THE NEW ROLE OF TEACHERS AFTER THE COVID19 PANDEMIC AND THE APPLICATION OF THE LEAN CONCEPT IN EDUCATION

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Abstract

In today's increasingly turbulent and unpredictable environment, it has been shown that at the very top of priorities, in terms of technological, social and economic development, as well as in the national global strategy, the state of the production and service sector, human resource structure and education of the country are at the very top. Thanks to the advancement of engineering and technology and the advantages offered by the Internet, it has been much easier to work in many professions, especially for professors during the Covid19 pandemic. Professors are also able to improve their knowledge, better design their lectures and compare their methodology with the work of their colleagues in any part of the world. By using technology, work operations are shortened, complex organizations are simplified, and time savings are certainly evident. One of the important, positive, impacts of the Internet is precisely that, reducing costs, such as the cost of telephone, fax, and photocopy through deliberate use of the Internet. The same can be applied to higher education, such as in terms of the time of preparation of lectures and "dissemination" of educational material, printing content and similar things. In this sense, we can notice a new role of professors in the new work environment as well as the importance, which has recently focused on two "phenomena", namely "smart" or "green" university, and which will be presented in the paper through a lean concept that through its philosophy can improve the university so that it becomes at least one step closer to the goal that its business and regulated processes can bear that exact name.

Keywords: Education technologies; Covid19 pandemic; costs reduction; "smart" and "green" university; lean concept

1. Introduction

1.1. Needed

One of the great advantages of the Internet is its "connection" with the whole world, so professors, students, as well as the administrative staff of schools, colleges, can constantly monitor new developments in the field of education. Through constant contacts with their colleagues around the world, professors get to know new teaching techniques, learn news from the field in which they work, i.e. which they teach and, in that way, provide their students with the latest information, which is certainly a big plus in education. If there is one domain of activity that benefit, especially from the Internet, it is the domain of research and development of knowledge, because the Internet was born in

scientific environments in order to stimulate cooperation in that domain [1], [2]. The use of the Internet makes it easier for professors around the world to compare their work methodology with the work of their foreign colleagues, to exchange personal experiences and thus improve their work. The innovative process is a basic research and development activity. There are no secrets to the way successful distance education programs are made. They are not created spontaneously; they are created by hard work and conscious effort of many individuals and organizations [2].

1.2. Issue

A large number of teachers still resisted the use of an online pedagogical approach and believed that online learning could decrease the engagement of students, thus leading to less favourable academic success than traditional face-to-face instruction [3]. Very few online teaching and learning activities could follow a rigid schedule and design [3]. Although online or distance education is not something completely new, both in the world and in our country, several challenges arose during the Covid19 pandemic regarding this type of education, such as: a) Lack of preparation time: Teachers have not prepared their learning content to adapt to online learning, and preparing such content will take time. Teacher/student isolation: In this first-ever application of pure long-term online learning (without face-to-face learning or blended learning), both teachers and students should not feel that they are left alone during the teaching and learning processes. b) Need for effective pedagogical approaches: New effective pedagogical approaches are needed to keep students motivated and engaged during this long period of online learning, especially that drop-out rates of distance learning is generally higher than in-campus based learning [4]. Distance learning professors face special challenges such as that the teacher must understand the characteristics and needs of distant learning students with little first-hand experience and limited, or no, face-to-face contact, and adjust the teaching style where necessary. The needs and expectations of multiple, often different, audiences are also to be taken into account. A prerequisite is to develop a working understanding of the technology he/she needs, but to stay focused on his/her teaching role which is a priority and to function successfully as a skilled assistant and lecturer.

