Value-Based Management of Educational Projects

Dmytro Lukianov[a], Kateryna Kolesnikova[b], Victor Gogunskii[c], Oleksii Kolesnikov[d], Danso Janet Obenewaa[e] and Ardak Mukhamediyeva[b]

[a] *GigaCloud, Pr. Bortnikova, 499A, Kiev, Ukraine*
[b] *International IT University, Manas 34/1, Almaty, Kazakhstan*
[c] *Odessa National Polytechnic University, 1, Shevchenko Ave. Odessa, 65044, Ukraine*
[d] *Edge Apps, Turan 46/2, Nur-Sultan, Kazakhstan*
[e] *Taras Shevchenko National University of Kyiv, 60, Volodymyrska Street, Kyiv, Ukraine*

Abstract

The article discusses possible ways for the development of the educational industry in the world and in Ukraine in connection with the avalanche growth in the supply of online educational services by market players. In the conditions of forced isolation and hostilities in Ukraine, it becomes necessary to transfer human-to-human interaction from a face-to-face format to a remote one. The authors of the study have developed a model of the life cycle of an educational program from an "idea" to a completed "first copy". This approach allows you to check the viability of MVP in the field of educational projects. Also, the developed model can be the basis for the implementation of the concept of lifelong education and corporate training. The model is based on the PDCA cycle and PDAA tools. As a mathematical apparatus, the theory of Markov chains is used in the work. The scientific novelty of the publication lies in the rethinking of existing models for the development of educational programs and the development of business process reengineering tools for educational content providers.

Keywords [1]

Educational projects, distance learning, business process, PDCA continuous improvement cycle, Markov chains

1. Introduction

The current situation in the world and in Ukraine has created a unique moment in terms of using the potential of distance learning. In recent years, the development of information technology has led to the creation of numerous distance learning platforms. However, this form of education existed in parallel with full-time education or supplemented it.

In the conditions of forced isolation and hostilities in Ukraine, it becomes necessary to transfer human-to-human interaction from a face-to-face format to a distance education. The development of modern information and communication technologies makes it possible, at least in terms of information transfer. Leaving beyond the scope of this research questions of the effectiveness of remote interaction, which seriously reduces the perceptual possibilities available in live human communication, consider the consequences of this mass transfer from offline communications. The consequences of these changes can be observed everywhere - from the local to the global. Of course, the ongoing changes have affected a huge number of areas of human activity, one of which is education. The history of the

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EMAIL: dlukiano@gmail.com (Dmytro Lukianov); kkolesnikova@iitu.edu.kz (Kateryna Kolesnikova); vd.gogunsky@gmail.com (Victor Gogunskii); akoles78@gmail.com (Oleksii Kolesnikov); dansojenny@gmail.com (Danso Janet Obenewaa); amukhamediyeva@iitu.edu.kz (Ardak Mukhamediyeva)
ORCID: 0000-0001-8305-2217 (Dmytro Lukianov); 0000-0002-9160-5982 (Kateryna Kolesnikova); 0000-0002-9115-2346 (Victor Gogunskii); 0000-0003-2366-1920 (Oleksii Kolesnikov); 0000-0002-8707-2298 (Danso Janet Obenewaa); 0000-0002-7646-5096 (Ardak Mukhamediyeva)

development of society shows that never, in such a short time, such qualitative changes was occurred. They can be considered, on the one hand, as catastrophic [1] and as those that open up new opportunities [2].

Today, the process of transition to distance learning is considered inevitable by almost everyone, as it is a consistent continuation of the transition to educational technologies of the future and a further stage in the introduction of digital innovations. On the other hand, a total transition to a new level of knowledge transfer, no matter how revolutionary, is not able to force a student to learn, and a mediocre teacher to brilliantly lecture online and become a bearer of unique knowledge.

The active development of distance learning reduces the role of a human teacher as a full-fledged carrier of professional knowledge, and education becomes depersonalized.

Let us consider what scenarios for the development of the situation can exist from the point of view of modeling, using the apparatus of Markov models [3, 4], and what this situation is for society - an opportunity or a threat.

