

External Motivation, the Key to Success in the MOOCs Framework

Žolt Namesztovszki¹, Lenke Major¹, György Molnár², Zoltán Szűts², Péter Esztelecki³, Gábor Kőrösi³

¹University of Novi Sad, Teacher Training Faculty, Štrosmajerova 11, 24000 Subotica, Serbia, zsolt.namesztovszki@magister.uns.ac.rs, major.lenke@magister.uns.ac.rs

²Budapest University of Technology and Economics, Department of Technical Education, Műegyetem rkp. 3, 1111 Budapest, Hungary, molnar.gy@eik.bme.hu, szuts.z@eik.bme.hu

³University of Szeged, Institute of Informatics, Árpád tér 2, 6720 Szeged, Hungary, epeter@inf.u-szeged.hu, korosig@inf.u-szeged.hu

Abstract: This paper aims at presenting the findings and sharing the experiences of a case study whose data were gathered from an experimental MOOC (massive open online course) platform. The content was designed with an end view of favoring media-based education, students' activities, and their interactive communication. The main advantage of the devised system is that students were able to learn using their mother tongue, Hungarian. This research involved 208 students, enabling the authors to test the following variables by applying statistical methods: residence (country), sex, occupation, age, external (offline) motivation, amount of time spent in front of the computer, length of time in the LMS (learning management system) and achievements during a specific course. Statistical analysis revealed correlations between numerous factors, which may later serve as a solid ground for further studies in this field.

Keywords: student achievements; e-learning; external motivation; LMS; MOOC; K-MOOC

1 Introduction and Literature Review

Massive open online courses (MOOCs) are the latest revolution in online teaching and learning [1]. These academic courses are available to the general public, worldwide; there are no preconditions; and they are usually free of charge. [2], [3], [1], [4], [5]

“The field of open and distributed learning has experienced a surge of media coverage and public interest in the last several years, largely focusing on the

phenomenon of massive open online courses (MOOCs). The term MOOC has been used to describe a diverse set of approaches and rationales for offering large-scale online learning experiences. MOOCs have been delivered using both centralized platforms and services including learning management systems (LMSs) and decentralized networks based on aggregations of blog sites and social media feeds. MOOCs have been designed to support university curricula, academic scholarship, community outreach, professional development, and corporate training applications”. [6]

“MOOCs are offered by a variety of development initiatives, such as Coursera, Udemy, MITx, edX, Udacity, which include the world's leading universities: Stanford, Harvard, and MIT. The courses are taught by leading-edge professors around the world, in various fields of science. They allow for flexible learning at any time and any place, integrating a variety of tasks into the course structure. The structure and scope of each course varies, depending on the characteristics and needs of the course curriculum, and the instructor's decision”. [7]

Similar to some popular MOOC systems, the authors created their own MOOC, and placed emphasis on students’ activities and multimedia contents. Although the impact of video and multimedia technologies in educational outcomes is a field of ongoing research, the pedagogical impact of using videos can be summarized by three key concepts. [8]

The following summary chart shows the history of MOOCs. The initiating higher education institutions were: MIT (2009), Stanford (2010) Harvard (2012).

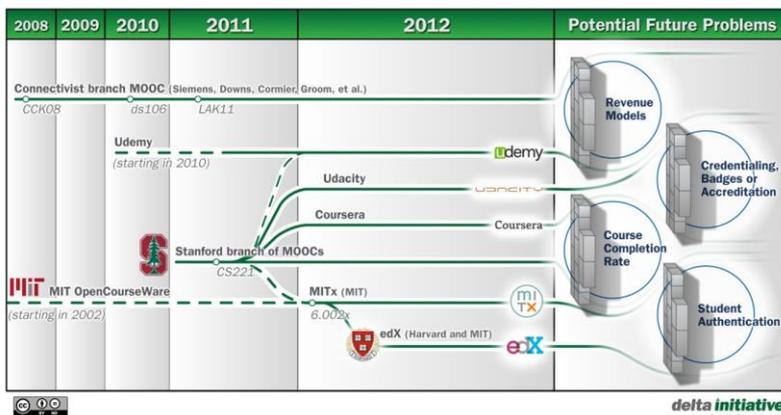


Figure 1

MOOC development between 2008-2012, source: <http://mfeldstein.com/four-barriers-that-moocs-must-overcome-to-become-sustainable-model/> (downloaded: 2013. 03. 10.)

