

Adult Learners' Responses to Online Learning: A Qualitative Analysis Grounded in Self-determination Theory

Nailya R. Salikhova^{1*}, Martin F. Lynch^{1,2,3}, Albina B. Salikhova⁴

¹ Institute of Psychology and Education, Kazan (Volga region) Federal University, 420008, Kremlevskaya 18, Kazan, RUSSIA

² Warner School of Education and Human Development, University of Rochester, Rochester, 305 Schlegel Hall, New York, USA

³ International Laboratory of Positive Psychology of Personality and Motivation, National Research University Higher School of Economics, 101000, Myasnitskaya 20, Moscow, RUSSIA

⁴ Department of Pedagogy and Medical Psychology, I.M. Sechenov First Moscow State Medical University (Sechenov University), 119435, Bol'shaya Pirogovskaya 2, Moscow, RUSSIA

Received 11 April 2021 ▪ Accepted 2 June 2021

Abstract

At a time when educators in many countries are adopting digital technology in their classrooms, whether by choice or mandate, the question of what the experience of online learning is like for students remains open and of vital interest. In the present study, adult learners (N = 37) in Russia were asked to write an essay about their experience of an online course they had taken as part of their graduate studies. Responses were examined by means of thematic analysis. From the conceptual framework of self-determination theory, responses were categorized with respect to psychological needs for autonomy, competence, and relatedness. Adult learners reported their online courses provided the greatest opportunities to satisfy the need for autonomy, with ample support for competence as well; however, they struggled in their online courses to find satisfaction for the relatedness need. The present study identified those elements of online courses that correspond with and facilitate the satisfaction of each of the three basic psychological needs.

Keywords: basic psychological needs, internal motivation, digital education, qualitative methods, online learning, self-determination theory

INTRODUCTION

Worldwide, educational systems are rapidly mastering digital technology. This technology includes a wide variety of tools that can increase the accessibility of education, expand its audience, and qualitatively develop teaching methods. Included are mobile technologies, massive open online courses (MOOC), synchronous and asynchronous online courses, hybrid online and off-line training, hybrid virtual classes for connecting local and remote students, and much more (Karatas, & Arpaci, 2021; Meda & ElSayary, 2021; Meet, & Kala, 2021; Min & Nasir, 2020; Mushtonina, Alexandrova, & Levchuk, 2021; Salame & Hanna, 2020; Suleri & Suleri, 2019). Interest in how people interact and develop in these complex and diverse spaces is steadily growing, as recorded in one of the first systematic reviews of MOOC research during the

(Liyaganawardena, Adams, & Williams, 2013). New questions continue to arise.

Among these, first, is the question of the effectiveness of digital education. Some problems that may interfere with quality learning have been noted. In this regard, the most frequently mentioned and pressing issue of online courses is the high dropout rate (Chen & Jang, 2010). Other important issues are related to the adoption and application of the educational information system (Kennedy, 2014) and the level of self-regulation required in order effectively to engage in online learning (Bayanova et al., 2020; Buhr, Daniels, & Goegan, 2019; de Barba, Kennedy, & Ainley, 2016; Irtuganova, 2018; Karkina, Mena Marcos, & Valeeva, 2021; Minakhmetova et al., 2017; Razumovskaya et al., 2019; Rubio et al., 2020; Tugun et al., 2020). Taken together, these issues suggest the importance of learners' motivation in the adoption and continuing usage of digital technologies for educational purposes.

Contribution to the literature

- Analysis of studies of educational technologies based on SDT showed that the majority are based on a quantitative, positivist approach, whereas our study is based on qualitative methods in the study of digital education.
- Our results show specific technological elements of online courses that support the needs for autonomy, competence and relatedness. Knowledge of their role can be used in designing online courses to improve their effectiveness.
- To differentiate and expand SDT's ideas about internal motivation, employed are concepts from the cultural-historical theory of L.S. Vygotsky on external tools for maintaining internal motivation.

With respect to the new realities of digital education, a number of new theories are emerging, some of which attempt to address motivational issues. Some of these perspectives in part parallel key aspects of self-determination theory (Ryan & Deci, 2017), perhaps the leading, empirically based theory of motivation in the world today. For example, within the approach known as connectivism (e.g., Tschofen & Mackness, 2012) can be found learning principles based on autonomy and relatedness, two concepts central to SDT's understanding of motivation. In addition, the role of intrinsic motivation in course completion has been emphasized (Barak, Watted, & Haick, 2016). The utility of these constructs has led to the active use of self-determination theory (SDT) in the study of digital education.

Basic Principles of SDT and its Application in Education

For many years, SDT has been applied in the context of traditional education. Numerous studies have demonstrated that both intrinsic motivation and autonomous types of extrinsic motivation contribute to engagement and optimal learning in different educational contexts (Niemic & Ryan, 2009). When there are opportunities to satisfy basic psychological needs for competence, relatedness, and autonomy in the classroom (Ryan & Deci, 2017), it promotes more internal forms of motivation as well as integration. This in turn stimulates deep cognitive processing of the material being studied, promotes retention of knowledge, and reduces avoidance strategies, all of which lead to an increase in academic achievement (Betoret & Artiga, 2011). Against this backdrop, it is no coincidence that SDT has become widely used in problem solving and research on digital education.

The Use of SDT in Digital Education

As suggested, perhaps the two most pressing issues of online courses are related, first, to the effectiveness of digital education, and secondly, to the problem of high dropout rates. It is known that the network approach, or digital learning, involves providing significant opportunities to exercise autonomy on the part of students, which requires of them a higher level of self-

regulation; for this reason, the role in course completion of internal motivation, which reflects the student's level of autonomy, is typically emphasized (Barak, Watted, & Haick, 2016). But internal motivation often benefits from supports from the environment in order to continue in an activity and bring it to completion. Thus, turning to SDT, which provides a framework for understanding both internal motivation and environmental supports in the form of basic psychological needs, seems a natural choice in the effort to resolve these issues. Indeed, an analysis of digital education research from the perspective of SDT over the past 15 years shows, on the one hand, the significant contribution of SDT to the development of learning through digital technologies, and on the other, the development of the theory itself in this context (Salikhova, Lynch, & Salikhova, 2020). Here we summarize several lines of research and key findings relative to online learning.