2. Problem

Finding answers to questions arising from new directions of development of society, led us to the need to identify new approaches to reforming the education system, the role of the teacher and student in this process. Recently, a value orientation has been observed in society, and in education a value approach as one of the ways to reform it. The focus is on indicators of the quality of educational activities, the relevance of the knowledge gained and the compliance of educational programs with the requirements of the labor market.

During the transition from the classical form of conducting training sessions to the system of "blended" learning, including possible models of "flipped class" and the like, there was always the practice of partial presence of students in the classroom. Sometime was allotted for independent study in the programs of "dual" education, however, it was still assumed that there would be full-time joint participation in such work of groups of students. Today, all providers of educational content have switched to distance learning - even those who were not going to do this. Moreover, many events are offered to visit without payment. A large number of other content providers have been added to the well-known "content for free - evidence for a fee" model offered by the Coursera platform and many educational services. Previously, they assumed full-time participation - these were exhibitions, conferences, forums, meetups, "seasonal schools", etc. At the same time, all these content providers came to social networks, began to make mailing lists, and master all possible means of communication. All this led to a rapid increase in supplier competition and a constant hunt for the main "primary" resource of trainees – the physical time of a potential content consumer. The issue of tuition fees has gone by the wayside. In this regard, there has been a shift in the distinction between "free" and "paid" content within the "sales funnel". Moreover, the educational content in some cases became completely free (Figure 1).

The monetization of such services began to occur through the acquisition of other types of company products, for example, the sale of their own certification systems. Moreover, the major players in the electronic educational sphere began to do this long before the general trend. It was this position that allowed some companies to take a significant market share in online training and certification systems, both with the help of their own content and by providing their platforms to other providers. The development of educational programs in any format requires not only the creation of a knowledge base and the availability of high-level professionals. A high-quality E-learning product is obtained where an environment has been generated to manage the learning process itself and the mandatory control of the assessment of the assimilation of the material. For example, as of the end of 2020, the VMEdu platform is a leader in vocational training and certification, helping to educate over 500,000 students from over 3,500 corporations in over 150 countries. The success of this project to date is 98.7% and all thanks to a global network of 1100+ training service providers [5].

Figure 1: Example of an offer to participate in a free webinar and entry-level certification training for the certification Scrum Fundamentals [www.VMEdu.com]

This publication addresses the challenges of rethinking and reengineering business models and business processes by educational content providers. Regardless of whether they previously used the logic of distance learning, correspondence, or blended learning, whether they used MOOC (Massive open online course) technologies [6], or not. The authors also consider a new concept of team building and group interaction during the implementation of educational projects [7, 8], from the point of view of transferring some human roles to automation tools [9] or, in modern terminology, using RPA [10].

3. Research methods

The following approaches were used in research:

- An analysis of the existing providers of educational content was carried out and their classification was proposed [10].
- A Markov model [11] of mutual influence of factors was built to assess the development potential of the existing system of knowledge transfer based on the project approach [12] in educational institutions.
- An analysis of decisions was made to select the optimal model for the provision of educational services based on the construction of a risk matrix.

4. Model development and use of modelling method

During the initial phase of the research (end of 2020 year), a primary hypothesis was formed: the transformation of the role of an "expert teacher" into the role of an "expert architect" to create the necessary set of competencies by students and a further transition to the role of an "expert facilitator" to accompany training participants during their passage of the relevant blocks of educational content. The primary basic model built by the authors was based on the logic of the interaction of four basic elements "competence model" – "elements of educational content" – "accompaniment / assistance of passing" – "assessment / testing". A model leads to continuous development and improvement of model which based on the PDCA cycle of continuous improvement [13] (Table 1).

Unfortunately, this model, despite its obviousness and simplicity, does not allow building the logic of managing the necessary abilities through an understandable system of factors that would promote or hinder the development goals (the "Win-Win" model) of all project participants.

In a more detailed consideration, the authors proposed an improved model of factors and the logic of their interaction (Figure 2). The model is presented in the form of an adjacency matrix. It is possible to single out the necessary elements in the model, up to the recognition/crediting of ECTS [14], PDU

[15] or accrual (transfer) of any kind of "credit units of the educational process" for the "freemium" model [16], which is widespread in the world of distribution of digital services [17].

