Empowerment or Limitation of the Teachers’ Rights and Abilities in the Prevailing Digital Environment

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Abstract—Digital education is actually a product of recent years, although it existed before in various forms. Obviously, modern devices and means of transmitting information are necessary for its development. Modern “virtual lectures”, e-learning courses, online testing, educational resources portals, as well as digital school registers and educational process monitoring systems have become everyday reality. However, the digitalization of the educational system has both positive and negative side. The purpose of the article is to consider the impact of digital educational technologies on learning, from a university teacher’s view point, and to consider their positive aspects and problems. The study was conducted at the I.M. Sechenov First Moscow State Medical University (Sechenov University) and University at the Inter-Parliamentary Assembly of EurAsEC. The study involved 89 teachers who have teaching experience at the university (11.9% - 1-7 years, 28.1% - 8-10 years; 30.8% - 11-15 years; 29.2% - 16-25 years). The main results show that, respondents overly have a good opinion towards learning in virtual environments. The advantages of e-learning are complex for a particular measurement, but it has been found that some identifying variables as “age” shows statistically significant differences, while “gender” and “teaching experience” are not important for evaluating the four provided variables. The study results can be used to improve the perception of new educational technologies by teachers, to organize approaches for introducing innovative educational technologies that expand the possibilities of progressive education on the part of administrations of higher educational institutions and educational departments.
Keywords—Digital environment; digitalization of education; educational technologies; e-learning; online technologies

1 Introduction

A rapid development and quantum leap in technological standards has affected all aspects of everyday life, especially in the field of education during recent decades. Digital transformation is a process that revolutionizing industries, rethinking products, redefining services and changes jobs [1], and the digital learning environment is accessible from anywhere and anytime [2]. The impact of this process is so strong that it is called the fourth industrial revolution. Today's schoolchildren and students will live and work in a completely different world, and it is teachers who must prepare them for it [3]. Since not only the lifestyle of the population changed, the transformation of traditional teaching and learning methods is required [4], due to a number of issues. For instance, problems of time, since many cannot get to the university according to the established schedule; distance problems; demand problems, since the typical study format makes it difficult to establish universities in cities with a small number of potential students.

Pedagogy is also transforming due to the benefits of information and communication technology (ICT) developed in the 21st century [5, 6]. Since pedagogy revises teaching strategies based on student needs, digital tools are becoming the main ones for active learning [7,8]. To achieve the new goals of pedagogy, universities should help students set goals and learn how to reach them. Nowadays education system requires a transition from the traditional curriculum-based model to a new one, which gives students practical experience and develops their personal potential [9].

A competency-based approach to learning has recently become popular. Education is viewed as a process of transferring competencies from teachers to students [10]. With the development of information and communication technologies (ICTs) and technical teaching aids (TTA), distance learning materials have gone through several stages, from printed learning materials to intelligent, multimedia, networked learning systems.

Electronic publications were one of the first learning materials to be posted on the Internet. When applying hypertext technology in electronic publications, students have another opportunity to create so-called “cross-references” that they can follow during the study process [11]. Then came electronic education courses. In addition to specially structured material, electronic courses outline educational goals and objectives, pedagogical methods for achieving them, and learning assessment. The electronic educational-methodical complex, unlike the electronic course, has an integrated approach and is designed not only for students, but also for training teachers, administrators and other interested parties involved in the learning process [12].

It is supposed that there are no advantages or disadvantages of e-learning that can be considered completely universal [13]. Decisions on educational technologies should always be made with increased awareness, and any list of generally applicable advantages and disadvantages of introducing e-learning can serve as a source for creating decisions rather than a set of strict rules [14].
The digitalization of education, like other educational activities, requires a comprehensive assessment [15] considering specific benefits and losses from the use of certain educational technologies, methodologies, etc. [16].

One of the fastest ways to implement digital learning is to provide teachers with structured programs technologies that can be used for “personal gain” [17]. “Personal gain” means that the teacher has a reason to use the technology, because it makes work easier and more productive, helps to develop interesting training measures, and getting more pleasure from work [18]. Until the teacher has a meaningful goal of using technology to improve their own lives, they are much less likely to accept the transformation of teaching activities [19]. Researches also associate teachers sustained professional development with significant student learning success [20].

