THE DEPENDENCE OF MASSIVE OPEN ONLINE COURSES' ENGAGEMENT RATE ON LEARNERS SUPPORT MODELS

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Abstract

The study is dedicated to evaluate the efficiency of massive open online courses (MOOCs) support models in terms of the influence on the engagement rate. This article contains the results of the research represented by the following parts: a list of widespread modern support tools, a description of support models based on platform and off-platform tools, the results of measurement the efficiency of the models at solving the problem of increasing MOOCs engagement rate. The mixed support model, based on platform and off-platform tools was considered as the most efficient.

Keywords: MOOCs, learners engagement rate, learning support models, online-platform, virtual assistant.

1 INTRODUCTION

Learners apply different educational strategies at massive open online courses depending on the learning objectives and other factors that determine their level of engagement. These strategies come out behaviorally, which is recorded by online platforms as a data on active actions of students within interaction with educational content. In 2014 scientists of Stanford and Cornell Universities A. Anderson, J. Lescovic, D. Huttenlocher and J. Kleinberg proposed classifying student behavior at MOOCs according to the following patterns: “all-rounders”, “viewers”, “solvers”, “collectors” and “bystanders" [1]. These patterns are mentioned in a sequence from the maximum to zero learners engagement rate, based on the data on viewing video lectures and solving tasks by learners.

By using the data mentioned above it is possible to determine not only engagement rate, but also to predict the level of completion. Researchers at Tsinghua University Wenzheng Feng, Jie Tang and Tracy Xiao Liu, in their article «Understanding Dropouts in MOOCs» indicate that the completeness of online courses depends on many factors, including demographic characteristics and learning motives of learners, the subjects of the courses, the pedagogical design of the courses, as well as the organization of learning support. Moreover, they noted that knowing the portrait of the listeners allows us to adjust various learning parameters in such a way that we could positively influence on engagement and completion rates [2].

Since the MOOC completion rate today is quite low (the average completion rate of courses is about 3-5%), the research interest in finding possible mechanisms for increasing it remains stable [3]. Moreover, researchers note the lack of self-organization skills at education for young generation, which approve the need of the current study [4], [5].

As already mentioned, learners support is one of the factors affecting the engagement rate. Due to the fact that online learning exists within the context of constantly developing information and communication technologies, the support also get new features, being implemented through regularly updated existing tools or completely new ones. We have identified a list of widespread modern support tools, defined various support models based on these tools and measured the efficiency of these models at solving the problem of increasing MOOCs engagement rate. The results of the study are presented in this article.

2 METHODOLOGY

At the first stage of the study, the tools used to accompany learners of online courses on such MOOC platforms as Coursera (USA), Lectorium (Russia), Stepik (Russia), National Open Education Platform (Russia), Charles Sturt University platform (Australia), as well as private russian online platforms such

as Skillbox and Netology were analyzed. The data was obtained from open sources by subscribing the open courses on these platforms and fixing the accompanying tools used.

The second step was to identify the perceptions and expectations of learners regarding the support tools in online courses. A survey of the Tomsk State University MOOCs learners was conducted in the period from 23rd September to 7th October 2019. The learners of the following courses took part in the survey: "Russian language as a tool for successful communication" (the course is presented on the platforms: Lectoruim and Coursera in Russian language), "Psychodiagnostics" (the course is presented on Coursera in two variants: in Russian and in English), "Genius. Talent. Golden Mediocrity" (the course is presented on Coursera in English and on Lectoruim in Russian). The general popularity (the total amount of learners on the given courses of the specified platforms from the launch dates till 07th October 2019) is 76 366 people, the number of the surveyed learners are 189 respondents (of them: 152 are learners from Russia, 37 are foreign learners). The confidence probability is 97 %; the confidence interval is 8 %. Questionnaire respondents were asked to answer questions related to the tools used at support in online learning. Relying on the answers, the most demanded tools for MOOC learners support were identified.

At the third stage, 3 models of MOOC learners support were compiled, including platform and off-platform tools, which the students marked as demanded.

The fourth stage was a pedagogical experiment. The purpose was to evaluate the efficiency of the formed support models in terms of the influence on the engagement rate. Participants of the pedagogical experiment: 5342 learners of the TSU MOOCs indicated above (6 MOOCs, included 2 variants of 3 MOOCs), who studied from September to December 2018 and 2019 on the Coursera platform and from September to December 2016 and 2019 on the Russian Lectorium platform. Cluster analysis revealed patterns of listener behavior before using the tested support models (control group) and during the application of such models (experimental group). The results were processed and a comparative analysis was carried out.