It is proposed to consider as the main model for the distribution of educational content - the "free-to-learn" model [17]. Based on the experience of participating in MOOC programs in various capacities, the authors propose to consider the following set of factors for modeling the life cycle of a curriculum from the "idea" to the completed "first copy":

- M1 - adaptation of the reference model / professional standard
- M2 - adaptation of the competence model / educational standard
- M3 - development of a reference model / professional standard
- M4 - development of a competency model / educational standard
- M5 - search for available components of the educational program
- M6 - creation of the missing components of the educational program
- M7 - assessment of competencies at the "input" of the program
- M8 - assessment of competencies at the "output" of the program
- M9 - support during the development of the program
- M10 - support upon completion of the program
- M11 - certification of "knowledge" – "Smart guy"
- M12 - certification of "practice" – "Practitioner"
- M13 - recognition of the program by third parties (PDU, ETCU, etc.)
- M14 - sale of "extended" service

Factor name	To	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
From		1	2	3	4	5	6	7	8	9	10	11	12	13	14
M1	1	0	1	1	0	0	0	1	1	0	0	0	0	0	1
M2	2	1	0	0	1	0	0	1	1	0	0	0	0	0	1
M3	3	0	0	0	1	1	1	1	1	1	1	1	1	1	0
M4	4	0	0	1	0	1	0	1	1	1	1	1	1	1	1
M5	5	1	1	1	1	0	1	1	1	0	0	1	1	1	1
M6	6	0	0	0	0	0	0	1	1	0	0	1	1	1	1
M7	7	0	0	0	0	1	1	0	1	0	1	1	0	1	1
M8	8	0	0	0	0	1	1	1	0	0	1	1	0	1	1
M9	9	0	0	0	0	1	1	0	0	0	1	1	0	1	1
M10	10	0	0	0	0	1	1	0	0	0	0	0	1	1	1
M11	11	0	0	0	0	0	0	1	1	0	1	0	0	1	1
M12	12	0	0	0	0	0	0	1	1	0	1	0	0	1	1
M13	13	1	1	1	1	1	1	0	1	1	0	1	1	1	1
M14	14	0	0	0	0	1	1	1	1	1	1	0	0	1	0

Figure 2: Adjacency matrix for the extended PDAA model in Free-to-learn logic [developed by the authors]

Having transformed the adjacency matrix obtained by an expert into a "system landscape" [18], one can see a set of the following factors that have the maximum impact on the system under study — the upper left quadrant, which includes (in descending order of the degree of influence) the following elements — M13, M5, M3, M4, M14, M7 and M8 (Figure 3, 4).

At the initial stage of development of the distance education system, especially when going beyond the local framework, such logic looks quite good. For further development, created according to such a "pilot course" model, it is proposed to consider an element of the PDAA model modified by the authors, where A = Asset (Table 1), which is very close in essence to the earlier modification of the PDCA model - PDSA, where S = Study [19] (Figure 5).

Table 1
Correspondence between elements of the PDCA model and PDAA tools

Code 1	Deming	Tool	Ability	Authors	Code 2
P	Plan	Competency Model/Gap	As the ability to plan a curriculum based on reference models of knowledge and available educational content	Plan	P
D	Do	Content mastered	As the ability to accompany students in the development of educational content	Do	D
C	Check	Assessing the change in competencies	As the ability to assess based on assessment	Asset	A
A	Act	Application in practice	As the ability to accompany students in the process of applying their knowledge in practice	Act	AA

The analysis of simulation modeling performed on the model presented in Figure 2 is also indicative. When constructing the matrix of transition probabilities, an approach based on the Laplace criterion [20] was used when choosing equiprobable values for each of the rows of the resulting matrix (Figure 6).

The simulation results are shown in Figure 7. The data obtained allow us to draw a conclusion about the nature and severity of transient processes in the system under study. For the model considered as an example, it is clearly seen that the system stabilizes its state only after the 7th step of the process.