- “Interactivity with the content (the student relates to visual content, whether verbally, by note taking or thinking, or by applying concepts)

- Engagement (the student connects to the visual content, becoming drawn in by video, whether on-demand or real-time)
- Knowledge transfer and memory (the student may remember and retain concepts better than via other instructional media)” [9]

Since video combines many types of data (images, motion, sounds, and text) in a complementary fashion, learning can be adjusted more easily than with other tools to diverse learning styles and the individual learning pace of students. With video, the learner has more control over the information they receive and an additional opportunity for deeper learning by being able to stop, rewind, fast-forward, and replay the content as many times as needed. [9]

The authors kept the following principles in mind when constructing their videos: the main findings are that shorter videos are much more engaging, that informal talking-head videos are more engaging, that Khan-style tablet drawings are more engaging, that even high-quality pre-recorded classroom lectures might not make for engaging online videos, and that students engage differently with lecture and tutorial videos. [10]

“Understanding motivation to learn in online environments is gaining much interest among researchers. For example, Shroff, Vogel, and Coombes [11] found that online learners were more intrinsically motivated than their on-campus counterparts. Online learners' intrinsic motivation is positively related to their learning performance”. [12] Studies on online learning suggest that unmotivated students may fail to use cognitive and meta-cognitive strategies, such as mastery learning or self-monitoring. In the context of MOOCs, because it is an open and free learning environment, participants tend to choose only segments of the learning environment, following their goals and interests. [13], [14] For example, Wang and Baker [14] found that course completers tend to be more interested in the course content, whereas non-completers tend to be more interested in MOOCs as a type of learning experience. In a wider perspective, [13] found that different motivational goals (e.g. relevant to job, career change, meet new friends), may predict different behavioral patterns for MOOC learners. In specific, they found that learners who enrolled with friends were more likely to be engaged with course materials than their counterparts [13]. These results correspond with other studies, showing that MOOC participants who were engaged in significant interactions with peers were less likely to dropout. [15], [16] Research on MOOCs, as described above, examined social engagement via large online groups. [17], [15], [13] Research also examined social engagement via small face-to-face groups, indicating a positive effect on MOOC completion [18]. To date, MOOC research lacks knowledge about the relationships between motivation and learning in small online groups. In addition, given that social engagement is mediated by language, this construct may also play a significant role in MOOC participants' motivation to learn. [12]

All the advantages of e-learning were combined in the educational framework that was used during the study; additionally, it has to be mentioned that it is suitable to launch further courses in the future. [19] However, it is important to emphasize the theoretical and practical aspects of such studies, besides the technical background, which can guarantee a successful and dynamic course, and would make it possible to involve and activate students in a greater number (several hundred) in learning. Such background support includes videos that summarize topics, students' activities, and expert groups surrounding a course [20]. It is possible to create a form of co-operative learning between students to blur the borderline between students and tutors; furthermore, it enables one to create an environment which allows carrying out modern pedagogical methods to eliminate inactivity, to enhance interactivity, student centeredness, collaborative and lifelong learning. On top of that, such an approach to learning opens the door to eliminating geographical obstacles and towards unifying regions for at least the time of a course. One of the main achievements of the course was the fact that students could use their mother tongue during learning. It should also be mentioned that all tutors were located in Serbia belonging to the Hungarian minority.

2 K-MOOC

A Hungarian innovative project was started in 2014 called K-MOOC (Carpathian Basin Online Education Center), where several MOOC courses were offered in Hungarian [27], [28]. One of the sources can be seen on the screenshot.