Predicting motivation and intention to continue digital learning. It has been shown that satisfaction of the three basic psychological needs for competence, relatedness, and autonomy has a significant positive effect on intrinsic motivation, increasing the psychological involvement of students in a MOOC (Sun et al., 2019).

Predicting academic success of students. Intrinsic motivation predicts higher grades, as an indicator of achievement, a higher interest of students in the content of the course, and a higher assessment of the importance of the acquired knowledge by them (Jeno, Grytnes, & Vandvik, 2017).

Digital education: Instructors' needs and motivation. It is also important to take into account the needs and motivation of teachers. For example, teachers who experience satisfaction of their basic psychological needs, and who report intrinsic motivation for their teaching, are more likely to endorse intentions to continue to use a virtual learning environment, or VLE (Hew & Cheung, 2014) and e-learning in working with students (Sørebø et al., 2009).

Designing and creating courses based on SDT-derived ideas. An SDT-based design framework has proven useful in developing MOOCs to enhance internal motivation, engagement, and course completion (Karkina et al., 2020; Martin, Kelly, & Terry, 2018). Based on SDT, on-line courses in engineering and digital

design (Danowitz, 2016) and emergency medicine (De Araujo Guerra Grangeia et al., 2016) have been developed. SDT has been used for the gamification of instruction (Ahn, Johnsen, & Ball, 2019), and also for the design of courses and instructional strategies regardless of the discipline taught (Bachman & Stewart, 2011).

In studies of digital education, SDT ideas have been successfully combined with other theories and concepts, including concepts of identity and proximity (Faye & Sharpe, 2008), cognitive assessments and emotions in MOOC (Buhr, Daniels, & Goegan, 2019), parameters of social interaction (Fang et al., 2019), Unified Theory of Technology Acceptance and Use (Pedrotti & Nistor, 2016), perceived ICT competency and institutional innovation orientation (Cincinnati, Zhu, & De Wever, 2015), theory of planned behavior (TPB) (Zhou, 2016), affective events theory (Ke & Zhang, 2010), among others. The above studies show that the satisfaction of basic psychological needs mediates the relationship of many of those key constructs with academic motivation, satisfaction with learning and its success.

Overall, our analysis of the literature found that preference has mainly been given to a quantitative, positivistic approach, as well as to studies of traditional, face-to-face education (e.g., Veletsianos & Shepherdson, 2016). Research using qualitative methods is rare. Among the latter, we identified studies that used a semi-structured individual interview for the analysis of motivation based on SDT (Escobar Fandiño, Muñoz, & Silva Velandia, 2019), interviews of 12 adults about their motivation to study in a MOOC, perceptions of success and learning disabilities (Loizzo et al., 2017), as well as a qualitative analysis of student blog project grades (Kramer & Kusrurkar, 2017).

Thus far, similar studies, drawing on the conceptual framework of SDT and based on qualitative methods, have not been conducted in Russia, where online learning has only recently begun to develop actively, gaining impetus in response to the global COVID-19 pandemic.

The advantages of qualitative methods are known (Braun & Clarke, 2006; Freebody, 2003). Compared to quantitative methods, they make it possible to reflect the reality of a phenomenon more comprehensively and to create a more holistic image of the phenomenon under study. The flexibility of the data analysis procedures makes it easier for the researcher to adapt to the material and tasks of the study, and most importantly, to be sensitive to the experience of respondents, to study phenomena in their relationships and patterns in the form in which they are represented to the person. In this way, they make it possible to hear the "voice" of a person outside and beyond theoretical concepts (Boukhanov et al., 2019; Khairullina, Tuchkova, & Krylatyh, 2021; Levina et al., 2019; Orekhovskaya et al., 2019). Using qualitative analysis is especially important when

investigating a new phenomenon, and, in the present case, is expected to help to identify those components that should be paid attention to in digital education technologies (Salikhova, Lynch, & Salikhova, 2020). The effectiveness of qualitative methods within the framework of SDT has also been demonstrated (Lynch, Salikhova, & Eremeeva, 2020).

The goal of the present study is to identify the components in digital education technologies that are necessary to meet learners' basic psychological needs and to support their internal motivation for learning through the online format, by analyzing descriptions by students of their educational experience in online courses.

METHODS

Data Collection Method

We invited students who had experience of online education to write an essay and describe this experience in those aspects that they recalled and which they wished to describe. The main criterion for choosing an online course for description was having completed the course. If a student had completed several such courses, we asked them to choose the one they considered to be the best, regardless of the content of the course. Essays were written in the classroom during class time. Although time was not limited, all essays were written within one hour. Students themselves chose to write an essay on this topic; alternative tasks were offered, if they preferred. Thus, all participants were volunteers. The study received prior IRB approval of the first author's institution.

We did not pose or ask any questions that would direct or shape students toward specific content. On the contrary, we considered it valuable to analyze the content of students' spontaneous memories of learning in online courses.

Description of Participants

The participants were 37 students of Kazan Federal University (Kazan, Russia), of which 9 studied in the 2nd year of a master's degree program (2 men, 7 women; average age: 32 years), and 28 studied in the 2nd year of their undergraduate program in Psychology (4 men, 24 women; average age: 19.5 years).

All participants had experience in on-line learning. They were not familiar with SDT. Material was collected in December, 2019, before the forced transition of education to the on-line mode in response to the COVID-19 pandemic in the Spring of 2020.

Description of Online Courses

The programs of the online courses that the students described in their essays were of different directions and durations: courses in biology, mathematics and Russian

language, in preparation for the Unified State Exam (which is taken by all high school graduates in Russia; described by 15 of 28 undergraduate students in the present study); psychology survey courses (described by 8 of 37 students in the present study); other professional activities courses (described by 6 of 37 students in the present study); hobby training (described by 4 of 37 students in the present study); self-development (described by 4 of 37 students in the present study).

There are advantages in having such a variety of courses represented: If impressions converge with respect to different online courses, then there may be basis to consider these aspects universal or at least broadly applicable. Such data provide a broader picture than if they were obtained with respect to one specific online course.

Data Analytic Strategy

In analyzing the essays, we used the thematic analysis method (Braun & Clarke, 2006). Here, the main question for analysis is: What themes will our respondents touch upon when they talk about their experience in online learning?