1.3. Distance learning and the new role of the professor

At the suggestion of the European Union, regarding the new process of education, and how it could stay in the race with the revolution in information and communication technologies and be able to follow the progress of technology in the near future, is the reform of educational systems. In order for teachers to become active actors using the full potential of information and communication technology, these new education systems force us to redefine the role of teachers and it is necessary to understand that the two teaching methodologies (face to face and online) are not in conflict but are, in fact, complementary. All of this conditions a completely new role of teachers in the 21st century, especially in the time after the pandemic, which has led to a simultaneous reduction in costs in terms of time, but also the cost of tuition, materials used, etc. Given that we live in a time that is rich in information and resources for acquiring knowledge, it is important to develop the ability to acquire knowledge faster and better [5]. In accordance with that, it is necessary to change the contents of education, acquaint teachers with efficient methods of work and shaping students' personalities, develop and expand systems for measuring and efficiency of teaching, adequately reward teachers, single out and encourage those who achieve the best results.

The new role of the teacher, in line with online teaching, allows the teacher a diverse and perhaps inspiring role, however, it is difficult to maintain a stimulating discussion between teacher and student, when spontaneity is conditioned by technical requirements and distance. For that reason, in recent times, the teacher is both a lecturer and a designer, producer, media specialist, provider. In order to achieve the best possible quality, it is necessary to use modern educational technology. The integrative role of teachers is reflected in the ability to connect the school environment, curriculum, student behaviour and their way of working into a single action unit [5].

The entire life and work in educational institutions depends a lot on the personality and activities of teachers: the organization and performance of educational work, the quality of acquired facts as well as their functional connection with objective reality. Teachers should have an active role in building a trustworthy learning environment by continuously encouraging their students to share their opinions and answers [4]. Successful realization of these roles requires that the teacher should be oriented to the new pedagogical laws of educational activities based on scientific principles, and that the role of teachers in modern teaching is contained in: inclusion in the informatization of education; the transition of the work of teachers from the stage of realization to the stage of preparation of teaching; increased engagement in planning and realization of goals and tasks of upbringing and education; optimal use of teaching aids, teaching films, computers; greater focus on student motivation; the need to make more use of educational technology in order to better perform teaching, especially in the online environment.

Given that modern man, ie the student of the 21st century, is flooded with a variety of information, we can distinguish short-term knowledge that students forget immediately after the course and which do not really serve anything. In this sense, such knowledge and information should be replaced by activities that both teachers and students need to work on and from which both can benefit. Therefore, everything that students provide as learning material as a result of their work (eg papers, presentations, videos), under the supervision of teachers, can be collected and transmitted online so that other students and teachers (future generations) can always have as an example of how you should (or should not) work and certainly benefit from them. [6].

2. Research review

2.1 Methods

In researching the impact of the impact of Digitization of education in the Republic of Serbia and the world as well as the problems school systems face worldwide, this paper used information from various websites and institutions, as well as articles and journals. Certainly research through Google academic helped to get information about how are Since 2012, various activities have been undertaken in the Republic of Serbia to improve the level of application of information and communication technologies (ICT) in teaching, which was especially influenced by the adoption of the Guidelines for Improving the Role of Information and Communication Technologies in 2013, as well as the Strategy of the development of education in Serbia until 2020. In accordance with this Strategy and guidelines, the "Digital Competence Framework - Teacher for the Digital Age" was adopted. However, specific activities of the competent ministry were undertaken only in the 2018/2019 school year, when a pilot project "2000 digital classrooms" was organized in primary schools, as part of which primary school teachers went through a two-day training for the use of electronic textbooks and digital educational content [7]. UNESCO (2020) pointed out that more than 1.5 billion students worldwide could not attend school or university due to the outbreak of Covid19 on April 4, 2020 [4]. In this context, the Chinese Ministry of Education (Moe) and university experts began to discuss the use of information and communication technologies (ICT) to reform the entire education system in the midst of this pandemic and to enable online and distance learning, even during sporadic classes [4]. The Covid19 virus pandemic has forced a rapid transition to online teaching, regardless of the readiness of students and teachers, and the digital technology available in schools. Therefore, the readiness of teachers and students for online teaching in the Republic of Serbia is an important problem, because it is necessary to identify obstacles to the effective implementation of online teaching and design training programs to overcome them. In addition, the benefits and advantages of online teaching can be permanently integrated into traditional teaching after the end of the Covid19 virus pandemic.

