relates to areas such as values, ethics, inspiration, consolidating goals, renewal, and motivating people to achieve agreed and shared goals.

The important challenge facing school principals and founding pedagogical leaders is to adopt and initiate strategies to change school management in the spirit of transformative management. Principals must develop and consolidate new, sustainable schools' vision together with teachers. Strategies devised by pedagogical leaders to realize these visions include providing setting a personal example, creating high performance expectations, and strengthening school culture, allocating appropriate resources, promoting group and achievable goals, supporting continuous and adjusted teacher training in daily teaching and learning methods, provide individual support, intellectual stimuli, problem solving and critical thinking. All these contribute to increasing teachers' commitment and motivation to achieve aims and common educational learning goals. Accordingly, school cultures will be developed to realize the positive potential of ICT that improve pedagogical processes in innovating teaching and learning processes taking place at schools and the environs.

Therefore, school require education principals and leaders who can make the change process easier and support learning communities to integrate technology. Successful development of an ICT culture in school education requires educational leaders to be aware of future developments of diverse technologies that are likely to be integrated into teaching and learning, change their traditional views of teachers, and translate educational processes into learning environments – learning with ICT as a key tool to achieve defined pedagogical goals.

Authors note:

The authors had equal contributions to this article.

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