The screenshot displays the KMOOC website interface. At the top left is the KMOOC logo with the tagline 'Kárpát-medencei online kurzuskatalógus'. The navigation bar includes 'Főoldal', 'Kurzusok', and 'Rólunk'. The user profile 'Dr. Molnár György' is visible in the top right. A search bar is located in the upper right section. The main content area features two course listings under the 'Köznevelés' category. Both courses are titled 'A jazz kultúrtörténete' (The History of Jazz Culture) and are offered by 'Óbudai Egyetem'. The first course is 'A jazz kultúrtörténete I.' and the second is 'A jazz kultúrtörténete II.'. Each course listing includes a brief description: 'A 45 éves múltú BENKÓ DIXIELAND BAND a világon elsőként vállalkozott arra, hogy a modern Amerika születésének és a jazz születésének egybeeső korát, majd azt követően elmúlt századunk történéseit egy sokszínű zenei anyaggal ábrázolja.' and indicates '3 kredit' (3 credits). A sidebar on the left contains filters for 'Kategória' (Társadalomtudomány, Gazdaság, Művészettörténet, Természettudomány) and 'Intézmény' (Apor Vilmos Katolikus Főiskola, Budapesti Műszaki és Gazdaságtudományi Egyetem, Debreceni Egyetem, Eszterházy Károly Tudományegyetem, Gábor Dénes Főiskola, Kaposvári Egyetem, Óbudai Egyetem, Partiumi Keresztény Egyetem, Pécsi Tudományegyetem, Sapientia EMT, Szabadkai Magyar Tanítóképző Kar).

Figure 2

K-MOOC courses, source: own screenshot

As part of the K-MOOC system, our own course entitled Digital Pedagogy was launched a second time. The set-up of the course was in accordance with the e-learning rules as well as the requirements drawn up by the ministerial application, which was designed in the course – module – thematic content – lesson model. The direct aim of this application was to encourage universities who were part of the K-MOOC Network to design and launch online courses, enriching the palette of courses and scientific fields submitted by Óbuda University. Owing to the project, 45 K-MOOC courses were run in the first semester of 2016 and 49 courses in the second semester [27].

The interested students could sign up for the courses on their own on this website: <https://www.kmooc.uni-obuda.hu/>. When choosing a course, the accepted and offered credits and the topic were dominating. The biggest challenge seemed to be the lack of knowing the evaluation time. Most users spent 2 hours with the course on a weekly basis [28]. Completing was satisfactory given the fact that 80-90% of the subscribers passed the course.

Regarding our course, based on the experiences we gathered we can claim that many students chose Digital Pedagogy because of the topic, the innovative methods and out of curiosity or for the sake of trying it out. Therefore, those students had not been motivated for completing the course. After every thematic unit or lesson the students were given questions for self-evaluation, tasks to be uploaded and tests as part of evaluation. The final assessment consisted of an online written examination paper and an essay. The participants lost interest in the latter one but were confident in completing the online tasks and other test-based solutions. This result is in accordance with the set-up for MOOCs [29].

Our course materials were centred around 15-20 screenshots that combined texts, media objects, examples, simulations and practical questions. Those who were continuously attending the class were seemingly active during the term, showing steady loading and activity. The following figure depicts our Digital Pedagogy course page (in Hungarian):



Figure 3

Our Digital pedagogy K-MOOC course, source: own screenshot

Taking everything into consideration, the first-term K-MOOC course was successful. Therefore, we wish to continue our work and launch the course again in the next semester in the hope of acquiring more students' attention.

3 Aims and Methods

In the first phase of the research, authors conducted an examination of the current educational environments and methodological tools. The duration of this MOOC course initiative was five weeks, altogether it consisted of a three week long training, a daily studying session of three-four hours, and activities required for its completion, without any necessary prerequisites. The primary target group of this MOOC was composed of Hungarian secondary school students in Serbia. The online course was conducted between February 8, 2015 and March 1, 2015. MOODLE (LMS - learning management system) was designated to serve as an online educational environment. Each set of topics was constructed using videos, which mediated the most important learning contents. The course was named "Conscious and safe internet usage", and was divided into sub-modules/weeks:

- Introduction to the course (5:58 minutes)
- Week 1 - Digital footprint (25:46 minutes)
- Week 2 - Conscious and safe internet usage (22:57)
- Week 3 - Online bullying(19:50)

The activities were divided into compulsory and optional units that ended with the completion of assignments on a weekly basis. The topics of the assignments were created in accordance with the subscribers' personal preferences, experience and recommendations. Deadlines and the start of a new week were always set to Sunday. The forms of an assignment varied including texts, pictures, and multimedia documents, while each assessment was conducted by the tutor. The point averages, then, were administered and recorded into the system. In line with the compulsory assignments, participants could gain additional points by taking an active part in forum discussions.