Initially, the analysis logic was built in an inductive, bottom-up way from the data (for example, respondents rated aspects of their experience as positive or negative, therefore we also subordinated the analysis to this contrast). Then we used a deductive, top-down analysis logic, which allowed us to consider the data from the standpoint of self-determination theory and the concept, drawn from that theory, of the three basic psychological needs.

Specifically, data analysis was carried out following the logic of the six-phase thematic analysis algorithm proposed by Brown and Clark (2006), and included the following steps:

1. Each researcher read and re-read every essay, familiarizing themselves with the content and writing down initial ideas.
2. Each researcher independently conducted primary coding of data (following the logic of content analysis) and defined initial themes.
3. Search by themes: Each researcher independently combined codes into potential themes and collected all the statements related to each potential theme.
4. Viewing and checking themes: Researchers discussed together the themes obtained by each of them. As a result of the discussion, some of the initial themes were rethought, some were enlarged or redesignated, some were excluded due to the inability to reach consensus between researchers. Then each theme was correlated with the three basic needs as conceptualized within self-determination theory (SDT). As a result, existing themes were subsumed within broader

themes reflecting support for one or another of the basic psychological needs. Here we note that one of the co-authors of the present paper completed his doctoral studies under the mentorship of SDT's founders, R.M. Ryan and E.L. Deci (2017). Some themes remained as additional themes outside this framework of basic needs. In accordance with the participants' assessment of the effects of the various aspects of online courses on the learning process, themes were classified as positive (contributing to the satisfaction of needs) or negative (preventing it).

5. Definition and naming of themes: This step involved the generation of clear definitions and names for each theme, as a result of ongoing refinement of the details of each theme and the history of discussion among all authors.
6. Preparation of a text describing the results: The researchers, in discussion, chose vivid, convincing examples, conducted a final analysis of extracts from the texts, while returning to the main research question and sources, and, by way of conclusion, created a scientific text about the analysis.

As a result of this process, we obtained a multi-level system of themes that were relevant for our students in the context of the online learning experience.

The analysis was carried out at a latent, interpretative level, i.e., we did not limit ourselves to a simple description of the data obtained, but tried to understand their meaning in the light of self-determination theory.

When analyzing the essays, it became clear that one of the students did not participate in online training of their own free will; rather, for this person participation was forced. Since this circumstance significantly distinguished him from all other students who themselves had decided to study and chose the course themselves, his data were excluded from the analysis. From the point of view of self-determination theory, this difference in initial motivation is very significant and sets from the outset a different quality of participation in training.

Then, a frequency analysis of the occurrence of identified themes was carried out. The unit of the thematic frequency analysis was the individual essay. That is, the researchers independently encoded each essay as containing or not containing each of the themes. Ambiguously coded essays were discussed. Consensus was reached on coding each essay for each theme. The frequency with which each theme was mentioned by the respondents was calculated. Further discussion and analysis included only those themes that were mentioned by at least two participants.

Table 1. Theme: Need for autonomy

Themes		Number of respondents (%)		
Positive	Resource management	1. Convenient time	15 (41%)	
		2. Economizing on resources (time, money)	12 (32%)	
		3. Freeing up one's schedule for other things	9 (24%)	
		4. Convenient location	8 (22%)	
		5. Technical capabilities	5 (14%)	
		6. The ability to take into account one's own physical and mental resources	3 (8%)	
	Life Context Management	7. Ability to distribute time between themes yourself	13 (35%)	28 (76%)
		8. Individualized pace of learning	11 (30%)	32 (86%)
		9. Support for motivation and self-organization through external mediation tools	12 (32%)	15 (41%)
	Motivation	10. Interface, design, pictures for internal motivation	5 (14%)	22 (59%)
		11. Motivating through the provision of a rationale	3 (8%)	13 (35%)
		12. Interest	9 (24%)	13 (35%)
		13. Goal setting	5 (14%)	13 (35%)
		14. Structure as an orientational basis for learning	21 (57%)	37 (100%)
		15. Increase in authorship	2 (5%)	
Negative	16. Lack of self-organization and self-discipline	19 (51%)		
	17. Technical malfunctions	7 (19%)	24 (65%)	
	18. Lack of interest, motivation	3 (8%)		

RESULTS

Themes related to basic psychological needs, and the number of respondents who mentioned each of them, are shown in the tables. Themes in the tables are arranged in order of frequency of their mention by respondents, from highest to lowest frequency. Additional themes are presented in a separate table. The columns on the right indicate the number and percentage of people who mentioned this theme in their essays.

Need for Autonomy

Most frequently occurring in the essay were themes that we classified under the broader theme of supporting the need for autonomy (Table 1). More specific themes are grouped into larger categories.

The most common theme was "Resource Management" (86%), having to do with things like place, time, money, etc.

Here are a few examples from the essays:

M.K. "I can take a lesson at any time that's convenient for me"

V.K. "The opportunity to study the subject in a comfortable environment, at home, without being stuck at school"

D.L. "I independently decided how much time I should devote to study the material,"

M. K. "It was possible to increase the playback speed of the recording and watch faster"

The second most frequently mentioned theme was motivation, broadly speaking (59%). For example:

T.A. "I was mindful of the money ... it did not let me get away with anything and beat off all laziness"

P.V. "The interface is important; if it looks beautiful and is in reality convenient, it increases desire to go there and to work"

S.S. "They started to motivate me directly with what in the end I will gain"

And the third most often noted was the theme, "Structure as an orientational basis for learning" (57%). For example:

K.D. "I liked this consistency, clarity, rigor and at the same time ease and calm. Everything was gradual and structured"

K.A. "I want to know the plan, the structure... It is very nice when ... the material is systematized"

Negative aspects were mentioned less frequently (65%) compared with positive ones, and there was less variety among such themes. Among them, with the highest frequency, was the theme, "Lack of self-organization and self-discipline" (51%).

For example:

J.N. "... self-discipline; to learn remotely you need to correctly allocate your time and not spend it on unnecessary things; I have some difficulties with this"

P.V. "At home it is sometimes very difficult to force yourself to study"

P.L. "One of the main problems here is the frequent lack of time, as well as the ability to self-organize, self-discipline"

K.A. "Very, very great willpower, interest / need (necessity) is needed. ... there are no means of external control of attention"

Need for Competence

The next most frequently occurring themes are those related to meeting the need for competence (Table 2).

