

Infocommunication tools: A new learning environment

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Abstract

The role of infocommunication devices in non-school activities is increasing and children sitting at school desks should be prepared by education to use technology and navigate in a technology-driven world (Burgeois et al. 2019). Gamification, including so-called serious games, can be one solution to the problem, but without a change in approach and methodology, they will not become a panacea. Mobile devices, for example, would perfectly support cooperative learning and personalised tasks, but teachers use them mostly for giving homework and tests and do not exploit any more possibilities (Molnár et al. 2020). In the following, the paper will review the changes in the learning environment, students' and teachers' roles, and will also intend to shed light on which areas are the shortcomings that hinder the wider use of ICT in schools.

Keywords: community education; gamification; learning environment; learning strategies; teacher training

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The learning environment and the changing role of the learner

The learning environment is defined in relatively simple terms: as a place where learning takes place and which covers the external conditions for learning (Kömcenzi 2010; Kovács 2011). In the traditional paradigm, a good teacher who teaches the learner is a fundamental condition for successful education. The learning environment for this is the school, where the learner acquires knowledge in, what is known as, the *directly-guided stage*. As opposed to this, in the home learning environment, the learner does certain tasks independently while (s)he also relies on previous information and explanations heard in the classroom, in the so-called *indirectly guided phase*. The emergence of electronic tools also implies a new learning environment and essentially requires a transformation of the previous paradigm (Kovács 2011). In the traditional learning environment, the use of infocommunication tools cannot be effective as these tools, when used in a truly modern way, do not transfer static knowledge but instead operate dynamic processes; that is, they are interactive (Kőfalvi 2006).

New technologies and ICT tools also provide a new learning environment. This

means changing conditions at an economic and social level, and a changing environment for education and learning. This change of emphasis is difficult to put into practice in school education. A new paradigm should be established which emphasises the need to enable learning rather than teaching. The paradigm shift should focus on learning (as opposed to the teaching-centredness of the previous paradigm), transforming the traditional role of the teacher, and making the learner the central element. Electronic, infocommunication tools are taking over part of the teaching function. In addition, new tools introduce and require new teaching technologies.

The traditional teacher-student relationship is partially transformed into a virtual one. The development of competencies is emphasised: static knowledge turns to applied knowledge (Kovács 2011). The characteristics of the new learning environment resulting from the emergence of new infocommunication tools and the changes that can be perceived in comparison to the traditional environment are summarised in Table 1. Kadocsa (2006) also highlights a complete reordering of the organisation, as well as methods and content of traditional teaching-learning in schools. Furthermore, Zoltán Szűts mentions the idea of “bringing the school back home” to the student’s individual learning environment. In other words, the phenomenon of a different pedagogical approach in an inverted classroom is pointed out, in which “the process of knowledge acquisition is transferred from the frontal, instruction-based learning space of the classroom to the individual learning space, and for this time it steps out of the real space. Later, when the student steps back, the classroom space becomes interactive, where the dynamics between teacher and learners are accelerated. In this learning environment, self-directed learning has an important role”¹ (Szűts 2020, 79).

Table 1: Changes in the learning environment²

Industrial society	Information society
Teaching facts, rules, ready-made solutions	Developing skills, competencies, attitudes
Source of knowledge, school, teacher, curriculum	Integration of knowledge elements from different sources
The dominance of teacher instruction	In a complex environment, the learner builds knowledge independently
Fixed curriculum, rigid timetable	Free time, project-based learning
Classroom teaching	Learning in the library

The e-learning environment, therefore, requires to focus on the learner’s learning activity. As a consequence, it is no longer appropriate to talk only about teaching

¹ Translation is mine.

² Source: Kadocsa 2006, 12.

but to understand the teaching-learning process. It is clear that the role of the teacher and the learning environment is changing, still considering the learner as an unchanged element of the process. As long as these interpretations remain within the traditional paradigm, e-learning is not integrated into the lifelong learning process, nor are the strategies for organising learning change. The importance of methodological changes is also reflected in the design and teaching-learning process (Kovács 2011; Ollé – Csekő 2004).

In the latter context, learning to learn should also be mentioned as a key competence. This is often mistakenly identified with learning itself, and to avoid misunderstandings it is better to approach it from the perspective of self-regulated learning. From this point of view, motivation, learning strategies, and self-concept related to learning are key concepts. These were subsequently complemented by learning attitudes, beliefs and commitment, and specific domain-related characteristics. In the case of reading, for example, these include comprehension, memorisation strategies, and memory. Overall, learning is a complex concept that cannot be reduced to the cognitive component alone. Learners need to know the purpose of learning and their own needs; they have to be willing to learn and actively monitor and regulate their own learning (Habók – Magyar 2020).