Further interpretation of this kind of visual data requires a deeper understanding of both the essence of the system being studied with the help of such tools, and the correct interpretation of the discrete grid of “steps”. In this case, we can say that a “step” is equivalent to a communication event with the participation of the corresponding “entities”, on the basis of which the primary adjacency matrix was built [21].

Factor name	To	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
From		1	2	3	4	5	6	7	8	9	10	11	12	13	14
M13	13	83	75	68	61	58	59	54	54	37	28	23	23	19	19
M5	5	75	67	58	57	50	54	49	48	33	24	20	20	17	17
M3	3	70	61	59	50	50	46	42	42	33	25	20	21	18	18
M4	4	71	65	58	50	49	46	46	39	37	23	22	21	19	19
M14	14	50	45	46	32	40	29	30	29	25	18	16	16	14	14
M7	7	49	45	43	34	36	32	32	30	23	17	15	15	13	13
M8	8	49	45	42	34	37	32	32	30	23	17	15	15	13	13
M9	9	42	39	37	29	32	28	28	27	19	15	13	13	11	11
M6	6	41	37	31	32	26	29	27	22	21	13	12	12	11	11
M10	10	37	35	32	26	28	26	25	25	16	13	11	11	9	9
M11	11	36	33	30	25	26	21	24	18	20	11	12	12	11	11
M12	12	36	33	30	25	26	21	24	18	20	11	12	12	11	11
M2	2	35	30	26	28	22	24	23	20	17	10	8	11	9	8
M1	1	35	33	26	25	22	23	24	19	18	9	11	8	8	9

Figure 3: The third-degree adjacency matrix for the extended PDAA model [developed by the authors]

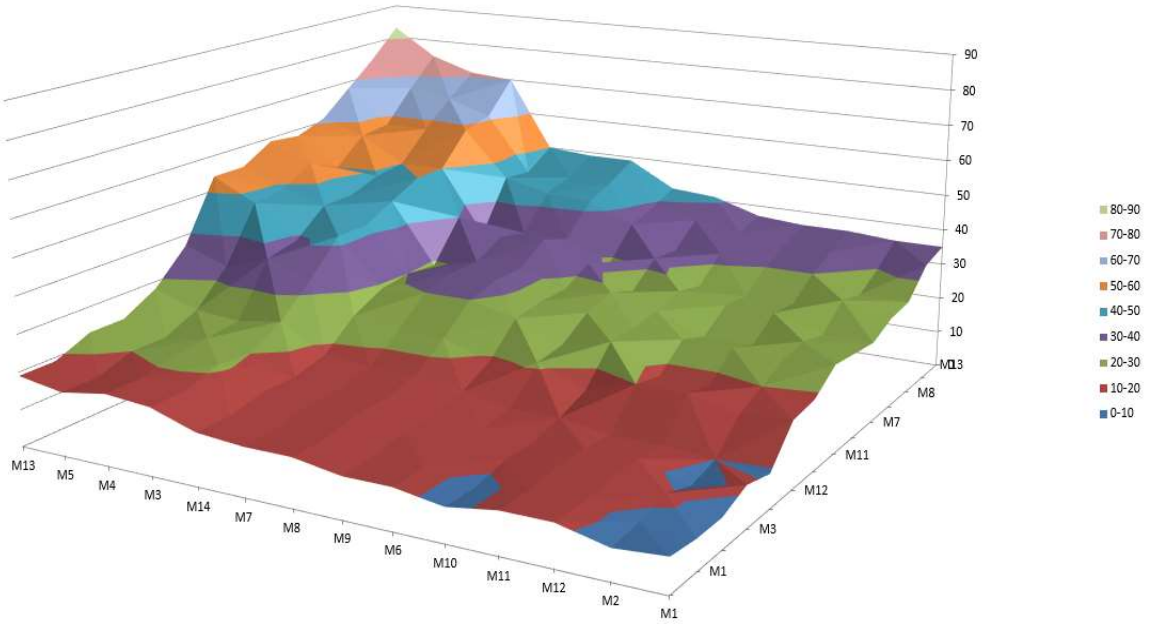

Figure 4: System landscape for the third-degree adjacency matrix for the extended PDAA model [developed by the authors]