Applied research methods are the following: questionnaires, data analysis, descriptive statistics, cluster analysis, visualization, comparative analysis.

3 RESULTS

3.1 Learners support tools

The experience of learners support at educational online platforms was analyzed on the basis of open sources data. As a result of processing the information received, a list of the most common tools was compiled:

- *Forum* - a special site or section on the site, which is serving for communication of learners with each other, a teacher or support team. The most widespread types of forum are built-in to the platform or external.
- *Messenger chat* - a mobile application or web service that involves instant messaging between users. May include the use of chatbot.
- *A group in a social network* – a community, where users are united by common interests, which are the topic of the community.
- *Feedback form* - the web page or service for posting the questionnaire. For example, SurveyMonkey, Typeform, Google forms.
- *Webinar* - a form of organizing the interaction of participants in the educational process using online video communications. For example, webinars run through Zoom, Adobe Connect, or platform-built elements.
- *Mailing* - automated sending of letters by e-mail to a specific group of recipients.

Thus, it was revealed that modern tools to accompany training are third-party services or technical solutions built into the platform that allow the support team to communicate with learners. Some of the services allow to automate communication (chatbots, automatic mailing lists, feedback forms), but in most cases "live" communication with the support team is assumed. In order to identify the most demanded communication tools, a survey was conducted among students of the TSU MOOCs. The

learners had to evaluate the tools that we identified for convenience. The results are presented in the next subsection.

3.2 The perceptions and expectations of learners regarding the support tools

A survey was conducted by using Google Forms questionnaire. The link was spread by mailing to Tomsk State University (TSU) MOOCs learners from the courses, which were mentioned earlier. The respondents were asked about the tools through which they had made various communications, such as receiving instruction on training, getting to know the course team, solving substantive and technical questions, receiving additional information, motivational messages, personal information about progress in training, feedback from the course team, direct communication with the course teacher. Additionally, learners chose preferred tools for each type of communication listed. Respondents were ask to do a multiple choice from the list of various tools, which we indicated in Section 3.1. There was also the opportunity to indicate their own option or to note that this kind of communication was not carried out or is not in demand. Thus, learners connected not all options with any tools. Correspondingly, the lack up to 100% of the answers in each type of communication concern options marked by listeners as unrealized or unclaimed. The results are presented at the following sub-subsections.

3.2.1 Getting instruction for training

66% of respondents replied that the training instruction was received via e-mail, 31% of respondents collected it through the information block on the course page, 13% got it through the webinar built into the platform, 12% found it in the forum. 39% of respondents would like to receive the instructions by e-mail, 21% through the information block on the course page, and 11% through messenger chat.

3.2.2 Acquaintance with a course team

28% of learners are familiar with the online course team via e-mail, 18% become acquainted through the dialogue on a social network. 20% of respondents would like to get acquainted via e-mail, 18% through a group dialogue on social networks, 13% by chat in the messenger, 13% through forum.

3.2.3 Solving substantive issues

31% of respondents usually get responses on the questions related to topics of online courses via e-mail, 29% get it through forums. 30% of respondents would like to solve substantive issues via e-mail, 30% through forums, 14% of respondents via chat in a messenger.

3.2.4 Solving technical issues

36% of respondents usually get responses on the questions related to the technical component of training on the educational online platform via e-mail, 24% get it through forums. 35% of respondents would like to solve technical issues via e-mail, 27% through forums, 16% of respondents via chat in a messenger.

3.2.5 Getting news

76% of respondents received the course news via e-mail and 55% of respondents would like to continue to receive it using this tool. The remaining respondents refrained from choosing tools in this type of communication.

3.2.6 Motivation messages

52% of respondents received messages via e-mail and 49% of respondents would like to continue this communication using this tool. The remaining respondents refrained from choosing tools in this type of communication.

3.2.7 Getting know the learning progress

51% of respondents received personal information about progress in training via e-mail and 53% of respondents would like to receive this information using this tool. The remaining respondents refrained from choosing tools in this type of communication.

3.2.8 *Feedback from the course team*

39% of respondents received feedback via email, 13% got it through the forum. 53% of respondents would like to receive answers to their questions and comments via e-mail, 15% in the messenger and 15% in the course forum.