Table 2. Theme: Need for competence

Themes		Number of respondents (%)		
Positive	1. A variety of ways to provide and organize material	11 (30%)	26 (70%)	
	2. Examples from life	7 (19%)		
	3. Mnemonics	6 (16%)		
	4. Brief summary of essential material	5 (14%)		
	5. High quality of the material (relevance, contemporariness, etc.)	4 (11%)		
	6. The ability to keep the material for yourself	4 (11%)		
	7. Detailed explanations	4 (11%)		
	8. Organization of activities for the assimilation of material	4 (11%)		
	9. Feedback on the quality of development of the material (assessment, editing)	13 (35%)		23 (62%)
	10. The ability to ask questions	17 (46%)		
	11. Goal attainment	7 (19%)		19 (51%)
12. The inability to ask questions	16 (43%)			
13. Lack of feedback	7 (19%)			
14. Lack of Practice	7 (19%)			
15. Poor quality of material	3 (8%)			
Negative	16. No opportunity to develop one's professional thought process	3 (8%)	22 (59%)	
	17. The possibility to engage in guessing g	2 (5%)		
	18. Video length	9 (24%)		
	19. Temporal organization of the course	3 (8%)		
Temporal organization	20. Online courses for preliminary / overview acquaintance with the content	7 (19%)	10 (27%)	
	21. Online courses for in-depth development of content (for Advanced Content?)	3 (8%)		
Functions of online courses: place and role in education			9 (24%)	

Most often, students' essays included the theme, "Educational resources and technologies" (70%). For example:

P.V. "A lot of information was given in simple drawings and diagrams that were drawn and painted during the video ... together with you during the training"

M.K. "They drew smart cards, schemes for better memorization. Sometimes scripts, a skeleton of the abstract, which was filled out and filled in at a webinar, were attached to the lessons ..."

V.C. "It is important that information be presented in different forms: text format, video, audio"

The second most frequent theme was, "Two-way communication about content" (62%), which included the sub-themes, "Feedback on the quality of development of the material (assessment, editing)" and "The ability to ask questions". For example:

K.K. "To the comment of the correct answer was added an explanation of the possibly selected incorrect answer and an explanation of why it cannot be used here. Thanks to this feature, it was possible to clarify subtle nuances",

H.E. "...feedback ... shortcomings of the work done were indicated, recommendations were given"

S.R. "The trainer went live 3 times a week ... communication, answered all questions ... it is convenient that there was feedback"

The theme "Difficulties in two-way communication about content" was most often mentioned among the negative characteristics (51%). For example:

M.K. "There were questions, but they could not be satisfied right away. And this incompleteness left a negative imprint"

K.G. "There was not enough feedback, some control over my work, whether I did it right or not"

Y.A. "There were no comments, explanations for incorrectly completed tasks"

A number of themes that were neutral in sign were identified: "Temporal organization" and "Functions of online courses: place and role in education". They were often discussed as essential aspects of an online course. For example:

V.C. "Can provide a good base, but deepen ... it is preferable in live contact with the teacher and in interaction with other students"

K. A. "It should be short-term!"

K.N. "The main components of a good online course should be the optimal course length"

Need for Relatedness

Compared to the other two needs, the need for relatedness was mentioned somewhat less frequently; still, nearly 2/3 of the participants mentioned it in their texts (see Table 3).

Notably, and in contrast to the needs for autonomy and competence, for the relatedness need negative assessments were prioritized, in terms of their frequency of occurrence in the student-generated essays. The most frequently occurring was the broad theme, "Quality of

Table 3. Need for relatedness

Themes		Number of respondents (%)	
Negative	Quality of contact with the teacher	1. Absence of live contact with the teacher	21 (57%)
		2. Absence of individualization of teaching	2 (5%)
		3. Absence of inclusion in the group	14 (38%)
		4. Absence of student life	4 (11%)
Positive	Group inclusion	5. Group communication and support	9 (24%)
		6. Exchange and comparison of results to support motivation (sharing and comparison of results)	5 (14%)
	7. Meta-relatedness	7 (19%)	12 (32%)
	Quality of contact with the teacher	8. Live contact with the teacher	3 (8%)
		9. Individualization of teaching	2 (5%)
			4 (11%)
			18 (49%)

Table 4. Additional themes

Themes		Number of respondents (%)	
Positive	1. Positive emotional states	8 (22%)	14 (38%)
	2. Self development	6 (16%)	
	3. Positive feedback about the teacher	4 (11%)	
	4. Ability for people with disabilities to receive education	3 (8%)	
Negative	5. Negative emotional states	7 (19%)	9 (24%)
	6. Negative feedback about the teacher	3 (8%)	

contact with the teacher” (57%), including its sub-theme, “Absence of live contact with the teacher”.

For example:

D.L. “... [absent was] the opportunity to communicate with the teacher”

Then followed the theme, “Absence of inclusion in the group” (38%). For example:

K.G. “The concept of “student life” in all its manifestations disappears”

S.L. “The feeling of emptiness, lack of interaction affects the interest in learning, the feeling of some “loneliness”, lack of emotions”

N.D. “This form of training excludes all opportunities for the development of sociability, teamwork skills”

K.A. “Socialization - the conditions of deprivation, there is no communication between peers”

The theme “Group inclusion” was also noted as a positive point (32%), including a feeling of connection and support (24%), and also sharing and comparing the results as a form of support for one’s motivation (14%). For example:

D.K. “Contact with people is important ... I communicate, communicate at the institute”

I.A. “I really needed the support of the group”

B.M. “The people who were mainly engaged in those who really needed it were engaged, and communication with them helped the learning”

Almost a fifth of the participants included mention of a theme we have here called, “Meta-relatedness” (19%), which reflects a sense of belonging to the broad, large-scale contexts of human existence, that is, a sense of connection with humanity, civilization, the era in which one lives, etc. For example:

I.M. “I understood and realized that this is the future”

N.K. “We live in the 21st century, and I believe that modern problems require modern solutions, so I advise everyone to save their time and money”

Additional Themes

Not all themes could be categorized under the rubric of basic needs, following the deductive, top-down logic of our analysis. Accordingly, the remaining themes that emerged from the inductive line of analysis (“bottom up”) we organized separately, given that they also represented important aspects of our participants’ experience of online courses (Table 4).