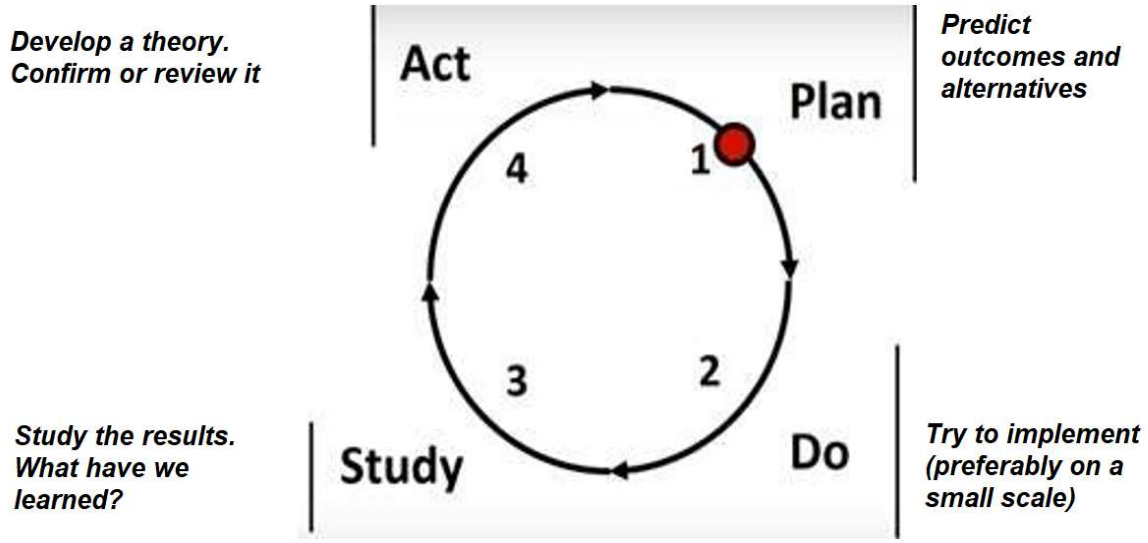

Figure 5: Shewhart-Deming PDSA cycle (knowledge theory) [20]

Factor name	To	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	Sum
From		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
M1	1	0	0,2	0,2	0	0	0	0,2	0,2	0	0	0	0	0	0,2	1
M2	2	0,2	0	0	0,2	0	0	0,2	0,2	0	0	0	0	0	0,2	1
M3	3	0	0	0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0	1
M4	4	0	0	0,1	0	0,1	0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	1
M5	5	0,09	0,09	0,09	0,09	0	0,09	0,09	0,09	0	0	0,09	0,09	0,09	0,09	1
M6	6	0	0	0	0	0	0	0,17	0,17	0	0	0,17	0,17	0,17	0,17	1
M7	7	0	0	0	0	0,14	0,14	0	0,14	0	0,14	0,14	0	0,14	0,14	1
M8	8	0	0	0	0	0,14	0,14	0,14	0	0	0,14	0,14	0	0,14	0,14	1
M9	9	0	0	0	0	0,17	0,17	0	0	0	0,17	0,17	0	0,17	0,17	1
M10	10	0	0	0	0	0,2	0,2	0	0	0	0	0	0,2	0,2	0,2	1
M11	11	0	0	0	0	0	0	0,2	0,2	0	0,2	0	0	0,2	0,2	1
M12	12	0	0	0	0	0	0	0,2	0,2	0	0,2	0	0	0,2	0,2	1
M13	13	0,08	0,08	0,08	0,08	0,08	0,08	0	0,08	0,08	0	0,08	0,08	0,08	0,08	1
M14	14	0	0	0	0	0,14	0,14	0,14	0,14	0,14	0,14	0	0	0,14	0	1

Figure 6: Transition probability matrix for the adjacency matrix for the extended PDAA model [developed by the authors]

The results which presented in Figure 7 show that if we start modeling the system from the state of adaptation of the future educational product of a certain reference model, then the transition processes provide the maximum probability that the main indicators of success will be achieved, namely, the "Win-Win" state is reached.