In practice, the change in the learner's role means that the former passive role is no longer characteristic. The learner must not only be motivated and engaged but must also search for information and be able to select the correct/precise information. This means searching, navigating, identifying, highlighting, structuring, and integrating information. Processing and transferring knowledge require the ability to hypothesise, make decisions, solve problems and evaluate results. The role of decision-making is paramount: the learner must select the correct information and data through appropriate and relatively rapid selection. New ICT tools also provide opportunities for reflection, repetition, and re-structuring of solutions (Kovács 2011).

The different learning strategies should become general, i.e. the learner should not only be able to use them for a specific task. Habók and Magyar (2020) presented an online development programme based on word processing techniques supported by learning strategies. Elements included sketching, concept mapping, and plot-based diagrams. The programme was structured in modules. At the beginning of each module, learners could read information about the tasks they were asked to do, what they would be practising in that module, and, finally, what to look out for when solving the tasks. The programme was tested by 127 secondary students. In the post-application evaluation, both teachers and students rated the programme as very good or good. According to their own reports, pupils found the use of the mind map particularly useful. The eighth module of the development programme contained a cooperative task, which was particularly difficult for the groups to solve. In this context, the authors concluded that collaborative, group-based problem-solving remains an area that needs to be practised in the classroom. Learning style is also relevant to online learning strategies. One approach is to divide learning by modality. The multimedia environment allows for the involvement of all senses, that is, multimodal perception. Studies on learning methods have already

shown that the more senses are involved the more effective the learning process. At the same time, it is also a fact that information is encoded and decoded at both visual and cognitive levels. When it is argued that multimedia “textbooks” and learning materials are less effective than traditional ones, it is probably due to a lack of balance between visual and verbal information. It is advisable to strive for both balance and simultaneity in learning materials, i.e. it is worthwhile to have explanatory text alongside the visual representation (Papp-Danka 2014).

Teacher role and classroom use

Both changing the learning environment and focusing on the learner require a change in the teacher’s role. Teachers should adapt their planning, teaching, and assessment processes to the new learning environment created by the information society. Gamification is of great interest in the field of education because it offers new possibilities for motivation and assessment. Gamification is essentially the use of game elements in a non-game environment, with the aim of engaging learners to solve certain tasks. A meta-analysis of twenty-six studies concluded that some research focuses on higher education, with motivation as one of the objectives. However, the content of what is meant by motivation is not uniform. The meta-analysis found the following main categories:

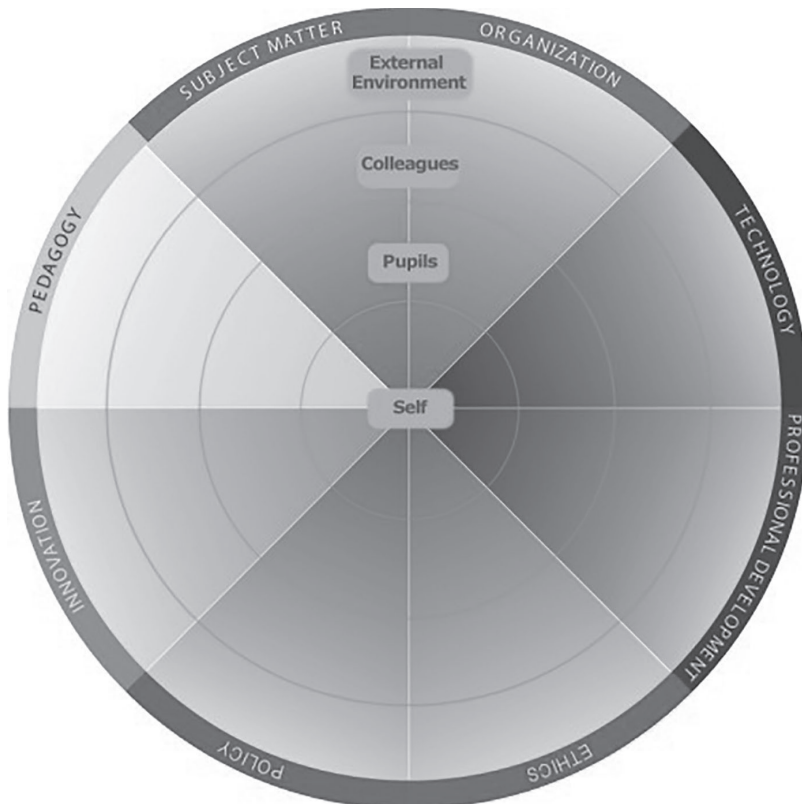
- developing the learners’ different skills
- facing a challenge in order to reinforce the learning content
- increasing learner engagement by making the content easier to understand
- increasing the acquisition of knowledge
- achieving behavioural change
- peer learning and socialisation.