The point distribution during the "Conscious and safe internet usage" course was as follows:

- 20 points by the end of the first week
- 20 points by the end of the second week
- 20 points by the end of the third week
- 10 points for involvement in forum discussions
- 20 points for the final assignment

- Student's host institution (elementary school, secondary school – vocational school, secondary school – grammar school, college, university, none)
- Length of time in front of the computer (less than 1 hour, between 1-3 hours, 3-5 hours, more than 5 hours)

Information provided by the MOODLE:

- Time spent in LMS
- Achievement during the course

5 Results

208 students enrolled on this given course, in the following composition: 79% (165) female and 21% (43) male students, as opposed to statistics in the available international literature [21], [22], [23] where male participants composed the significant majority. The age demographics of the participating students was similar to edX [23], given that a major part (59%) of them were under the age of 30.

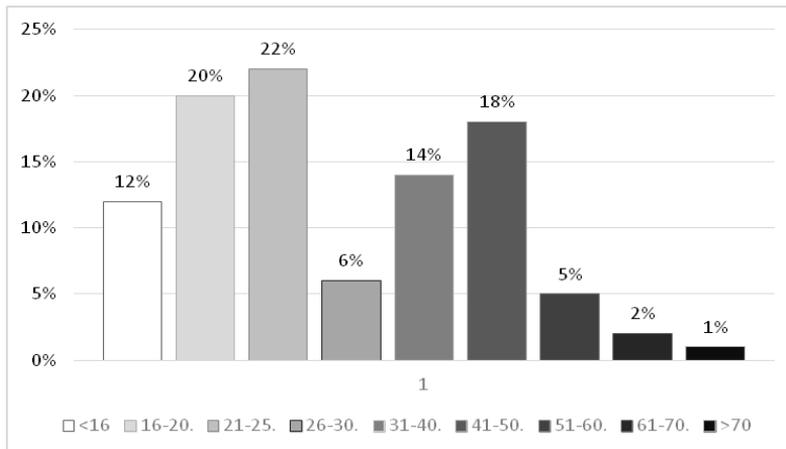


Figure 5
Sample by age group

The online course involved not only Hungarian secondary school students in Serbia, but also a number of educators were involved, who had a chance to indirectly develop study materials. Apart from students in Serbia, students from Hungary could also sign up for to the course, which, in turn, further differentiated the expert community. They answered questions by engaging in an intensive and constructive series of discussions with the aim of untangling possible solutions.

Based on their origins of country of all participants, 135 students (65%) were from Serbia, 71 students (34%) from Hungary, while 2 students (1%) were from Romania. The occupational distribution of the participants showed as follows: 99 (48%) were students, 86 (41%) of them were teachers, whereas 23 – a total of 11% listed themselves as having another profession.

Given that MOOCs are becoming more and more popular worldwide, learners' motivation should be further studied from various aspects. [12], [13], [24] This paper examines the impact of "external motivation". By "external motivation" the authors mean points, obtained on a MOOC platform, which can be added to those acquired in formal education. This method, during our studies, served as a motivational tool for university students at the University of Novi Sad, Faculty of Hungarian Teacher Training –for first and second year students. Compared to the overall number of students (N=208), this group is made up of 44 students, i.e.: 21% of the entire sample. They accounted for 10% of the total number of points gained from the courses Introduction to Informatics and Educational Informatics.

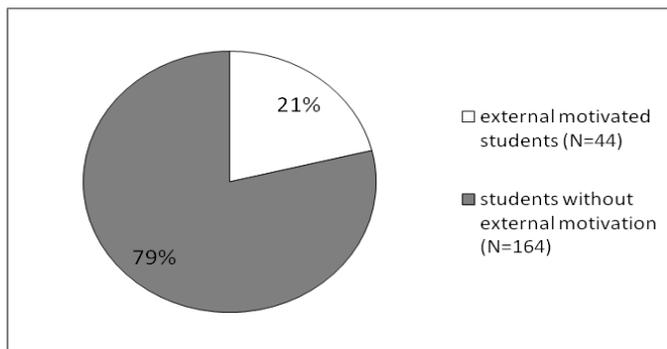


Figure 6
Sample by external motivation

The students, based on their own estimation, provided the amount of time spent in front of the computer during their online application. According to the obtained data from the registered students, 12% (26 students) spent less than one hour in front of the computer, 46% (95 students) one to three hours, 27% (56 students) three to five hours, and 15% (31 students) more than five hours a day.