Many participants wrote about their emotional states, both positive (22%) and negative (19%). Some mentioned both the positive and negative characteristics of the teacher. Almost a sixth of the participants wrote about self-development (16%), some about the possibility of education for people with disabilities, the possibility to receive traditional education despite issues of health.

DISCUSSION

The present study utilized a qualitative approach, guided by thematic analysis, in order to identify themes in the descriptions of online learning experiences produced by adult learners. Using self-determination theory (SDT) as a theoretical lens from which to view these descriptions, a number of themes were identified, the central of which pertained to what in SDT are referred to as the basic psychological needs for autonomy, competence, and relatedness. It is important to note that because of the nature of data collection (free description by participants, in their own words) and the subsequent qualitative nature of data analysis, in the

present study we obtained a more detailed picture of the various aspects of these themes than might have been possible by quantitative means (Braun & Clarke, 2006; Lynch, Salikhova, & Eremeeva, 2020).

Need for Autonomy

Among the most frequently occurring sub-themes in participants' essays was what we have called resource management. It seems clear that an important advantage of online learning is the ability to manage, firstly, the broad contexts of one's life, and to be able to integrate education into it. A second important advantage is the management of time itself and of the learning process within the framework of the educational process and content. These advantages of online courses have already been partially described (Grytnes & Vandvik, 2017; Starcic et al., 2017; Vanslambrouck et al., 2016; Yang, Zhou, & Cheng, 2019), and seem clearly to pertain to what SDT refers to as the need for autonomy, which represented the most frequently occurring of the basic need themes in the present study.

The second most frequently occurring sub-theme was that of motivation. It can be noted that those aspects of online courses that helped a person from the outside to maintain motivation for their studies came to the fore here. Specifically, these were external organizational support and other means of supporting one's motivation. Moreover, among the negative aspects of online courses, the theme "Lack of self-organization and self-discipline" (by more than 50% of respondents), both of which pertain to motivation, was noted. Examination of this clearly shows the ambivalence of attitudes towards online courses precisely in the context of the need for autonomy; this is both a huge opportunity and a real challenge to human autonomy.

The theme, "Structure as an orientational basis for learning" was also often mentioned (57%). In off-line programs, students are always provided discipline-based programs of study, and they can familiarize themselves with them. Apparently, in offline learning, students have less need to familiarize themselves with them, at least in Russia. In online learning, students have to be more independent, so there is a need to build their own "map" of everything that remains to be mastered. In our opinion, this also reflects a more autonomous mode of educational activity of students in online education.

Need for Competence

It is worth noting the wide variety of different aspects of online learning which were marked as positive (95%) or negative (59%). Positive assessments outweighed the negative in a wide variety of different aspects of online learning, with respect to the need for competence. At the same time, some themes were often mentioned both in a positive and negative way, for example, the theme,

"Two-way meaningful communication". Some students were pleased with the opportunities for two-way communication in their online learning, while others were not. Perhaps the ambivalence of this theme is connected with the fact that students described a variety of online courses, which may have differed from each other in important ways, or perhaps there were important individual differences between the students themselves, unaccounted for in the present study; but students' ambivalence in this regard further emphasizes the importance of satisfying the need for competence.

Need for Relatedness

The most problematic need for online education was mentioned by about 2/3 of the participants. This need was assessed as very important in Russia (Lynch & Salikhova, 2016). Unlike the other needs, for relatedness the most frequent assessments were negative. Difficulties in contact with the teacher (57%), primarily the lack of live contact with the teacher, were noted. Second in terms of frequency was the negative theme, "Absence of inclusion in a group" (38%). Importantly, some students noted this same theme, inclusion in the group, as positive. This suggests that the online format as such may not be an obstacle to meeting the need for relatedness, at least not for everyone, but rather that some creators of online courses manage to build their course in such a way that it makes it possible to feel included in a group (32%), which gives a feeling of connection and support (24%) and the possibility of sharing and comparing results in order to support motivation (14%).

Among the new themes for SDT, the theme which we have called "Meta-relatedness" (19%), which has not yet been included in the semantic field of the need for relatedness within canonical SDT, should be noted. In free descriptions by the participants of online learning, this theme manifested itself in the form of experiencing their involvement in and communication with connections beyond the immediate environment or community: humanity in the modern world, humanity in the future, civilization, the era in which one lives. Similar ideas can be found in the writings of several Russian psychologists (Slobodchikov, 1994). This seems worth exploring further in future research: whether the need for relatedness can be met with respect to one's membership in such meta-groupings of humanity.

At the Junction of Theoretical Traditions

The material obtained in the present study, together with the data analytic strategy we employed, allow us to suggest a dialogue between representatives of different theoretical traditions in psychology and education, namely self-determination theory (SDT; Ryan & Deci, 2017) and the cultural-historical theory of Vygotsky (1984). From the point of view of SDT, bonuses, fines,

payments, time limits and other external limitations typically involve the perception of pressure or coercion from the outside, and therefore typically tend to promote external motivation rather than motivation that is internal or more autonomous. However, the participants in our study spoke positively about these components of online courses. In their essays, students perceived them not as pressures, but as supports for their own internal motivation (recall that students themselves chose to take these online courses), personal responsibility, and organization. From our perspective, this positive assessment of external structures brings to mind theoretical ideas derived from the cultural-historical approach. From a cultural-historical perspective, people use the external tools of culture to transform their natural mental functions, in order to master their own behavior. Indeed, a person sometimes creates external tools for organizing oneself, mastering oneself from the outside, especially in complex matters and processes. Because of various life circumstances, one's own available energy (i.e., intrinsic motivation) is not always enough for a person to act and to organize oneself for this action. In such cases, what are called motives-stimuli in Leontiev's (1977) activity theory can be of assistance.

Education, indeed, is often a complex, time-consuming process. And a person's own decision to obtain an education has deep meaning for the person; often, it is initially internally motivated, but there are many other, sometimes competing areas of activity in life. Therefore, in order to see this activity through to its completion, a person may need support for their motivation and self-organization through external supports and tools. In the words of Leontiev (1977), in complex, time-consuming or lengthy matters, besides motives-meanings, a person often needs motives-stimuli that he can create for himself or by tools of external support.

Thus, bonuses, fines, payments, time limits and other external frameworks, in terms of their meaning for a person, do not necessarily reflect pressure or coercion. From the experience shared by our participants, these elements of on-line courses provided the support for the student's own internally motivated actions, such that they helped to increase the acting force of the student's own motivation, motivation which was, as it seems, initially intrinsic.