Other, similarly comprehensive analyses have found that in nearly half of the cases such tasks are used in higher education, in the other half, in adult education, and only the remaining few percent appear in public education. In general, the majority of educators do not possess the knowledge and time to create an appropriate learning environment, dominated by the misconception that gamification is linked to IT courses. For this very reason, the results of studies on its effectiveness are also contradictory (Borges et al. 2014, Caponetto et al. 2014, Dicheva et al. 2015).

The opinion above also shows that although gamification brings new opportunities in assessment, teachers typically do not recognize or use them. In other words, whatever framework a teacher adopts, it is primarily a matter of abandoning the traditional paradigm. In order to create a new learning environment, a group of experts identified the following qualities as necessary: creativity, intuition, risk-taking, decision-making, motivation, adaptability, flexibility, resilience, intellectual curiosity, positive outlook, resourcefulness, cooperation, communication skills, systematicity, organisation, determination, and problem-solving attitude. Within this framework, not only a matrix has been developed but also a dynamic model (Figure 1). The model identifies eight main areas: pedagogy, curriculum, organisation, technology, professional development, ethics, education policy, and innovation.

These professional attributes should be reflected in each of the domains, underpinning professional competencies and helping teachers to address issues arising from changes in society and the educational environment.

Figure 1: Dynamic model³



Ultimately, the role change for teachers should mean creating a tutoring and mentoring role, whereby they are able to support students' self-regulated learning. In doing so, this role needs changing the content of the curriculum and the forms of assessment and mapping out the competencies that the teachers want to develop in their learners. However, there is a contradiction between the current classroom environment and self-regulated learning: while the electronic environment would encourage self-regulation, the instructive, closed classroom environment does not provide any opportunity for self-regulation (Papp-Danka 2014).

At the same time, we know that all students, through self-directed development, will acquire useful and innovative knowledge, thinking, and problem-sensitivity that will enable them to lead constructive lives. In a study on self-regulated learning,

³ Source: www.univirtual.it/uteacher/framework/framework_map.htm

self-regulation is deeply fused with the study of personality (D. Molnár 2013). Thus, self-regulation, along with the main attributes of individuality, is considered to be the foundation of character, which grows stronger as a function of the competence acquired (Blair – Calkins – Kopp 2010).

In terms of the use of IT tools, teachers need to be able to navigate the available digital learning materials, to select and adapt the right resources to the situation. The use of educational management tools such as a virtual learning environment or a digital diary requires regularity. Creativity and imagination are needed to produce good learning materials and to use the tools appropriately. Effective communication and teamwork skills are necessary to use digital communication tools well and to be able to apply cooperative and collaborative working in teaching.

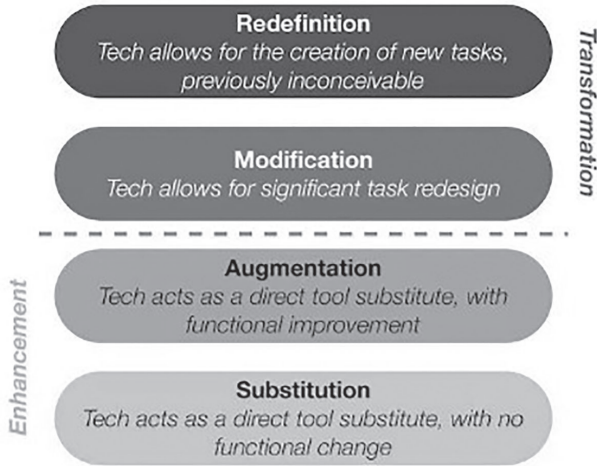
Teacher education and training in Hungary have a mixed record in terms of ICT tools. In the first TALIS survey of 2008, a quarter of teachers surveyed indicated that they had ICT training needs for which they could not find a solution. This was one of the top three areas of shortage in the OECD average and in Hungary (Hermann et al. 2009). The 2018 TALIS survey showed that Hungary is already among the leaders in in-service training, with 69.3 percent of teachers surveyed having received such training (compared to 63 percent in TALIS). 20 percent of Hungarian teachers would like to receive in-service training in ICT, compared to 20.5 percent in TALIS. At the same time, 51% of students in teacher training receive training in the use of ICT tools for teaching purposes, compared to an average of 79% in TALIS. A gap is also observed when looking at support for students' independent work. TALIS included in this category, for example, projects of longer duration and tasks using ICT tools. The average results show that 54% of teachers allow frequent use of ICT tools, compared to 48% in Hungary. However, only a tenth of teachers gives longer tasks to be done independently, compared to the TALIS average of nearly 30 percent. Related to this, on average, 51 percent of teachers assign tasks requiring independent group work, compared to only 36 percent in Hungary (Balázs – Vadász 2019).