Firstly, it’s necessary to ensure that teachers have the tools required for the transformation [21]. One of the biggest mistakes that educational systems make is that teachers are not provided with technical devices and invests in their professional development. It is imperative that technology be given to teachers as early as possible so that professional development is the most effective [22].

Practically, the digitalization of education is ambiguously perceived by teachers. Studies also show interesting differences in teachers’ acceptance of distance education programs. The early studies [23] have empirical evidence indicating that teachers were primarily opposed it. E-learning technology cannot be presented as a learning environment where students simply read or receive information from a computer screen, as it was before using paper or multimedia methods [24]. The teacher and students are still the main participants in the context of e-learning, and computers should be used as technological tools, and not as the ultimate solution. Education is associated with the principle of motivation, which is important for both students and teachers [25].

Even today 50% of school teachers in Africa do not actually use ICT tools and digital resources for teaching practice, due to both a lack of resources and a critical attitude to new educational approaches [26].

The proper education is a problem in India. Despite having a reasonable infrastructure, not all teachers accept online platforms and e-learning [27]. The more recent studies [28, 29] emphasize the positive attitude towards advanced technological methods for better training programs organizing and knowledge assessment. European educational practice, in particular Italian, shows that most of the teachers are quite comfortable with new technologies and take them positively [30]. Today, professors overall have a good attitude towards distance learning programs. This is an important step in opening up new opportunities for students, as well as achieving improved communication between colleagues, ensuring the exchange of information and new experiences [31].

According to Nagrale [32], teachers spend less time for learning and preparing courses, as can constantly work in the same learning environment. Virtual training systems provide benefits that can justify their rapid expansion, such as the ability to use multimedia materials, simple content updates, interactivity and easy access to courses. However, despite the great potential of virtual training, one should beware of the illusion that the virtual training system is a panacea [33].
To achieve pedagogical effectiveness in e-learning, it should be considered how comfortable teachers are in digital environment in order to prevent them from the potential problems [32].

Despite a significant number of studies in this area, there is a lack of Russian research regarding the work of teachers in the digital environment. The article proposes to consider the attitude of teachers towards digital educational technologies. The main goal is to determine the views of teachers, from the I.M. Sechenov First Moscow State Medical University (Sechenov University) and University at the Inter-Parliamentary Assembly of EurAsEC, on the possible limitations and viability of the digital environment in education, considering personal experience and a positive or negative perception towards introducing digital technologies.

2 The Styles Materials and Methods

Surveys are considered the main tool for studying teacher satisfaction [34], which makes it possible to identify the disadvantages and advantages of the digital environment. The lack of time for introducing these innovative programs is the most important obstacle to their use.

Survey and expert assessments prevail due to the fact that pros and cons for digitalization of education, the introduction of distance technologies and computer systems are practically not subjected to a specific measurement [32].

The ability to teach in a digital environment (TIDE), which is defined as the knowledge, skills and attitude of a teacher for developing, organizing, guiding and evaluating activities, can be measured [35]. This ability is associated with awareness of clear learning objectives and criteria in order to develop students' skills for solving information and communication problems in a digital environment.

A number of institutions use Q-methodology and semi-structured interviews to highlight the teachers view points and how they use of digital technologies in teaching themselves [36].

It is suggested to apply [37] a survey-based model for assessing teachers' attitudes to digitalization of education. The measurements received by survey were evaluated using Likert scale. Cronbach's Alpha Coefficient $\alpha$ for Likert-Type Scales was used to determine its reliability.

This study was attended by teachers of I.M. Sechenov First Moscow State Medical University (Sechenov University) and University at the Inter-Parliamentary Assembly of EurAsEC. Initially, it was planned to conduct a survey among 125 people who were asked to participate in this study via e-mail. After the reference population was determined, the final sample was esteemed according to the following assumptions:

- Confidence level = 0.96
- Sampling error = $\pm$ 4%

It was established that the minimum sample amount was 87 participants. Thus, 89 teachers took part in the study. The age of the respondents varies of 25 to 65 years.
The majority of 75.2% were women and 24.8% of men. Most of the study participants have significant pedagogical experience (11.9% - 1-7 years, 28.1% - 8-10 years; 30.8% - 11-15 years; 29.2% - 16-25 years).

To achieve the goal of the study, the Likert scale was used for setting up survey questionnaire.