3.2.9 *Communication with a teacher*

27% of respondents communicated with the course teacher via e-mail, 12% did it through the forum. 40% of respondents would like to communicate with the teacher via e-mail, 23% of respondents via chat in the messenger, and 22% of respondents through the course forum.

Thus, based on the responses of the learners, the leading position in demand is the "mailing" tool, which appears in the answer to each question. The second and the third demanded tools are forum and messenger chat.

Based on the described platform and non-platform tools, we have formed support models for experimental groups studying at TSU MOOCs. The detailed description of the models formation is presented in the next subsection.

3.3 The learners support models

In order to increase the engagement rate we investigated the potential of three support models: 1st - a platform support model, 2d - an off-platform support model, 3d - a mixed support model.

The models were based on the model of electronic moderation by J. Salmon [6], which consists of such steps as "communication before training", "acquaintance", "communication during training", "feedback", "coaching".

The platform support model is based on the use of a tool kit for communication built into the online educational platform. At the communication stage prior to the start of training a pdf-file or screencast with learning instruction is embedded into the structure of the course. Acquaintance, communication, feedback and coaching takes place on the course forum on the online platform.

The off-platform support model contains a set of tools external to the online platform. Such tools include external forums, instant messengers, applications, browser extensions, and other technological solutions. In the framework of the study, the following external services were tested: a virtual assistant "DoUseful", which is an extension to the browser, which reminds the learners in the form of pop-ups about continuing the course (steps: acquaintance, communication); instant messenger "Slack" (stages: acquaintance, communication, feedback); mailing (stages: acquaintance, communication, feedback); feedback forms "Google Forms" (stages: acquaintance, feedback, coaching); webinars in "Adobe Connect" (stage: coaching).

The mixed support model combines a set of platform and off-platform tools. In this model, before the start of training, a virtual assistant "Do useful" was built into the course and applied throughout the course. Acquaintance and communication stages were carried out on the forum and/or in Slack. Feedback was collected by using Google forms. Coaching was implemented through webinars in Adobe Connect and / or through answers in Google forms or on the forum.

3.4 The pedagogical experiment

Within the framework of the pedagogical experiment, the behavioral patterns of TSU MOOCs learners were identified, according to the classification of A. Anderson, J. Lescovic, D. Huttenlocher and J. Kleinberg [1]:

1 «All-rounders» (complete the majority of assignments, watch all video lectures);

2 «Viewers» (watch all video lectures but hardly ever complete assignments);

3 «Solvers» (complete assignment and hardly ever watch videos or don't watch them);

4 «Collectors» (watch some lectures and partially complete assignments, or don't complete them);

5 «Bystanders» (enroll on a course, but do not watch video lectures and do not complete any assignments).

Let us further consider the behavior patterns of students of each course in the context of the tested support model, as well as the results of its application.

3.4.1 MOOC “Genius. Golden. Mediocrity”. The off-platform support model

The course is taught in English and available on Coursera by the link: coursera.org/learn/genius.

Patterns for this course were generated on the data on 885 learners. The following ratio was identified: 73% of collectors, 17% of viewers, 7% of all-rounders and 3% of solvers.

The cluster analysis was carried out using the k-means method. An analysis of the data regarding the performance of tasks is presented in Figure 1. A class of learners who practically do not perform tasks (Cluster 1), who have completed only the first task (Cluster 2), who completed the first few tasks (Cluster 3) and reached the end (or almost to the end) of the course (Cluster 4) is distinguished. An analysis of the data regarding viewing video lectures is presented in Figure 2. A class of listeners who practically do not watch video lectures (Cluster 1), view the first few video lectures (Cluster 2), selectively view video lectures (Cluster 3) and view all or most of the videos (Cluster 4) is distinguished.