Community education, the use of ICT tools, and the e-learning environment require more open structures than traditional ones. In other words, the teacher should teach the whole learning process and share the control of learning outcomes with the learner, even should delegate this role completely. However, the change in the division of tasks disrupts the previous model of pedagogical relationships, and the above results may suggest that this is not yet accepted in Hungary (Kovács 2011).

Research shows that teachers use digital technologies very often in the planning and preparation phase. They use various databases and task banks, for example, and in the case of visual aids, too much supply may be a problem, i.e. it is difficult to choose the most appropriate one, rather than not being able to find one (Buda 2020). These applications in the classroom needs to be considered in more nuanced terms. The so-called SAMR model (Figure 2) summarises the cases where ICT tools appear in the classroom, but their use does not bring about any significant methodological change. In the case of substitution, for example, the only thing that happens is that a diagram is not put on the blackboard but on a PowerPoint slide – there is essentially no gain from using the new technology, but

it is easier for the teacher to create some kind of visualisation tool.

Figure 2: The SAMR model⁴



Podcasts on iTunes U: <http://tinyurl.com/aswernmayteach>

In the case of the extension, we are already noticing functional improvements, for example, instead of a diagram drawn on a whiteboard, students can see a 3D model. This advantage is already perceptible for the learner and can improve the efficiency of teaching, but it does not make a methodological or conceptual difference. Modification is regarded as the first level of actual transformation. According to Buda (2020), these changes occur most often in the area of assessment and evaluation. For example, learners make some kind of presentation, share the completed tasks on a blog or other electronic platform, and peers and teachers can provide feedback on these. Reimagining is the highest use of ICT tools: it offers solutions that could not be created without the tool, for example, using multimedia tools to create something collaboratively. In the area of assessment and self-assessment, knowledge is measured and self-tested, which can be easily done using ICT tools, and interactive exercises are also used for repetition, practice, and verification. Computer-based testing can be seen as a clear positive change, but its potential drawbacks must also be taken into account. For example, if learners have to type a longer text response, those who do so less frequently and are unfamiliar with certain symbols or key combinations, for example, may be at a disadvantage (Buda 2020).

Buda's (2017) research also points out that the majority of teachers are not

⁴ Source: Puentedura, 2014. www.meshguides.org/guides/node/981

prepared to use digital tools and are uncertain about their knowledge. At the same time, the research gave averages of around 3.1 and 3.2 on a four-point Likert scale for questions on attitudes towards preparedness and equipment. That is, teachers feel prepared, but this is probably not an accurate perception for higher-level applications. Although computers ranked third in terms of classroom presence after textbooks and blackboard chalk in terms of classroom applications, interactive whiteboards and prompts moved to the bottom of the list of devices.

Aknai-Fehér (2017) also highlights the benefits of ICT-enhanced language learning based on literature. Among the benefits are the lifelike, visually interactive nature of online learning materials, the fact that they are available anywhere and any-time, and that they effectively support online collaboration.

Conclusion

The literature clearly demonstrates that the e-learning environment differs from the traditional one in several respects. It puts the learner at the centre and depends on self-regulated learning. The latter requires the learner to be aware of his/her own learning strategies and to be motivated. The obstacle here is that the competencies needed to do this are not sufficiently developed in the traditional school learning environment. The role of teachers is also changing completely: they have to replace their previous role as knowledge providers with a mentoring role; they also need to be sufficiently familiar with ICT tools and the opportunities they offer. Although teachers have received training on ICT tools and consider their own skills to be adequate, further changes in role perception and ICT skills are likely to be needed. One indication of this is that, according to the 2018 TALIS survey, just over a third of teachers in Hungary regularly give students tasks requiring independent group work.

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