The scale consists of 35 questions with answers (1 - "rarely", 2 - "sometimes", 3 - "quite often" and 4 - "always"). They were grouped according to 4 main aspects:

1. The possibility to achieve the goals of training programs in the digital environment
2. The effectiveness of training planning programs in the digital environment
3. Learning challenges in the digital environment
4. The advantages of learning in a digital environment.

To ensure the reliability of the questionnaire, it was analysed by 7 qualified experts in the field of educational technology, psychology and the educational field.

The Cronbach's Alpha Coefficient $\alpha$ for Likert-Type Scales was used to determine its reliability and expressed by the following values:

1. The possibility to achieve the goals of training programs in the digital environment - 0.80
2. The effectiveness of training planning programs in the digital environment - 0.77
3. Learning challenges in the digital environment - 0.76
4. The advantages of learning in a digital environment - 0.72
5. The general coefficient of the scale is 0.88.

The Cronbach coefficients exceed the value of 0.70, for both individual and the general scale, which proves the stability of the analysed scale and its compliance with the tasks.

The main limitation in the study was a relatively small sample where out of 125 people received a questionnaire, 95 responded (the rest probably did not check their email or did not want to take part in the questionnaire), and only 89 teachers participated as the rest were unsuitable due to mistakes.

The questionnaires answers were processed anonymously. The respondents indicated only gender, age and teaching experience, and then the questionnaires were anonymously transmitted for expert evaluation and analysis.

3 Results

Today, digital skills are critical to the full spectrum of education, which requires specific efforts to create an environment in which students can demonstrate and develop these abilities. However, the digitalization of educational affects not only students, but also teachers, for whom it carries both new challenges and new opportunities.

A survey of the teaching staff showed that among the positive consequences of education digitalization, the following can be distinguished:
The development of the Internet and mobile technologies creates almost unlimited access to information, provides an easy information exchange, collaboration on topics and projects, provides direct feedback, and the greater anonymity and individuality in a digital environment has a positive effect on student learning outcomes.

Digital materials can be stored and transferred to the educational community by direct upload to the “Cloud”, distributed via a social network, e-mail, on websites, on learning management systems, through video conferencing services, expanding cooperation between teacher and student.

Digital educational materials do not occupy space comparing to traditional paper media, they can be organized into personal collections and archives, edited in accordance with the training needs of a particular student. There is no need to create and download new versions of training materials, as the services offer direct editing via the Internet.

Online technologies assist with setting up training modules, teachers can use a wide range of online tools to create training materials of various forms: from text documents to graphic files, interactive models and multimedia presentations. It is possible to show examples and processes that students usually cannot observe in real conditions, e.g., environmental modelling, experiments, linguistic research.

Monitoring tools and training analytics facilitate testing and assessment of students’ skills and competencies.

Communication tools allow external participants to join the training process at the set time, students are given the opportunity to communicate with experts, teachers from other institutions, successful practitioners. Teachers can use online tools for their professional growth and development, deepening knowledge in the field and pedagogical skills.

However, the survey also showed a number of disadvantages:

- Despite the development of ICTs and lower prices for personal computers, laptops, smartphones, tablets and other devices, there is still an imbalance among teachers regarding material equipment and the Internet access.
- Older teachers may not have enough knowledge and skills to effectively use technology to improve professional experience.
- A negative attitude towards information technology represents a significant block for some people, technology-based training may cause dissatisfaction of teachers who lack sufficient motivation.
- The information overload - too many contacts, working at the computer when compiling manuals, workshops, presentations, constant communication through various channels, checking completed tasks can lead to health problems. The process of preparing a high-quality training module, which will include not only texts and other materials, but also provide practical opportunities, is complex and time-consuming. Thus, it takes personal time.
- Online technologies cannot be applied to each individual learning case in the same way, sometimes the use of online tools can even oppose learning.
• Teachers often deal with basic technical problems; the inevitable dependence on the technological infrastructure, which determines technical failures, may influence the motivation to implement e-learning.

Further, there was concocted the results analysis of four selected aspects that determine the attitude of teachers towards the digitalization of education.

The analysis of a descriptive and logical nature is as follows. Firstly, pairwise related samples were compared to determine the statistical significant differences between the 4 aspects of the scale. The main descriptive results for each measurement were as follows (Fig. 1).