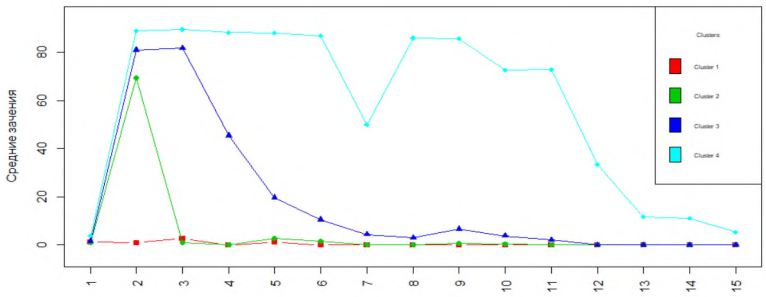

Figure 1. Clusters for completing assignments in the MOOC “Genius. Golden. Mediocrity”

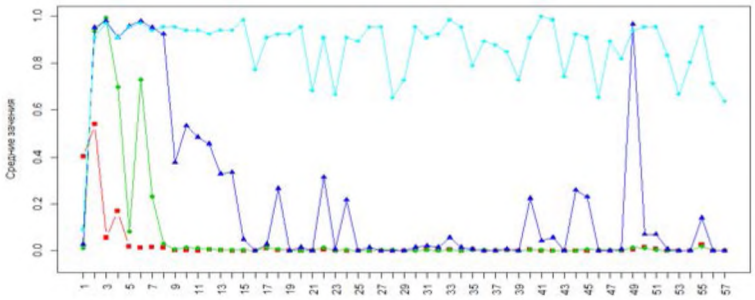

Figure 2. Clusters for viewing video lectures in the MOOC “Genius. Golden. Mediocrity”

During the experiment, a model with off-platform tools was implemented. The used tools are: polls in Google forms, reminders via virtual assistant “Do useful”, mailing. During the experiment there was a need to replace the external communication channel (Slack messenger) with the internal one (forum), since the first one was not used by all the learners. This model influenced the behavior of the solvers, which part in the new cohort increased by 4.5% (in the control group this pattern is 2.3% of learners, in the experimental group it is 6.8%). We noticed that the rate of completing the assignments increased by 2%, while watching video lectures remained at the same level. The performance of students reflected at the completion rate increased by 3% (control group - 1.6%, experimental group - 4.5%).

3.4.2 MOOC “Russian language as a tool for successful communication”. The off-platform support model

The course is taught in Russian and available on Coursera by the link: coursera.org/learn/russian.

Patterns for this course were generated on the data on 574 learners. The following ratio was identified: 80% of collectors, 9% of viewers, 6% of all-rounders and 5% of solvers.

The cluster analysis was carried out using the k-means method. An analysis of the data regarding assignments is presented in Figure 3. The class of learners who performed the first few assignments (Cluster 1), who completed most of the assignments in the course (Cluster 2) and all the assignments in the course, except one (Cluster 3) is distinguished. An analysis of the data regarding viewing video lectures is presented in Figure 4. A class of listeners who practically do not watch video lectures (Cluster 1), view the first few video lectures (Cluster 2), selectively view video lectures (Cluster 3) and view all or most of the videos (Cluster 4) is distinguished.

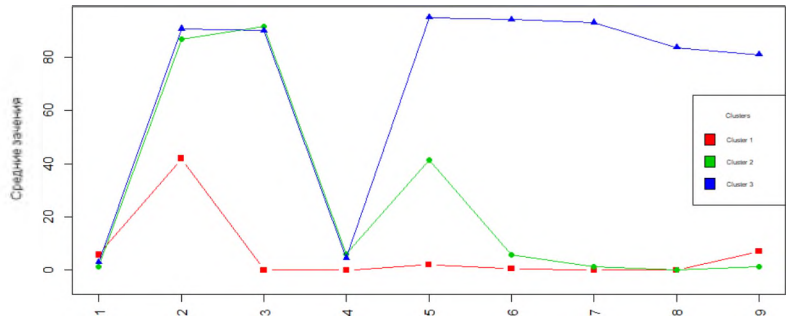

Figure 3. Clusters for completing assignments in the MOOC "Russian language as a tool for successful communication"

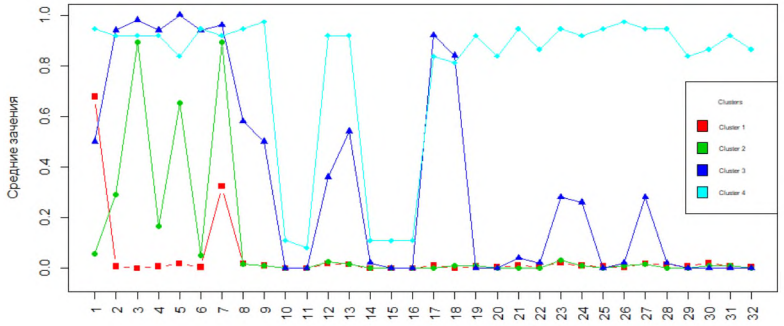

Figure 4. Clusters for viewing video lectures in the MOOC "Russian language as a tool for successful communication"

During the experiment, a model with off-platform tools was implemented. The used tools are: polls in Google forms, Slack messenger, webinar in Adobe Connect Pro During the experiment there was a need to replace the external communication channel (Slack messenger) with the internal one (forum), since not all the learners used the first one. This model did not affect the behavior in the experimental group, the performance of the learners neither.