2.2 Research

The research on the attitudes of high school students about online education in Serbia arose from the need to look at the technical readiness of both students and teachers from the point of view of students and their expectations, and to raise readiness in that sense to a higher level so that they can learn and progress [7]. The research instrument is a questionnaire that the respondents filled out, which contains questions related to satisfaction related to the online teaching conducted in the high schools they attend. The students answered the closed-ended questions by choosing the answer that best suited their attitude. The research procedure was initially invited to participate in the research towards 300 schools from the territory of the Republic of Serbia. The invitation to participate in the research contained a link to a questionnaire that was directly forwarded to the students by the teachers [5].

Online classes:	Percentage:
Lack of interaction with teachers	26,5 %
Lack of interaction with other students	31%
Lack of various content (movies, simulations, animations, interactive exercises, quizzes, games, etc.)	19,6%
Monotonous teaching	18,6%
Insufficient knowledge of ICT by teachers	4,5%

Table 1. What bothers high school students in Serbia in conducting online classes in the schools they attend?

What is obviously the most urgent segment for improvement from Table 1 is the interaction in online teaching, both the interaction of students with teachers and the interaction between students [5]. Also, it is necessary to improve the teaching content, make them more diverse and interesting to students.

Teacher access to online teaching	Percentage
I am not satisfied at all	5,7%
I am not satisfied	5,7%
I am very satisfied	11%
I am neither satisfied nor dissatisfied	32,5%
I am satisfied	45,1%

Table 2. Student satisfaction with teachers' access to online teaching

In terms of student satisfaction with teachers' access to online teaching, we see that 62.6% of students are satisfied with the way teachers approach online teaching, which still shows that students recognize and valorise teachers' efforts to cope with new circumstances, while 11,4% of students are not satisfied with teachers' approach to online teaching, and 32.5% of them are undecided (neither satisfied nor dissatisfied).

Measures to improve the quality of online teaching	Percentage
To use other teaching platforms / applications in teaching	20,8%
That schools organize additional trainings for teachers	20,3%
For teachers to say which platforms / applications for online teaching they know, so that they can use them	31,7%
That schools hire administrators who would facilitate the work with teachers	27,3%

Table 3. What should schools and teachers do to improve the quality of online teaching?

According to the presented data, it is noticed that students believe that online teaching can be improved through several segments. The largest share of students (31.7%) believe that teachers should say which platforms they know so that these platforms / applications are used in online teaching, which is observed with the fact that 20.3% of respondents believe that schools should organize additional training for teachers, shows that more than half of the respondents believe that teachers need to improve their digital competencies and knowledge of platforms / applications used in online teaching, which would contribute to the quality of online teaching [5]. Certainly, this can be added to 27.3% of respondents who believe that schools should hire an administrator to facilitate work with teachers, and this attitude of almost a third of respondents indicates that students recognize and valorise the work and commitment of teachers, and have an understanding of the circumstances, in which online teaching took place at the time of the pandemic. Additionally, the Covid19 pandemic, and the sudden, widespread transition to online instruction, has created an even stronger need for faculty support, and in particular, support in a form that is compatible with remote working and teaching [8]. More broadly, there is a need for more and better models for supporting faculty's pedagogical growth and development. This need is acute in situations where faculty are attempting to use approaches that are substantially different from how they themselves were taught [8].

3. Discussion

3.1 *Some of the solutions in conducting online classes as an introduction to the application of the lean concept as a saving of work time and learning materials*

To overcome the problem of time to prepare online content, teachers could now use the thousands of open educational resources (OERs) published by the Ministry of Defence in China, for example, which are available in other national and international online "repositories", as well as public networking tools, platforms and available technologies. The term open educational resources was first used at the UNESCO Forum in 2002, and was defined in a recent UNESCO Recommendation on OER as "learning, teaching and research materials in any format and medium placed in the public domain or under copyright which is published under an open license that provides access at no cost" [4]. In order to solve problems related to teacher / student isolation, as well as the need for effective pedagogical approaches to activate and engage students, teachers should build their OER courses and require their students to find problem-solving content, written reports, or research on a given topic.