And this means that the direction of the action is set from the inside, by internal motivation, and external stimuli, supports, tools, etc. help a person, perhaps providing additional energy and support to self-organization for action. At the same time, the direction of action specified from the inside does not change. Reflecting these sensibilities, we identified in the student essays a theme which we labelled, "External mediation tools for internal motivation," drawing from the theoretical frameworks of Vygotsky (1984) and Leontiev, noted above. Of course, within SDT there is a role for

external supports in terms of the structure provided within a specific context to frame and guide the completion of a specific task (see, e.g., Ryan & Deci, 2017), but we believe there is an important nuance to be gleaned from the perspectives of Vygotsky (1984) and Leontiev (1977) (Leontiev, 2016).

Again, we note that it was the use of qualitative methods that allowed the authors to be more flexible in theoretical discussions and that allowed different traditions to hear each other, meeting and finding agreement through the material provided by participants, themselves. We listened to the voice of a person who did not fit into any pre-existing theoretical constructions, we heard that person and with our theory-based ideas we followed after.

LIMITATIONS

There were important limitations of the present study. Among them was the fact that the adult learners were drawn from just one geographical region (the Republic of Tatarstan), in just one country (Russia). It would be informative to conduct similar research in other regions of Russia, and in other countries, although we point out that a strength of qualitative methods is precisely the depth or richness of understanding of a phenomenon of interest, rather than its breadth or generalizability.

Another limitation is that we did not account for the specific technology or device being used by participants. It is possible, of course, that a learner's response to online learning is greatly affected by the quality or size of the screen on the device they are using, the quality of the sound, the reliability and speed of the internet connection, their device's processing power, and so on. Future studies should track and assess the impact of these differences in the technological tools being used by learners, and how learners' motivation might be affected accordingly.

CONCLUSIONS

Based on the results obtained, the following conclusions can be drawn:

1. Meeting basic psychological needs during online learning was an important component of students' assessment of course effectiveness and satisfaction.
2. The most relevant and differentiated in the students' perception of online learning was the need for autonomy. Positive assessments of the opportunities of online courses prevailed over negative ones: online training provided considerable opportunities to satisfy this need. At the same time, there were challenges to the autonomy of a person, to the person's ability to be an autonomous subject.

The key themes of autonomy in online education were life management, motivation, and independence, each of which was evaluated positively by students.

3. The theme of the need for competence was often mentioned by students and was very differentiated in students' statements. Positive assessments of the possibilities of online courses to satisfy this need prevailed over negative ones. The key sub-themes of the need for competence in online education were two-way content communication, and educational resources and technologies. Each of these was evaluated both positively and negatively in the descriptions of specific online courses.

4. A prevalence of negative over positive ratings was found in the need for relatedness. Key themes regarding the need for relatedness in online education were the quality of contact with the teacher and inclusion in the group. Each of these could be, and were, evaluated both positively and negatively in the descriptions of specific online courses.

Currently, Russia is seeking to introduce distance education through the creation of online courses, which is further spurred by the COVID-19 pandemic and consequent quarantine. When creating online courses, many practical issues have to be addressed. The data obtained can be considered as a picture of the main important aspects of digital educational resources for the design of new programs. As can be seen, on the basis of qualitative research (Lynch, Salikhova, & Eremeeva, 2020), it is possible to develop theories and push the boundaries and horizons of the reality that the theory covers, and also to find a context for agreement in the dialogue between theories.

Author contributions: All authors have sufficiently contributed to the study, and agreed with the results and conclusions.

Funding: This paper has been supported by the Kazan Federal University Strategic Academic Leadership Program.

Declaration of interest: No conflict of interest is declared by authors.

REFERENCES

- Ahn, S. J., Johnsen, K., & Ball, C. (2019). Points-based reward systems in gamification impact children's physical activity strategies and psychological needs. *Health Education and Behavior, 46*(3), 417-425. <https://doi.org/10.1177/1090198118818241>
- Bachman, C. M., & Stewart, C. (2011). Self-Determination Theory and Web-Enhanced Course Template Development. *Teaching of Psychology, 38*(3), 180-188. <https://doi.org/10.1177/0098628311411798>
- Barak, M., Watted, A., & Haick, H. (2016). Motivation to learn in massive open online courses: Examining aspects of language and social engagement. *Computers and Education, 94*, 49-60. <https://doi.org/10.1016/j.compedu.2015.11.010>
- Bayanova, A. R., Sivova, I. V., Kamasheva, Y. L., Popova, O. V., Semyanov, E. V., Shagieva, R. V., & Yusupov, I. M. (2020). Student online services consumption: Routine practices or mistrust to digital service? *Contemporary Educational Technology, 11*(1), 47-54.
- Betoret, F. D., & Artiga, A. G. (2011). The relationship among student basic need satisfaction, approaches to learning, reporting of avoidance strategies and achievement. *Electronic Journal of Research in Educational Psychology, 9*(2), 463-496. <http://www.investigacion-psicopedagogica.org/revista/new/english/ContadorArticulo.php?597>
- Boukhanov, G. V., Vrublevskiy, A. S., Kosolapova, N. V., & Martynova, E. V. (2019). Project activity as a technology implementation of the competence-based approach in modern educational process. *Vestnik NCBŽD, 1*(39), 26-32.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. <http://doi.org/10.1191/1478088706qp0630a>
- Buhr, E. E., Daniels, L. M., & Goegan, L. D. (2019). Cognitive appraisals mediate relationships between two basic psychological needs and emotions in a massive open online course. *Computers in Human Behavior, 96*, 85-94. <https://doi.org/10.1016/j.chb.2019.02.009>
- Chen, K.-C., & Jang, S.-J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behavior, 26*, 741-752. <https://doi.org/10.1016/j.chb.2010.01.011>
- Cincinnati, S. Zhu, C., & De Wever, B. (2015). Teacher and institutional characteristics affecting teaching practices in OBL: A self-determination approach. *Proceedings of the European Conference on e-Learning, ECEL, 790-793*. <http://www.iwt-alo.be/wp-content/uploads/2015/11/Teacher-and-Institutional-Characteristics-Affecting-Teaching.pdf>
- Danowitz, A. (2016). Leveraging the final project to improve student motivation in introductory digital design courses. *Proceedings - 46th Annual Frontiers in Education Conference, FIE 2016, Bayfront Convention CenterErie*. <https://doi.org/10.1109/FIE.2016.7757380>
- De Araujo Guerra Grangeia, T., De Jorge, B., Franci, D., Santos, T. M., Setubal, M. S. V., Schweller, M., & De Carvalho-Filho, M. A. (2016). Cognitive load and self-determination theories applied to e-learning: Impact on students' participation and academic performance. *PLoS ONE, 11*(3), e0152462. <https://doi.org/10.1371/journal.pone.0152462>
- De Barba, P. G., Kennedy, G. E., & Ainley, M. D. (2016). The role of students' motivation and participation in predicting performance in a MOOC. *Journal of*