Based on the authors' experience and compared to other MOOC systems, an average of 540 minutes of active learning was set as necessary to successfully complete the course. The amount of time spent in a MOODLE system was recorded and later it was retrieved for further study. The conclusion was reached that it showed a heterogeneous picture. Students were logged in to the system 235 minutes on average, though the standard deviation of 225 was quite significant.

Table 1
Distribution of the time spent in the system (N=208)

Time spent in the system	n	%
Between 0 and 100 minutes	83	40
Between 100 and 200 minutes	36	17
Between 200 and 300 minutes	14	7
Between 300 and 400 minutes	10	5
Between 400 and 500 minutes	21	10
Between 500 and 600 minutes	30	14
Between 600 and 700 minutes	14	7

104 students (50%) completed the course successfully (by acquiring 75% or more points). This score is usually regarded as low in formal offline courses; however, in the category of non-formal online courses it is thought to be an outstanding result. These results were higher than the results available in the works of other authors, such as 10% [25] and 15% [26].

Those students who performed successfully spent an average of 387 minutes online with a standard deviation of 192. Students who finished the course successfully achieved high scores, on average 93.64, with a standard deviation of 4.60.

Table 2
Distribution of students' achievement (N=208)

	N	%
Successfully completed the course (75% or more points achieved)	104	50%
Completed pre-requisites without passing the course (did not achieve 75%)	2	1%
Tasks and the course were not completed.	31	15%
Registered in the system without earning any points	44	21%
Did not signing into the system	27	13%

During the statistical analysis, the authors did not find any correlation between the variables of sex, external motivation, length of time in front of computer and students achievement.

There are significant differences between the groups formed on the basis of residence and external motivation. While only two students enrolled in the course from Romania, we removed this group from this investigation. Analysing only the students from Serbia and Hungary, using two-sample t-tests we can conclude that there are detectable differences in variables of external motivation and achievement.

Based on the average value of external motivation, for the 100% participants from Hungary showed an impact of this factor, whereas the corresponding figure was only 67% for participants from Serbia. The significant differences were proven using t-test ($t=8,04$ $p=0,001$). Future research will further examine the nature of these differences.

External motivation and the variable of time spent in this framework demonstrated an apparent relationship (Pearson correlation factor=0.38, $p=0.001$). According to these, motivated participants took part more actively in the acquisition of knowledge.

Authors were also able to point out an observable correlation, based on the entire sample, between the amount of time spent in the LMS and student achievements - amount of acquired points (Pearson correlation factor $r= 0.75$, $p= 0.001$).

Table 3
Correlations between time spent in the LMS and student achievement

		Time spent in an educational framework	Student achievements
Time spent in the LMS	Pearson Correlation	1	,750
	Sig. (2-tailed)		,000
	N	208	208
Student achievements	Pearson Correlation	,750	1
	Sig. (2-tailed)	,000	
	N	208	208

In this case of narrowing down the sample (leaving those participants out who, while having enrolled in the course, but never logged in into the learning environment), a statistically outstanding correlation emerges between the external motivation and time spent in LMS (Pearson correlation factor = 0.25, $p= 0.003$).

Table 4
Correlations between external motivation and time spent in LMS

		External motivation	Time spent in the LMS
External motivation	Pearson Correlation	1	,247
	Sig. (2-tailed)		,003
	N	141	141
Time spent in the LMS	Pearson Correlation	,247	1
	Sig. (2-tailed)	,003	
	N	141	141

Through the analysis of the sample that was narrowed down (active students in learning environment), we could demonstrate that the amount of time spent in the LMS and the variable of student achievements show a significant correlation (Pearson correlation factor = 0.46, $p=0.001$).