Specifically, Open educational practices (OEP) – including open pedagogy, open collaboration, and open assessment – should be implemented to keep the students motivated and engaged during this long period of online learning. To facilitate acquiring OEP, teachers should choose already known learning tools and technologies that students are already familiar with. They should also avoid overloading students by asking them to use too many tools, which in practice in most cases has resulted in a less desirable learning practice for them.

Learning is facilitated not only by teachers but also by peers. Therefore, to make the teaching process more interactive, teachers can build open learning communities where the students can openly exchange ideas, create discussions, and collaborate on different tasks [9]. To ensure interactive and open learning communities, teachers should use social networks during the learning process, such as Wechat, QQ, and Sina Weibo (Facebook or Twitter, for international readers). By using these social networks, teachers can share questions related to specific course materials, and students can discuss them to determine specific answers.

Consequently, students learn by exchanging ideas and opinions. Furthermore, the jigsaw classroom pedagogy can be applied online by dividing the assignment into several tasks and making each team work on a specific task. This will foster both individual accountability and the achievement of team goals. Additionally, the open learning within social networks can be gamified using Emojis to make the learning process more engaging and interactive. For instance, Saif used, during the learning process on Facebook, the number of given "likes" on a particular learner's answer as the score he/she gets for that answer [10].

3.2 *The advantage of online learning and the spontaneous introduction of the lean concept in education*

Online learning advantages included remote learning, comfort, and accessibility but online learning was limited to inefficiency and difficulty in supervising students. When conducting online teaching, teachers could try to monitor students and improve their learning efficiency [11]. It is the internet and online education that has conditioned the urgent need to modernize governance within higher education, which is extremely important for both efficient and effective business.

All this somehow spontaneously conditions the application of the lean concept in higher education, which will enable easier (re) definition of existing as well as future organizational and managerial structures. By modernizing the management and improvement of university / faculty processes, along with systematic and continuous research for the improvement of university / faculty processes, it directly affects the possibility for university faculties to receive the epithet "smart or green" university [12]. Therefore, to assess learners in open learning environments, teachers should use project-based assessments based on the OER delivered by learners. In this context, teachers can invite their students to open presentations (where parents and other teachers can attend) of their delivered projects for assessment and grading.

Modernisation of the learning process, especially in higher education institutions, can be achieved through several platforms that support live video communication, such as Skype and Zoom. If we talk about mobile technologies that facilitate access to the platform for online learning, these are all applications that are supported by smart phones as well as computers [13]. Certainly, what makes online learning much simpler, more efficient, easier are all the aids related to information technologies such as laptops, tablets, iPads, which are already widely used and well accepted in higher education institutions [14]. Online learning could bring many benefits to students such as focusing on really important knowledge as well as enabling them to engage in mutual cooperation and group exchange of opinions online when it comes to learning [15]. All this together saves time, space, and in a way automatically reduces costs.

3.3 Modernization of management within higher education and application of the lean concept

In every social community in the world, we can show the level of social development that it has reached by the educational level of the population. Higher education institutions will play a central role in solving the challenges of the 21st century, because education is of key importance for the development of a knowledge-based economy and the improvement of society as a whole [12]. The role of higher education institutions through leadership training, education of the growing population in all social skills needed to achieve a complex, modern society are vital in an increasingly dynamic climate of competitiveness and globalization, higher education is a significant link between national and international environment, especially in Covid19 we achieve primarily through the internet and online education [1].

It was the Covid19 pandemic that, like the internet [16] and online education, conditioned the urgent need to modernize governance within higher education, which is extremely important for both efficient and effective business. All this somehow conditions the application of the lean concept in higher education, which will enable easier (re) definition of existing as well as future organizational and managerial structures. By modernizing the management and improvement of university / faculty processes, along with systematic and continuous research for the improvement of university / faculty processes, it directly affects the possibility for university faculties to receive the epithet "smart or green" university.