3.4.3 MOOC "Psychodiagnostics". The mixed support model

The course is taught in Russian and available on Coursera by the link: coursera.org/learn/psykhodyahnostyka.

Patterns for this course were generated on the data on 448 learners. The following ratio was identified: 90% of collectors, 6% of viewers, 3% of all-rounders and 1% of solvers.

The cluster analysis was carried out using the k-means method. An analysis of the data regarding the performance of tasks is presented in Figure 5. A class of students who practically do not perform tasks (Cluster 1) and who complete all tasks (Cluster 2) is distinguished. An analysis of the data regarding viewing video lectures is presented in Figure 6. A class of listeners who practically do not watch video lectures (Cluster 1), selectively view video lectures (Cluster 2) and watch all or most of the videos (Cluster 3) is highlighted.

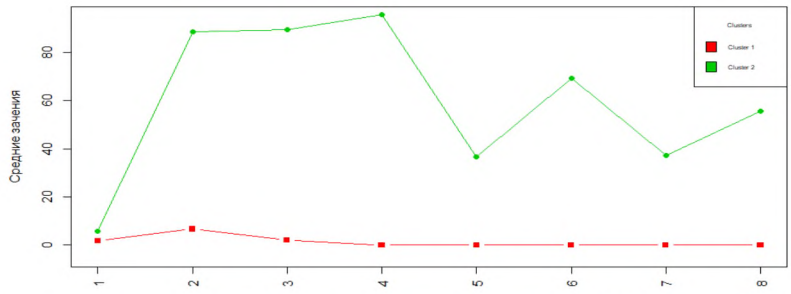

Figure 5. Clusters for completing assignments in the MOOC "Psychodiagnostics"

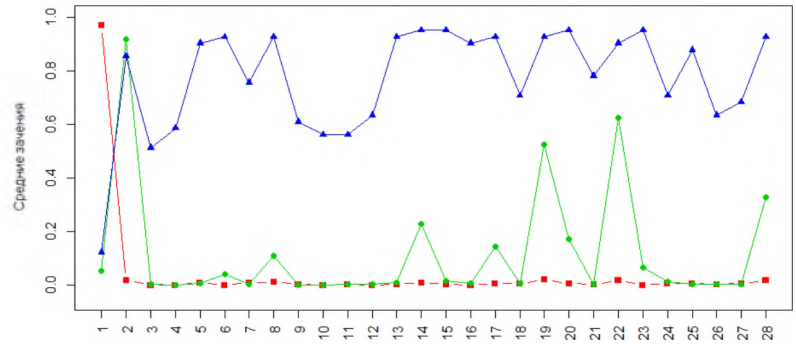

Figure 6. Clusters for viewing video lectures in the MOOC "Psychodiagnostics"

During the experiment, a model with mixed tools was implemented. The used tools are: instruction on the platform, built into the course structure, Google forms, Slack messenger, mailing, forum. This model influenced the behavior of the solvers, which part in the new cohort increased by 3.46% (0.24% in the control group and 3.70% in the experimental group). We noticed that the rate of completing the assignments increased by 2% and watching video lectures by 1%. The performance of students reflected at the completion rate increased by 0,4%.

3.4.4 MOOC "Psychodiagnostics and Psychological Assessment". The mixed support model

The course is taught in English and available on Coursera by the link: coursera.org/learn/psychodiagnostics.

Patterns for this course were generated on the data on 748 learners. The following ratio was identified: 74% of collectors, 19% of solvers, 6% of all-rounders and 1% of viewers.

The cluster analysis was carried out using the k-means method. An analysis of the data regarding the execution of tasks is presented in Figure 7. A class of students who did not complete the tasks (Cluster 1), who completed part of the tasks (Cluster 2) and all tasks (Cluster 3) is highlighted. An analysis of the data regarding viewing video lectures is presented in Figure 8. A class of listeners who practically do not watch video lectures (Cluster 1), selectively view some of the video lectures (Cluster 2) and view all or most of the videos (Cluster 3) is distinguished.