Table 5
Correlations between student achievements and time spent in the LMS (sample of active students in LMS)

		Time spent in the LMS	Student achievements
Student achievements	Pearson Correlation	1	,465
	Sig. (2-tailed)		,000
	N	141	141
Time spent in the LMS	Pearson Correlation	,465	1
	Sig. (2-tailed)	,000	
	N	141	141

Variables, based on a two-sample t-test, provided the difference for the correlation of sexes and the results achieved by the end of the course. The variables of the place of residence (country), age, and occupation affected the participants' efficiency. There are statistical differences in the achievements between the groups of students, those from Hungary and Serbia, based on the two-sample t-test. The rate of having successfully completed the course shows that 73% for the participants from Serbia as opposed to 58% for participants from Hungary ($t=2,15$ $p=0,03$).

The group of teachers and students were analysed through a two-sample t-test and the results showed a statistically significant difference concerning their achievements ($F=5,9$ $p=0,01$ $t=3,4$ $p=0,001$).

Table 6
Independent Samples Test

		Independent Samples Test			
		F	Sig.	t	Sig. (2-tailed)
Student achievements	Equal variances not assumed	5.903	,016	-3.400	,001

The authors established three groups on the basis of the participants' age. The one-way ANOVA analysis pointed to the fact that there was a significant difference between the students' achievements of the following age groups: 10-19, 20-40, and above 40 amounting to ($F=10.7$, $p=0.001$). The post hoc (Tukey's-b test) analysis established two groups, according to which achievements of younger and elderly groups are different from the middle-age group [elderly, young]<[middle-age].

Table 7
One-way ANOVA

ANOVA					
Student achievements					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39488,776	2	19744.388	10.674	,000

Table 8
Tukey's range test

Tukey B ^{a,b}		
Student achievements		
1	N	Subset for alpha = 0.05
		1
elderly (above 40)	53	35.66
young (aged 10 -19)	47	43.02
middleage (aged 20 -40)	108	66.22

In line with the amount of time spent in front of the computer, we form four groups of the applicants. The one-way ANOVA test also showed that a significant difference indeed existed ($F=6,7$ $p=0,001$) in the groups whose members spent less than one or more than five hours in front of the computer. The authors also analyzed participants who spent one-thre or three-five hours of their time at the PC compared for student achievements during the course. Tukey's b-test demonstrated the following correlation between the groups: [less than one hour, less than five hours]<[one-three hours, three-five hours]. These tests do not prove that students who spent more time at the PC will perform more successfully in MOOCs. For a more detailed explanation of these results, these variables will have to be subjected to a deeper analysis.

Table 9
One-way ANOVA

ANOVA					
Student achievements					
	Sum of Squares	df	Mean Square	F	Sig.
In-between groups	37879.414	3	12626.471	6.764	.000

Table 10
Tukey's range test

Tukey B ^{a,b}		
Student achievements		
Time in front of the computer	N	Subset for alpha = 0.05
		1
less than 1 hour	26	30.77
more than 5 hours	31	32.42
3-5 hours	56	57.27
1-3 hours	95	63.71

Using the two-sample t-test method, the authors investigated the question if there was a difference in external motivation between those participants who succeeded and those who failed. The results obtained from this research indicate that the external motivation of successful participants is significantly higher than those who achieved zero points ($F=185.9$ $p<0.01$; $t=6.09$ $p<0.01$). It may thus be said that those students who were extrinsically motivated (by the fact that points from

the completed courses can be transferred to some school subjects) would persist with a higher probability until the end of the online course.

Table 11
Independent Samples Test

Independent Samples Test					
		F	Sig.	t	Sig. (2-tailed)
External motivation	Equal variances assumed	185.936	,000	4.624	,000
	Equal variances not assumed			6.097	,000

5 Discussion

This experimental study involving 208 students from 3 countries revealed significant statistical correlations with the help of an experimental MOOC system (Conscious and safe internet usage). Authors gained a great amount of experience regarding online learning. Such observations could pave the path to further studies or may serve as a basis for future online learning courses.

Significant results in research related to time spent in LMS:

- It has been concluded that students who spent more time in LMS would be more successful within the framework MOOC.
- The most significant observation is the fact that external motivation showed a correlation not only with the quantity of time spent in the educational framework but also with the performance during the course.
- The amount of time spent in the educational framework is intertwined with the efficiency variable on a MOOC platform.
- Students who spent more time in LMS would be more successful within the framework MOOC.
- Students who had external motivation, spent more time in the LMS than students, who did not have external motivation.
- Those students who spent more time on a MOOC platform, and presumably completed not only the obligatory tasks but also the recommended ones and other activities.
- To sum up, the students who were motivated to not only gain access to online contents and earn online certificates but also by the offline contents, in this case, points earned during "real" (physical) courses, were also the ones who achieved better at learning online and at completing the MOOC courses.