That is, the consumer receives, as a result of his participation in such a distance educational project, not only some knowledge, but also recognition of the quality of such education from other recognized providers of educational services. In turn, the provider of educational content gets the maximum probability of selling related paid content at almost every step of learning (M13 - recognition by third parties (PDU, ETCU, etc.), M14 - sale of "extended" service).

5. Conclusion

The results obtained, at first glance, contradict the logic of the presented factors of the recombined adjacency matrix of the 3rd order (Figure 2). However, in the “systemic landscape” shown in Figure 4, these elements are also in the “top” in terms of the degree of influence, but in terms of impact on them, they are the most difficult to achieve. From the point of view of the authors, this indicates that for the content to achieve the “Win-Win” state, it is necessary to constantly keep in focus the main value - the creation of a high-quality educational product (M13 - recognition by third parties (PDU, ETCU, etc.)) and only after that count on financial success.

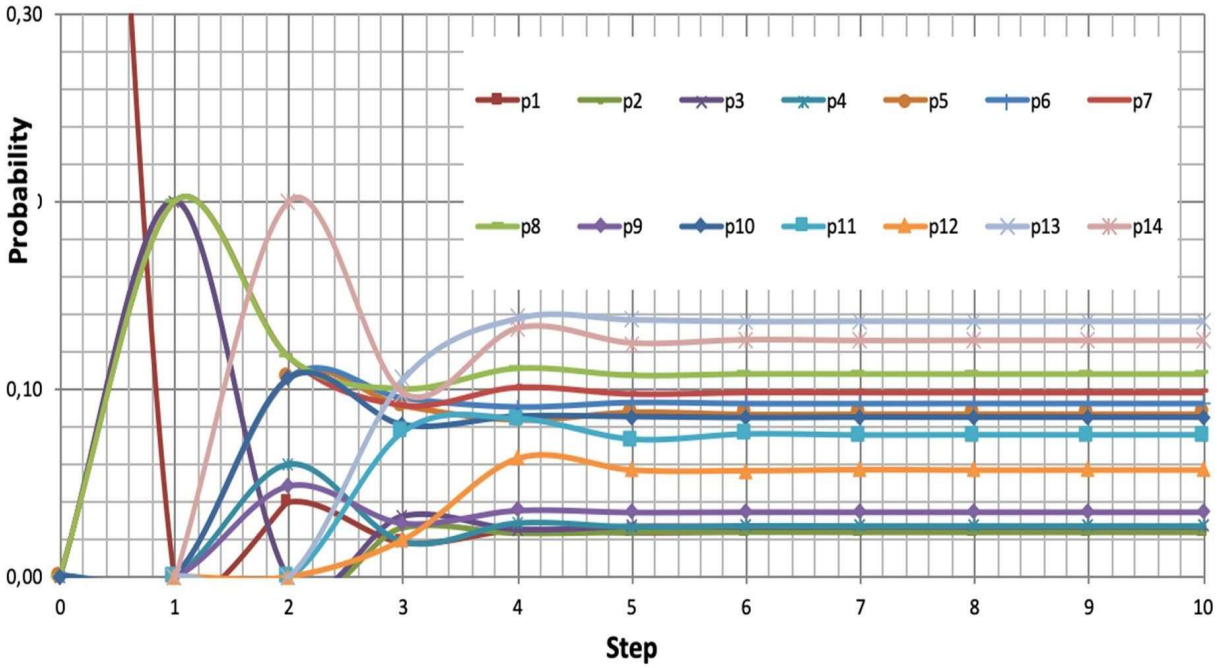

Figure 7: Transition probability matrix for the adjacency matrix for the extended PDAA model [developed by the authors]

According to the authors, the proposed model can be used as a kind of "control Markov twin" for created digital products in the field of education that implement the "Free-to-learn" business model, as well as to test the viability of MVP in the field of educational startups [22].

As can be seen from the research goal, the identification of mutual influences in a complex multifactorial system is a rather laborious task, which is difficult to cope with if only knowledge of business processes and qualitative methods of analysis (including graphical interpretation) are used. The use of an appropriate mathematical apparatus makes it possible to obtain reasonable conclusions regarding system-forming factors in the analysis of complex multifactorial systems, which include modern educational projects.