- Computer Assisted Learning*, 32(3), 218-231. <https://doi.org/10.1111/jcal.12130>
- Escobar Fandiño, F. G., Muñoz, L. D., & Silva Velandia, A. J. (2019). Motivation and e-learning English as a foreign language: A qualitative study. *Heliyon*, 5(9), e02394. <https://doi.org/10.1016/j.heliyon.2019.e02394>
- Fang, J., Tang, L., Yang, J., & Peng, M. (2019). Social interaction in MOOCs: The mediating effects of immersive experience and psychological needs satisfaction. *Telematics and Informatics*, 39, 75-91. <https://doi.org/10.1016/j.tele.2019.01.006>
- Faye, C., & Sharpe, D. (2008). Academic motivation in university: The role of basic psychological needs and identity formation. *Canadian Journal of Behavioural Science*, 40(4), 189-199. <https://doi.org/10.1037/a0012858>
- Freebody, P. (2003). *Qualitative research in education: Interaction and practice*. Sage Publications. https://books.google.ru/books?hl=ru&lr=&id=HBvNB938euEC&oi=fnd&pg=PA1&ots=dctjyv1idq&sig=dL05NxufQpt8hJkIEz4tWhKp_0&redir_esc=y#v=onepage&q&f=false
- Hew, K. F., & Cheung, W. S. (2014). Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges. *Educational Research Review*, 12, 45-58. <https://doi.org/10.1016/j.edurev.2014.05.001>
- Irtuganova, E.A. (2018). Problems of psychological safety of the educational environment for students with health limitations. *Vestnik NCBŽD*, 1(35), 36-41.
- Jeno, L. M., Grytnes, J.-A., & Vandvik, V. (2017). The effect of a mobile-application tool on biology students' motivation and achievement in species identification: A Self-Determination Theory perspective. *Computers and Education*, 107, 1-12. <https://doi.org/10.1016/j.compedu.2016.12.011>
- Karatas, K., & Arpacı, I. (2021). The Role of Self-directed Learning, Metacognition, and 21st Century Skills Predicting the Readiness for Online Learning. *Contemporary Educational Technology*, 13(3), ep300. <https://doi.org/10.30935/cedtech/10786>
- Karkina, S. V., Mena Marcos, J. J., & Valeeva, R. A. (2021). Improvement of art creative skills by the means of signature pedagogy in online musical education. *Communications in Computer and Information Science*, 1344, 86-99.
- Karkina, S.V., Mena, J., & Valeeva, R.A. (2020). Design of online course based on SPOC as a signature pedagogy in music teacher education. *ACM International Conference Proceeding Series*, 3436576, 870-876.
- Ke, W., & Zhang, P. (2010). The effects of extrinsic motivations and satisfaction in open source software development. *Journal of the Association for Information Systems*, 11(12), 784-808. <https://doi.org/10.17705/1jais.00251>
- Kennedy, J. (2014). Characteristics of massive open online courses (MOOCs): A research review, 2009-2012. *Journal of Interactive Online Learning*, 13(1), 1-16. <http://www.ncolr.org/issues/jiol/v13/n1/1.html>
- Khairullina, L. I., Tuchkova, O. A., & Krylatyh, I. S. (2021). Occupational risk assessment: recommendation or obligation to the employer. *Vestnik NTSBGD*, 2(48), 149-158.
- Kramer, I. M., & Kusrkar, R. A. (2017). Science-writing in the blogosphere as a tool to promote autonomous motivation in education. *Internet and Higher Education*, 35, 48-62. <https://doi.org/10.1016/j.iheduc.2017.08.001>
- Leontiev, A. N. (1977). *Deyatelnost. Soznaniye. Lichnost. Politizdat*. http://www.psychmsu.ru/library_files/Deyatelnost_soznanie_lichnost_Leontev.pdf
- Leontiev, D. A. (2016). Potrebnosti. motivy i emotsii. Ponimaniye motiva v trudakh A. N. Leontyeva i S. L. Rubinshteyna. *Vestnik Moskovskogo universiteta. Seriya 14. Psikhologiya*, 2. <https://doi.org/10.11621/vsp.2016.02.03>
- Levina, I. D., Ukolova, L. I., Lavrentyeva, E. Y., Akhilogova, M. T., Zharikov, Y. S., Popova, O. V., Semyanov, E. V., Malanov, I. A., Muskhanova, I. V., Magomeddibirova, Z. A., & Bazaeva, F. U., Isaeva M. A. (2019). Nursing home conditions for elderly people and its peculiarities of their adaptation. *EurAsian Journal of BioSciences*, 13(2), 1549-1555.
- Liyaganunawardena, T. R., Adams, A. A., & Williams, S. A. (2013). MOOCs: A systematic study of the published literature 2008-2012. *International Review of Research in Open and Distance Learning*, 14(3), 202-227. <https://doi.org/10.19173/irrodl.v14i3.1455>
- Loizzo, J., Ertmer, P. A., Watson, W. R., & Watson, S. L. (2017). Adult MOOC learners as self-directed: Perceptions of motivation, success, and completion. *Online Learning Journal*, 21(2). <https://doi.org/10.24059/olj.v21i2.889>
- Lynch M. F., Salikhova N. R., & Eremeeva A. V. (2020). Basic needs in other cultures: Using qualitative methods to study key issues in self-determination theory research. *Psychology, Journal of the Higher School of Economics*, 17(1), 134-144. <https://doi.org/10.17323/1813-8918-2020-1-134-144>
- Lynch, M. F., & Salikhova, N. R. (2016). Teachers' conceptions about the child's developmental needs: A structural analysis. *Mathematics Education*, 11, 1471-1479.