Significant results in research related to achievement during the course:

- External motivation showed a correlation not only with the quantity of time spent in the educational framework but also with the performance during the course.
- Regular computer users have a better chance at completing an online course.
- In addition, they participated in online forums communicating intensively with their peers were significantly more efficient.

The results of the pilot study contributed to the better understanding of an alternative learning environment, where one of the greatest disadvantages is the low achievements of participating students.

6 Limitations

The statistical analysis presented in this study are limited to a special segment of students. The sample size of the study was relatively small. In their future work authors intend to implement longitudinal research in which multiple MOOC cohorts are analyzed under the same statistical model and also among the same qualitative framework.

References

- [1] H. Najafi, C. Rolheiser, S. Håklev, L. Harrison: Variations in Pedagogical Design of Massive Open Online Courses (MOOCs) Across Disciplines. *Teaching Learning Inquiry*, 2017 5(2) pp. 47-64
- [2] F. C. Bonafini, C. Chae, E. Park, K. W. Jablow: How Much Does Student Engagement with Videos and Forums in a MOOC Affect Their Achievement? *Online Learning Journal, Online Learning*, 2017, 21(4) pp. 223-240
- [3] E. Allen, J. Seaman: *Grade Change: Tracking Online Education in the United States*. Babson Survey Research Group and Quahog Research Group, LLC, 2014
- [4] A. Fini: The Technological Dimension of a Massive Open Online Course: The Case of The CCK08 Course Tools. *International Review of Research in Open and Distance Learning*, 2009, 10(5) pp. 74-96
- [5] B. Stewart: Massiveness + openness = New literacies of participation? *MERLOT Journal of Online Learning and Teaching*, 2013, 9(2), pp. 228-238. Retrieved from: http://jolt.merlot.org/vol9no2/stewart_bonnie_0613.htm

- [6] A. Anders: Theories and Applications of Massive Online Open Courses (MOOCs): The Case for Hybrid Design. *International Review of Research in Open and Distance Learning*, 2015, 16(6) pp. 39-61
- [7] S. Halawa, D. Greene, J. Mitchell: Dropout Prediction in MOOCs Using Learner Activity Features. In U. Cress, & C. D. Kloos (Eds.), *Proceeding of the European MOOC stakeholder summit*, Lausanne, Switzerland, February 10-12, 2014, pp. 58-65
- [8] M. Castells: *The Rise of the Network Society. Classics of the Information Society. The Information Age. Economy, Society, Culture. Volume I. Thinking* – Infonia, 2005
- [9] A. D. Greenberg, J. Zanetis: *The Impact of Broadcast and Streaming Video in Education*. Report commissioned by Cisco Systems Inc. to Wainhouse Research, LLC. Ainhouse Research, 2012
- [10] J. P. Guo, J. Kim, R. Rubin: How Video Production Affects Student Engagement: An Empirical Study of MOOC Videos. *Proceedings of the first ACM conference on Learning @ scale conference*, 2014
- [11] R. H. Shroff, D. R. Vogel, J. Coombes: Assessing Individual-Level Factors Supporting Student Intrinsic Motivation in Online Discussions: a Qualitative Study. *Journal of Information Systems Education*, 2008, 19(1), pp. 111-125
- [12] M. Barak, A. Watted: *Nanotechnology for All: Examining Students' Motivation and Learning Outcomes in a Massive Online Open Course*. Chicago, USA: National Association for Research in Science Teaching (NARST) 2016
- [13] R. F. Kizilcec, E. Schneider: Motivation as a Lens to Understand Online Learners: Toward Data-driven Design with the OLEI Scale. *ACM Transactions on Computer-Human Interactions*, 2015, 22(2)
- [14] Y. Wang, R. Baker: Content or Platform: Why do Students Complete MOOCs? *MERLOT Journal of Online Learning and Teaching*, 2015, 11(1) pp. 17-30
- [15] A. Brooker, L. Corrin, P. de Barba, J. Lodge, G. Kennedy: A Tale of Two MOOCs: How Student Motivation and Participation Predict Learning Outcomes in Different MOOCs. *Australasian Journal of Educational Technology*, 2018, 34(1) pp. 73-87
- [16] D. F. O. Onah, J. Sinclair, R. Boyatt: Dropout Rates of Massive Open Online Courses: Behavioral Patterns. In *Proceedings of EDULEARN14*, Barcelona: Spain, 2014, pp. 5825-5834
- [17] C. Alario-Hoyos, M. Perez-Sanagustín, C. Delgado Kloos, G. Parada, , M. Munoz-Organero, A. Rodríguez-de-las-Heras: Analysing the Impact of Built-in and External Social Tools in a MOOC on Educational