Also, such an approach should ensure the implementation, on the one hand of the “knowledge funnel” [23], on the other hand, become a tool that is able to keep the provider of educational services in trend for a certain time, ideally for the implementation of Lifelong learning concepts. and corporate training [24, 25]. Perhaps in the future, specialists will not need to demonstrate their diploma to employers, due to the rapid obsolescence of knowledge [26, 27] and the use of the term “competence half-life” [28, 29]. In this case, the "Free-to-learn" model can become a "subscription" service - with guaranteed storage of the entire learning history and the ability to construct the necessary "skills" to move up the career ladder. The traditional education system, focused on training specialists with a certain set of professional knowledge and skills, no longer meets the requirements of modern society.

As noted in [30], “the realities of the VUCA world put the flexibility of the education system at the forefront, its representatives should be guided in the training of personnel primarily by requests, guidelines, professional standards and wishes of industry state regulators, professional associations and individual enterprises and organizations, coordinating with them educational standards and requirements for them”. Therefore, it is worth preparing for the fact that students and teachers will spend most of their professional lives outside the classroom [31, 32]. The dynamically developing environment of educational projects will force both developers and suppliers of educational content, represented by methodological "architects" of educational standards and programs, and teachers who create and transmit their content to students, and students themselves, to be more demanding on the quality of such content, as well as its relevance [33, 34]. Perhaps it is this ability to analyze and synthesize accessible educational content that will remain that part of the “student-faced” interface of educational institutions. And the rest of the elements that do not require "human creativity" will be transferred to "artificial intelligence" [35, 36].

6. References

[1] Yitzhak Adizes, 2020-2025 will go down as the most memorable disaster in history, 2021. URL: https://adizes.me/posts/itskhak-adizes-2020-2025-samaya-zapominayushchayasya-katastrofa.

[2] German philosopher: a pandemic is an opportunity to slow down, 2022. URL: https://www.dw.com/ru/German-philosopher-pandemic-is-an-opportunity-to-slow down/a-53004406.

[3] Chernova L. S. et al., Development of a simulation model of the created value on the Markov chain for foresight methodology. Bulletin of the Odessa National Maritime University. 60 (2019) 171–189.

[4] L. S. Chernova et al., Modeling the state of the foresight project based on the Markov chain. Collection of scientific works "Project management and development of manufacturing". 2 (2019) 82–96.

[5] Who We Are. 2022. URL: https://www.vmedu.com/AboutUs/Who-We-Are.

[6] K. A. Mozhey, D. V. Lukianov, Aspects of the practical implementation of mass open online courses in the educational process of a higher educational institution. Actual problems of humanitarian education 2 (2017) 41–45.

[7] O. S. Evmenchik, D. V. Lukianov, Formation of effective “student-cathedral teams” according to M. Belbin as a necessary feature of modern university education, 2019.

[8] L. Chernova, S. Titov, S. Chernov & other, Development of a formal algorithm for the formulation of a dual linear optimization problem. Eastern-European Journal of Enterprise Technologies 4(100) (2019) 28-36.

[9] D.V. Lukianov, Transformation of team roles in projects in the digital age, in: Proceedings of the XV International Conference Project Management in the Development of Society, 2018, pp. 130-133.

[10] Robotic Process Automation (RPA) for Education Industry, 2021. URL: https://automationedge.com/rpa-for-education-industry/.

[11] K. Kolesnikova, T. Olekh, D. Lukianov, D. J. Obenewaa, Markov Principles of Project Effectiveness, in: IEEE International Conference on Smart Information Systems and Technologies SIST, Nur-Sultan, 2021, pp. 1-6. doi: 10.1109/SIST50301.2021.9465881.

[12] S. Bushuyev, D. Bushuiev, A. Zaprivoda, J. Babayev, Ç. Elmas, Emotional infection of management infrastructure projects based on the agile transformation. CEUR Workshop Proceedings 2565 (2022) 1–12.