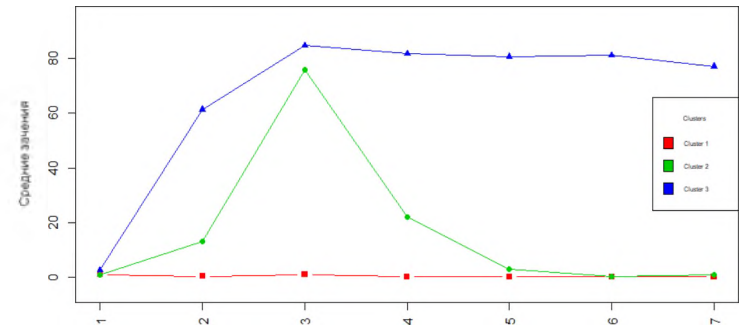

Figure 7. Clusters for completing assignments in the MOOC "Psychodiagnostics and Psychological Assessment

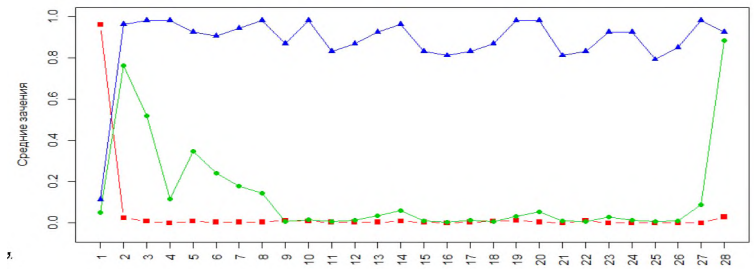

Figure 8. Clusters for viewing video lectures in the MOOC "Psychodiagnostics and Psychological Assessment"

During the experiment, a model with mixed tools was implemented. The used tools are: polls in Google forms, virtual assistant "Do useful", mailing, forum. This model influenced the behavior of viewers and solvers. 7.58% more solvers and 0.19% more viewers appeared in the new cohort. We noticed that the rate of completing the assignments and watching video lectures increased by 2%, but this model did not affect the performance of students in the experimental group.

3.4.5 MOOC "Genius. Golden. Mediocrity". The platform support model

The course is taught in Russian and available on Lektorium by the link: lektorium.tv/genius

Patterns for this course were generated on the data on 1341 learners. The following ratio was identified: 56% of collectors, 23% of viewers, 19% of all-rounders and 2% of solvers.

The cluster analysis was carried out using the k-means method. An analysis of the data regarding assignments is presented in Figure 9. A class of students who did not complete assignments (Cluster 1), who completed only the first assignment (Cluster 2), part of assignments (Cluster 3), and all assignments (Cluster 4) is highlighted. An analysis of the data regarding viewing video lectures is presented in Figure 10. A class of listeners who practically do not watch video lectures (Cluster 1), view half of video lectures (Cluster 2) and view all videos (Cluster 3) is distinguished.

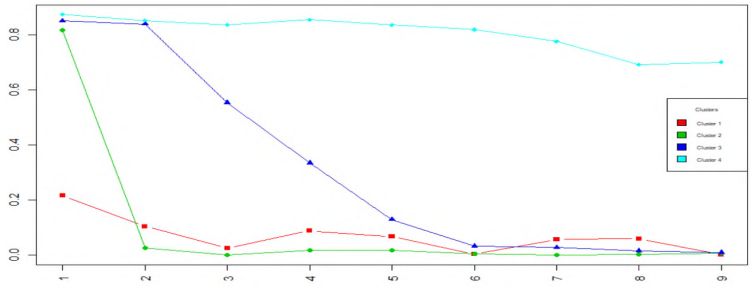

Figure 9. Clusters for completing assignments in the MOOC "Genius. Golden. Mediocrity"