- Technologies. In D. Hernandez-Leo, T. Ley, R. Klamma, A. Harrer (Eds.), *Lecture notes in computer science: Vol. 8095, Proceedings 8th European Conference on technology enhanced learning*, 2013, pp. 5-18
- [18] N. Li, V. Himanshu, A. Skevi, G. Zufferey, J. Blom, P.: Dillenbourg: Watching MOOCs Together: Investigating Co-located MOOC Study Groups. *Distance Education*, 2014, 35, pp. 217-233
- [19] G. Siemens: *Connectivism: A Learning Theory for the Digital Age*, 2004 <http://www.elearnspace.org/Articles/connectivism.htm> (Last accessed: 28.03.2016.)
- [20] A. Plessis: Student-Teachers' Pedagogical Beliefs: Learner-centred or Teacher-centred When Using Ict in the Science Classroom?, *Journal of Baltic Science Education*, 2016, 15(2) pp.140-158
- [21] L. B. Breslow, D. E. Pritchard, J. DeBoer, G. S. Stump, A. D. Ho, D. T. Seaton: Studying Learning in the Worldwide Classroom: Research into edX's First MOOC. *Research & Practice in Assessment*, 2013, 8, pp. 13-25
- [22] Coursera Blog: Coursera Hits 1 Million Students across 196 Countries. Coursera. Retrieved from: <http://blog.coursera.org/post/29062736760/coursera-hits-1-million-students-across-196>, 2012
- [23] edX (2015). Age Demographics. edX. http://edx.readthedocs.org/projects/edx-insights/en/latest/enrollment/Demographics_Age.html (Last accessed: December 7, 2015), edX (2015). Gender Demographics. edX, Retrieved from: http://edx.readthedocs.org/projects/edx-insights/en/latest/enrollment/Demographics_Gender.html
- [24] T. Sinha: Together We Stand, Together We Fall, Together We Win: Dynamic Team Formation in Massive Open Online Courses. In *Proceedings of the 5th IEEE International Conference on application of digital information & web technologies (ICADIWT) India*, 2014
- [25] J. Wilkowski, A. Deutsch, M. D. Russell: Student Skill and Goal Achievement in the Mapping with Google MOOC. L@S '14 *Proceedings of the first ACM conference on Learning @ scale conference*. ACM New York, NY, USA, 2014, pp. 3-10
- [26] K. Jordan: MOOC Completion Rates: The Data. 2013. www.ktyjordan.com. Retrieved from: <http://www.katyjordan.com/MOOCproject.html>
- [27] F. Hegyesi, K. Némethy, A. Szakál, J. Gáti, G. Kártyás: Human Interactions in the Context of K-MOOC, Óbuda University Courses - Source of the Document SISY 2016 - IEEE 14th International Symposium on Intelligent Systems and Informatics, Proceedings 7601511, 2016, pp. 271-274

- [28] F. Hegyesi, Gy. Kártyás: MOOC in Higher Education - Source of The Document ICETA 2013 - *11th IEEE International Conference on Emerging eLearning Technologies and Applications*, Proceedings 06674415, 2013, pp. 119-122
- [29] M. György: Pillanatképek az IKT szakképzésben alkalmazható megoldásairól - avagy kételyek és jó gyakorlatok az innovatív pedagógiai módszerek útján - visszatekintés az EDU elmúlt időszakára, *EDU SZAKKÉPZÉS ÉS KÖRNYEZETPEDAGÓGIA ELEKTRONIKUS SZAKFOLYÓIRAT* (ISSN: 2062-3763) 6: (2) pp. 7-18 (2016)