![Histograms of descriptive statistics for four aspects of the scale](image)

According to Fig 1, three of the four aspects show very similar arithmetic means: “planning” (average = 2.54), “goals” (average = 2.55) and “challenges” (average = 2.53). The average means for all three cases vary between "sometimes" and "quite often." Standard deviation indicates the similarity of teachers’ assessment. Unlike those three, the “advantage” criterion has higher average value - 2.74, which varies between “quite often” and “always”. This means that participants of the study are more likely to use the benefits of e-learning.

The other goal of the study was to determine whether gender, age, teaching experience influence teachers’ evaluation of such aspect as “goals of education digitalization”, “planning of educational process”, “challenges” of the digital environment” and “advantages of the digital environment”.
a) Assessment of “Gender” criterion (Table 1)

Table 1. “Gender” criterion assessment values

<table>
<thead>
<tr>
<th>Gender</th>
<th>Aspect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>goal</td>
<td>2.56</td>
</tr>
<tr>
<td></td>
<td>planning</td>
<td>2.54</td>
</tr>
<tr>
<td></td>
<td>challenges</td>
<td>2.55</td>
</tr>
<tr>
<td></td>
<td>advantages</td>
<td>2.73</td>
</tr>
<tr>
<td>Female</td>
<td>goal</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td>planning</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>challenges</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>advantages</td>
<td>2.70</td>
</tr>
</tbody>
</table>

According to Table 1, "gender" has no statistically significant differences in each four cases. Teachers, regardless of gender, provide almost the same values for all four aspects.

b) Assessment of “Age” criterion (Table 2)

Table 2. “Age” criterion assessment values

<table>
<thead>
<tr>
<th>Age range</th>
<th>Aspect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-35</td>
<td>goal</td>
<td>3.59</td>
</tr>
<tr>
<td></td>
<td>planning</td>
<td>3.42</td>
</tr>
<tr>
<td></td>
<td>challenges</td>
<td>2.28</td>
</tr>
<tr>
<td></td>
<td>advantages</td>
<td>3.45</td>
</tr>
<tr>
<td>36-45</td>
<td>goal</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>planning</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>challenges</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>advantages</td>
<td>2.85</td>
</tr>
<tr>
<td>46-65</td>
<td>goal</td>
<td>2.42</td>
</tr>
<tr>
<td></td>
<td>planning</td>
<td>2.51</td>
</tr>
<tr>
<td></td>
<td>challenges</td>
<td>3.35</td>
</tr>
<tr>
<td></td>
<td>advantages</td>
<td>2.52</td>
</tr>
</tbody>
</table>

According to Table 2, “age” has statistically significant differences. Thus, the younger the teachers, the more they appreciate such aspects as goals of education digitalization, simplified planning of educational process and the advantages of digital environment.

c) Assessment of “Teaching experience” criterion (Table 3).
Table 3. “Teaching experience” criterion assessment values

<table>
<thead>
<tr>
<th>Teaching experience</th>
<th>Aspect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-7 years</td>
<td>Goal</td>
<td>2.69</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
<td>2.71</td>
</tr>
<tr>
<td></td>
<td>Challenges</td>
<td>2.69</td>
</tr>
<tr>
<td></td>
<td>Advantages</td>
<td>2.81</td>
</tr>
<tr>
<td>8-10 years</td>
<td>Goal</td>
<td>2.52</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
<td>2.48</td>
</tr>
<tr>
<td></td>
<td>Challenges</td>
<td>2.49</td>
</tr>
<tr>
<td></td>
<td>Advantages</td>
<td>2.69</td>
</tr>
<tr>
<td>11-15 years</td>
<td>Goal</td>
<td>2.52</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
<td>2.53</td>
</tr>
<tr>
<td></td>
<td>Challenges</td>
<td>2.51</td>
</tr>
<tr>
<td></td>
<td>Advantages</td>
<td>2.60</td>
</tr>
<tr>
<td>16-25 years</td>
<td>Goal</td>
<td>2.51</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
<td>2.55</td>
</tr>
<tr>
<td></td>
<td>Challenges</td>
<td>2.54</td>
</tr>
<tr>
<td></td>
<td>Advantages</td>
<td>2.63</td>
</tr>
</tbody>
</table>

Thus, the “teaching experience” indicates no statistically significant differences in any of the aspects. The number of years in teaching did not affect the assessment of the “goals of education digitalization”, “planning of educational process”, “challenges of the digital environment” and “advantages of the digital environment”. Nevertheless, it should be noted that teachers with less pedagogical experience rate four aspects higher than their colleagues with more experience of teaching at the university.