[13] A. Bondar, S. Bushuyev, V. Bushuieva, S. Onyshchenko, Complementary strategic model for managing entropy of the organization. CEUR Workshop Proceedings 2851 (2021) 293–302.

[14] Guidelines for the use of the European Credit Transfer and Accumulation System (ECTS), 2018. URL: http://nihe.bsu.by/images/titovich/ESTS-2015.pdf.

[15] How Many PDUs Do I Need to Maintain My Certification?, 2021. URL: https://www.pmi.org/certifications/maintain/requirements.
[16] Freemium or Free Trial - which business model to choose when selling software?, 2021. URL: https://habr.com/ru/post/234579/.
[17] Free-to-play games: how to make them successful, 2021. URL: https://habr.com/ru/company/nevosoft/blog/137423/.
[18] Gray P. Free to learn: Why unleashing the instinct to play will make our children happier, more self-reliant, and better students for life, 2013.
[19] D. Lukianov, K. Mazhei, V. Gogunskii. Transformation of the International Project Management Association Project Managers Individual Competencies Model, in: Proceedings of IEEE International Conference on Advanced Trends in Information Theory (ATIT-2019), Kyiv, Ukraine, 2019, pp. 506-512. doi: 10.1109/ATIT49449.2019.9030486.
[20] Neve Henry R., The Space of Dr. Deming: Principles for Building a Sustainable Business. Alpina Business Books, 2005.
[21] The system of deep knowledge of E. Deming, 2021. URL: https://deming.pro/deming_profound_knowledge.html.
[22] Decision making under uncertainty. Criteria for situation analysis, 2022. URL: http://it.kgsu.ru/IO/io_013.html.
[23] 7 mistakes in the development of an MVP product. URL: https://artjoker.ua/ru/blog/7-oshibok-razrabotki-mvp-produkta/.
[24] S. D. Bushuyev, Integrated computer-aided system for project management under market conditions. Journal of Computer and Systems Sciences International 32 (5) (1994) 132–138.
[25] V. Gogunskii et al., Lifelong learning is a new paradigm of personnel training in enterprises. Eastern European Journal of Advanced Technologies 4 (2) (2016) 4–10. doi: 10.15587/1729-4061.2016.74905.
[26] D. V. Lukianov, The concept of creating corporate training centers for advanced training and retraining of personnel. Management of warehouse development 29 (2017) 168–176.
[27] Kateryna Kolesnikova, Dmytro Lukianov, Tatyana Olekh, The role of a higher education diploma in the professional career of the specialist in the future. Applied Aspects of Information Technology 3 (1) (2020) 456–466. doi: 10.15276/aait.01.2020.7.
[28] R. Grant Continuing education-does it make for a more competent practitioner? Australian Journal of Physiotherapy 40 (1996) 33–37. doi: 10.1016/S0004-9514(14)60621-8.
[29] Careers and learning, 2021. URL: https://www2.deloitte.com/content/dam/Deloitte/ec/Documents/deloitte-analytics/Estudios/Capi2.pdf.
[30] The European skills passport, 2022. URL: http://yourcompetences.com/en/toolbox-uk/pendant-la-realisation-2/passeport-europeen-competences/.
[31] V. Morozov, O. Mezentseva, Development of Optimization Models of Complex Infocommunication Projects Based on Data Mining, in: Proceedings of IEEE International Conference on Smart Information Systems and Technologies (SIST 2021), 2021, pp. 233-241. doi: 10.1109/SIST50301.2021.9465991.
[32] Education: from the closure of educational institutions to the resumption of their work, 2022. URL: https://ru.unesco.org/covid19/educationresponse.
[33] Planning for a Safe Campus Reopening, 2021. URL: https://www.harvard.edu/coronavirus/planning-2020-21.
[34] HarvardX. Free online courses from Harvard University, 2021. URL: https://www.edx.org/school/harvardx.
[35] The Latest in Translation Devices, 2022. URL: https://www.nytimes.com/2019/11/07/travel/the-latest-in-translation-devices.html.
[36] How universities are using robotic process automation, 2022. URL: https://www.ey.com/en_us/government-public-sector/how-universities-are-using-robotic-process-automation.