3.4 Higher education and lean concept

Lean means working more with less human effort, equipment, time and space, while providing products that will meet the needs of consumers, which is actually the ideal solution in the newly created working conditions during a pandemic, when it comes to higher education. In order to implement the lean concept within higher education, it is necessary to fulfil several steps that can be presented as: loss detection and process mapping, implementation of various lean methods and tools for certain processes and continuous improvement of improved process processes [12]. In order to better apply the LEAN system in education, the initial step we must take is to identify the losses in education (WASTE) [17] and based on the identified losses it is necessary to define the strategy of LEAN system, ie the application of appropriate LEAN tools that can be used in the education process [18]. The final value of the product, in this case, is the knowledge and success of the students, which would be at the highest possible level, and thus the quality of school work would be higher and better. If we look at the education system, several possible losses can be noticed here: 1. lack of motivation of students and teachers; 2. insufficient teaching aids; 3. poor material conditions; 4. plan and program; 5. a good textbook; 6. low interest in professional development of teachers; 7. weak control over the work of teachers; 8. poor schedule; 9. information system exists but does not function; 10. poor cooperation on the teacher-parent line.

4. Conclusion

The Covid19 virus pandemic imposed a rapid transition to online teaching, regardless of the readiness of students and teachers and available digital technology in schools, which led to greater use of the Internet, which in these conditions was of great importance for quality teaching. Internet and online education have conditioned the urgent need for technological and technical modernization, especially in the management within higher education, which is extremely important for both efficient and effective business. All this spontaneously introduces the application of the Lean concept in higher education, which gives the professor a completely more complex role in education. The application of LEAN tools in education would provide better motivation of students, better grades of students, better average of all students in general, great satisfaction and motivation of teachers for better results. On the other hand, by using modern technologies in education, the professor becomes both a lecturer and a designer, producer, media specialist, provider.

In order to achieve the best quality in education in the 21st century, especially during the Covid19 pandemic and after it, it is necessary to invest in new methods of education which include the implementation of Lean methodology within which it is necessary to expand measurement systems and teaching efficiency, teachers, and especially to single out and encourage those who achieve the best results.

Currently, the work is limited by the small number of papers that exist on the application of the lean philosophy in higher education, especially related to online learning, and further research will be focused on the implementation of several different Lean tools in higher education institutions in Serbia in order to improve the current way of working through online platforms during the Covid19 pandemic.