4 Discussion

The use of technologies - laptops, tablets, smartphones, virtual systems and data storages in the teaching process is a relatively new phenomenon that requires studying the impact not only on students, but also on teachers [38].

Technologies provide teachers with the opportunity to expand learning capabilities beyond university audiences. They help create communities of students, colleagues, specialists in various disciplines around the world [39], provide access to a huge number of educational materials, resources and tools [40].

However, in order to realize all the possibilities of digitalizing education, teachers need to facilitate access to technology and ensure their efficient use [41, 42]. Teachers, like students, need constant and timely support, means of professional development, and the opportunity to learn.

Majority of teachers would like more technological means in classrooms, and the lack of timely instruction is one of the biggest obstacles to introducing technology into teaching [43].

Institutions responsible for the professional development of teachers should focus on enabling them to select, evaluate, and use appropriate technologies and resources,
understand the security issues associated with technology, and be able to rethink educational approaches and methods [44]. This rethinking should be based on a deep understanding of teachers’ role in learning environments supported by technology.

Teachers should feel comfortable in a digital environment, that’s be able to introduce and have no fear to use them for training [45]. This is possible if the skill of introducing technology is not additional, but is formed as a basic pedagogical component.

Therefore, young teachers can easily adapt to innovations in the teaching, but for the older generation it is necessary to create opportunities to increase their digital literacy so that they can implement attractive learning activities that improve teaching, assessment and learning methods [46]. To make this goal a reality, training programs for school and university teachers, initiatives by state and local authorities, and standards that expand connectivity and access to devices are required. Technology should not be separated from the subject area, but should be used to transform and expand teaching [47].

Studies of this problem indicate numerous challenges, such as knowing of special programs, lack of time for their use and modernization of training courses [28]. Thus, teachers with a large academic workload and little experience in using technology may suffer. There are other challenges, such as providing of advanced technological methods that allow teachers to design the textbooks based on their effective teaching experience [29].

The integration of digital literacy in the education system can be strengthened or undermined in different ways as it is associated with other events and priorities [48]. Teaching is determined by an unstable social, technological and educational changes, and the nature of this the work is further complicated by the personal understanding, values and beliefs of the teacher and how they interact with institutional goals and requirements [49].

5 Conclusion

The study results contribute to the synthesis of diverse and often conflicting discourses. The problem of the pros and cons of online technology, distance learning and the digitalization of education is complex and polyhedral. Any technological solutions of training are considered as improvements of the teaching process. Additionally, it is necessary to evaluate a number of other factors, such as the type of course, subject, educational, technical infrastructure, technological and methodological support. Sometimes it is advisable to remain cautious about new solutions and allocate enough time to assess the possible costs and benefits. It seems that it is best to have a broad, open-minded view on the implementation of educational technologies, considering best practices in the learning environment.

The main conclusion is that the teachers participating in the study express a generally positive attitude towards the digitalization of education, which is consistent with the results obtained in other modern studies. The “advantages” of learning digitalization was supported the most among other three aspects (planning, goals, and challenges). It
should also be noted that the other three aspects analysed were perceived moderately good by teachers.

The other results include the influence of various criteria that characterize the sample, such as gender, age, and teaching experience. We can conclude that teaching in digital and virtual environments, despite the general positive perception, is less enthusiastic about teachers of the older generation, but the gender criterion and teaching experience were not so significant.

The statistical significance testing shows that “gender” and “teaching experience” were not important in assessing the four aspects of learning in a digital and virtual environment. The results show those male and female teachers, as well as those with less or more experience, equally evaluated the four aspects analysed in the study. The research results are universal and can be used in world pedagogical practice, including by researchers specializing in improving the perception of new educational technologies by university administration and departments of education.

Further, the study of the positive and negative aspects of expanding the influence of the digital environment on the professional and social life of teachers can be conducted. Of particular interest is the problem of personal and work time distributing, for example, studying the problem of transferring work responsibilities to weekends or night time, problems of time management in conditions when contacts with students become more active and go beyond the classroom.

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7 References


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