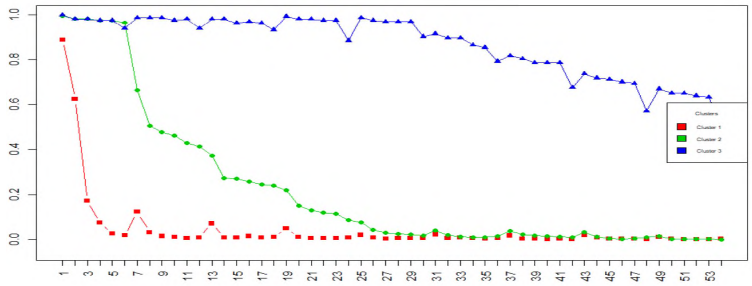

Figure 10. Clusters for viewing video lectures in the MOOC "Genius. Golden. Mediocrity"

During the experiment, a model with platform tools was implemented. The used tools are: instruction on learning on the platform, surveys on the main page of the online course, forum. This model did not affect the behavior in the experimental group, the performance of the learners neither.

3.4.6 MOOC "Russian language as a tool for successful communication". The platform support model

The course is taught in Russian and available on Lektorium by the link: lektorium.tv/russian

Patterns for this course were generated on the data on 1346 learners. The following ratio was identified: 45% of collectors, 15% of viewers, 34% of all-rounders and 6% of solvers.

The cluster analysis was carried out using the k-means method. An analysis of the data regarding the execution of tasks is presented in Figure 11. The class of students who performed only the first task (Cluster 1), who completed part of the tasks (Cluster 2), and all tasks (Cluster 3) is distinguished. An analysis of the data regarding viewing video lectures is presented in Figure 12. A class of listeners who view the first tasks (Cluster 1), view more than half of the video lectures (Cluster 2) and view all the videos (Cluster 3) is distinguished.

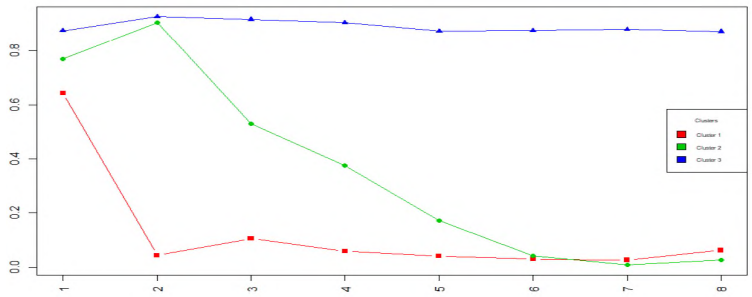

Figure 11. Clusters for completing assignments in the MOOC "Russian language as a tool for successful communication

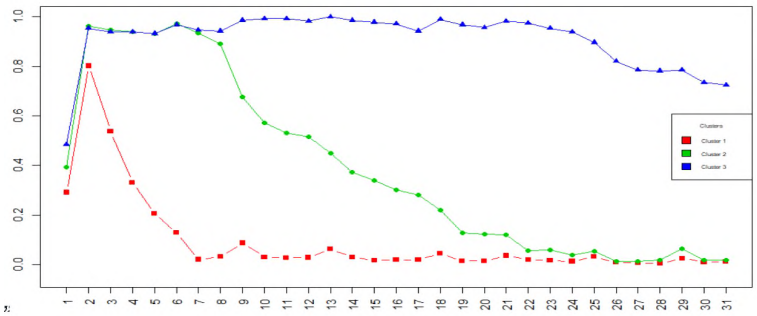

Figure 12. Clusters for viewing video lectures in the MOOC "Russian language as a tool for successful communication"

During the experiment, a model with platform tools was implemented. The used tools are: instruction on learning on the platform, surveys on the main page of the online course, forum. This model did not affect the behavior in the experimental group, the performance of the learners neither.

4 CONCLUSIONS

Testing the three support models shows that maximum efficiency is achieved with a mixed support model, which can be varied, depending on the used internal and external tools.

An experiment conducted at six MOOCs showed that using external support tools increases the involvement of students, which is reflected in the number of students who completed more than 10% of the tasks and / or completed the course. The increase was more than 2%.

However, during the experiment, students were unable to abandon the built-in support tools on the platforms and switch completely to external tools. The forum, which is criticized by many listeners and developers of MOOCs as an out-of-date and inconvenient communication tool, turned out to be the most demanded in terms of speed and ease of use. This situation is likely due to the high activity of TSU specialists who accompanied the training on the forum.

The result of the study is the conclusion that it is impossible to use exclusively external MOOC support tools, but it is necessary to build support on a mixed basis, combining support resources of both the online platform itself and ecosystem agents that can be integrated into online platforms.

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