5. References

- [1] Radosevic, M.; Baosic, M.; Radicev, S.; Ikonov, D. & Matic, B. (2011). Advancing higher education with the "Lean" philosophy, XVII Conference development trends, Kopaonik, ISBN 978-86-7892-323-4, Publisher Faculty of Technical Sciences Novi Sad
- [2] Desnica E. (2010). Distance learning model as a factor in the efficiency of teaching graphic communications in higher education of technical professions, Ph.D. Dissertation, Technical faculty „Mihajlo Pupin”, Zrenjanin, University Of Novi Sad, Novi Sad, Republic of Serbia
- [3] Zhonggen, Yu. (2021). The effects of gender, educational level, and personality on online learning outcomes during the COVID-19 pandemic, *International Journal of Educational Technology in Higher Education*, 18, 14 (2021). <https://doi.org/10.1186/s41239-021-00252-3>
- [4] Huang, R.; Tlili, A.; Chang, T.W.; Zhang, X.; Nascimbeni, F. & Burgos, D. (2020) Disrupted classes, undisrupted learning during COVID-19 outbreak in China: application of open educational practices and resources. *Smart Learn. Environ.* 7, 19 <https://doi.org/10.1186/s40561-020-00125-8>
- [5] <http://zadecu.org/wp-content/uploads/2021/02/Rezultati-istrazivanje-o-stavovima-mladih-o-onlajn-obrazovanju-u-Srbiji-1.pdf>, (2021). Friedrich Naumann Foundation for Freedom - Office for the Western Balkans, Research results Attitudes of young people about online teaching in Serbia, Accessed on: 2021-08-21
- [6] Wiley, D., & Hilton III, J. L. (2018). Defining OER-enabled pedagogy, *The International Review of Research in Open and Distance Learning*, 19(4). DOI: <https://doi.org/10.19173/irrodl.v19i4.3601>
- [7] <https://digitalnaucionica.edu.rs>, (2021). Digital classroom, Accessed on: 2021-09-05
- [8] Price, E.; Lau, A.C.; Goldberg, F.; Turpen, Ch.; Smith, P.S.; Dancy, M., & Robinson, S. (2021). Analyzing a faculty online learning community as a mechanism for supporting faculty implementation of a guided-inquiry curriculum, *IJ STEM Ed* 8, 17 <https://doi.org/10.1186/s40594-020-00268-7>
- [9] Hegarty, B. (2015). Attributes of open pedagogy: A model for using open educational resources, *Educational Technology*, pp. 3–13.7
- [10] Saif, M. A. F.; Tlili, A.; Essalmi, F. & Jemni, M. (2019). Impact of Facebook as a learning tool on learning outcomes, technology acceptance, and attitude, *Journal of Cases on Information Technology (JCIT)*, 21(4), pp. 46–61.
- [11] Stankovski, S., Ostojić, G., Zhang, X., Baranovski, I., Tegeltija, S., Horvat, S. (2019). Mechatronics, Identification Tehnology, Industry 4.0 and Education, 18th International Symposium INFOTEH-JAHORINA, INFOTEH 2019 - Proceedings, art. no. 8717775
- [12] Radošević M. (2014). LEAN concept to “SMART I GREEN” University, XX Conference development trends, Kopaonik, Publisher Faculty of Technical Sciences Novi Sad, Available from: http://www.trend.uns.ac.rs/stskup/trend_2014/radovi/T6.2/T6.2-1.pdf Accessed: 2021-09-07
- [13] Panigrahi, R.; Ranjan, P. & Sharma, D. (2018). Online learning: Adoption, continuance, and learning outcome - A review of literature, *International Journal of Information Management*, Vol. 43, pp. 1 - 14. <https://doi.org/10.1016/j.ijinfomgt.2018.05.005>
- [14] Starr-Glass, D. (2013). From connectivity to connected learners: Transactional distance and social presence. Increasing student engagement and retention in e-learning environments: Web 2.0 and blended learning technologies, Bingley: Emerald Publishing. [https://doi.org/10.1108/S2044-9968\(2013\)000006G007](https://doi.org/10.1108/S2044-9968(2013)000006G007)
- [15] Alwi, N.; Adams, R. & Newton, J. (2012). Writing to learn via text chat: Task implementation and focus on form, *Journal of Second Language Writing*, Vol. 21, pp. 23–39.
- [16] Gabriel, Dinu, and Dinu Loredana. "Using Internet as a Solution for Sales in Covid-19 Pandemic: E-Commerce." *Annals of DAAAM & Proceedings*, annual 2020, pp. 0104+. Gale Academic OneFile, link.gale.com/apps/doc/A653725459/AONE?u=anon~50641215&sid=googleScholar&xid=64853d91. Accessed 11 Oct. 2021.
- [17] Tegeltija, S.; Lazarevic, M.; Stankovski, S.; Ćosic, I., Todorović, V. & Ostojić, G. (2016). Heating circulation pump disassembly process improved with augmented reality, *Thermal Science*, Vol. 20, pp. S611-S622.
- [18] Manojlovic, G.; Macuzic, I.; Jeremic, B. & Arsovski, S. (2012). Lean koncept as a tool for education system improvement; *Quality Festival 2012*, ISBN 978-86-86663-83-2, Publisher Association for Quality and Standardization of Serbia