- Martin, N. I., Kelly, N., & Terry, P. C. (2018). A framework for self-determination in massive open online courses: Design for autonomy, competence, and relatedness. *Australasian Journal of Educational Technology*, 34(2), 35-55. <https://doi.org/10.14742/ajet.3722>
- Meda, L., & ElSayary, A. (2021). Establishing social, cognitive and teacher presences during emergency remote teaching: Reflections of certified online instructors in the United Arab Emirates. *Contemporary Educational Technology*, 13(4), ep318. <https://doi.org/10.30935/cedtech/11073>
- Meet, R. K., & Kala, D. (2021). Trends and future prospects in MOOC researches: A systematic literature review 2013–2020. *Contemporary Educational Technology*, 13(3), ep312. <https://doi.org/10.30935/cedtech/10986>
- Min, H., & Nasir, M. K. M. (2020). Self-regulated learning in a massive open online course: A review of literature. *European Journal of Interactive Multimedia and Education*, 1(2), e02007. <https://doi.org/10.30935/ejimed/8403>
- Minakhmetova, A. Z., Skutelnik, O. A., Fedorchuk, Y. M., Shulga, T. I., Pavlushin, A. A., & Shagiev, B. V. (2017). Motivational and valuable orientation of teachers as a condition to form students' tolerant behavior. *Man in India*, 97(3), 323-332.
- Mushtonina, E. A., Alexandrova, A. V., & Levchuk, A. A. (2021). Ensuring labor safety based on the formation of corporate informal leadership program. *Vestnik NTSBGD*, 1(47), 141-150.
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education*, 7(2), 133-144. <https://doi.org/10.1177/1477878509104318>
- Orekhovskaya, N. A., Chistyakov, A. A., Kryukova, N. I., Krokina, J. A., Ospennikov, Y. V., & Makarova, E. V. (2019). Orthodoxy and modernity their contact facets in Russian society. *European Journal of Science and Theology*, 15(2), 67-77.
- Pedrotti, M., & Nistor, N. (2016). User motivation and technology acceptance in online learning environments. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. 11th European Conference on Technology Enhanced Learning, EC-TEL 2016 (pp. 472-477). Lyon. https://doi.org/10.1007/978-3-319-45153-4_45
- Razumovskaya, M. I., Larionova, A. A., Zaitseva, N. A., Petrina, O. A., Vinogradova, M. V., Nagay, N. G., & Takhumova, O. V. (2019). Models of Integrated Interactions Organization in the Field of Environmental Education. *Journal of Environmental Treatment Techniques*, 7(4), 576-580.
- Rubio, G. L., Leskova, A., Prokopyev, A. I., Miroshkin, D. V., & Kamneva, E. V. (2020). Despair or the loss of selfhood in Kierkegaard's sickness unto death. *XLinguae*, 13(3), 63-77. <https://doi.org/10.18355/XL.2020.13.03.07>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications. <https://www.guilford.com/books/Self-Determination-Theory/Ryan-Deci/9781462538966>
- Salame, I. I., & Hanna, E. (2020). Studying the impact of online homework on the perceptions, attitudes, study habits, and learning experiences of chemistry students. *Interdisciplinary Journal of Environmental and Science Education*, 16(4), e2221. <https://doi.org/10.29333/ijese/8543>
- Salikhova N. R., Lynch M. F., & Salikhova A. B. (2020). Psychological aspects of digital learning: A self-determination theory perspective. *Contemporary Educational Technology*, 12(2), ep280. <https://doi.org/10.30935/cedtech/8584>
- Slobodchikov, V. I. (1994). *Development of subjective reality in ontogenesis* (Doctoral dissertation). Moscow.
- Sørebo, Ø., Halvari, H., Gulli, V. F., & Kristiansen, R. (2009). The role of self-determination theory in explaining teachers' motivation to continue to use e-learning technology. *Computers and Education*, 53(4), 1177-1187. <https://doi.org/10.1016/j.compedu.2009.06.001>
- Starcic, A. I., Huang, P.-S., Valeeva, R. A., Latypova, L. A., & Huang, Y.-M. (2017). Digital storytelling and mobile learning: Potentials for internationalization of higher education curriculum. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 10676 LNCS, 400-406.
- Suleri, J. I., & Suleri, A. J. (2019). Comparing virtual learning, classical classroom learning and blended learning. *European Journal of Sustainable Development Research*, 3(1), em0072. <https://doi.org/10.20897/ejosdr/3970>
- Sun, Y., Ni, L., Zhao, Y., Shen, X.-L., & Wang, N. (2019). Understanding students' engagement in MOOCs: An integration of self-determination theory and theory of relationship quality. *British Journal of Educational Technology*, 50(6), 3156-3174. <https://doi.org/10.1111/bjet.12724>
- Tschofen, C., & Mackness, J. (2012). Connectivism and dimensions of individual experience. *International Review of Research in Open and Distance Learning*, 13(1), 124-143. <https://doi.org/10.19173/irrodl.v13i1.1143>

- Tugun, V., Bayanova, A. R., Erdyneeva, K. G., Mashkin N. A., Sakhpova, Z. M., & Zasova, L. V. (2020). The opinions of technology supported education of university students. *International Journal of Emerging Technologies in Learning*, 15(23), 4-14. <https://doi.org/10.3991/ijet.v15i23.18779>
- Vanslambrouck, S., Zhu, C., Tondeur, J., Phillippen, B., & Lombaerts, K. (2016). Adult learners' motivation to participate and perception of online and blended environments. Proceedings of the European Conference on e-Learning, 14th European Conference on e-Learning, ECEL 2015 (pp. 750-757). University of Hertfordshire Hatfield.
- Veletsianos, G., & Shepherdson, P. (2016). A systematic analysis and synthesis of the empirical MOOC literature published in 2013-2015. *International Review of Research in Open and Distance Learning*, 17(2), 198-221. <https://doi.org/10.19173/irrodl.v17i2.2448>
- Vygotsky, L. S. (1984). *Collected works*. Pedagogika.
- Yang, S., Zhou, S., & Cheng, X. (2019). Why do college students continue to use mobile learning? Learning involvement and self-determination theory. *British Journal of Educational Technology*, 50(2), 626-637. <https://doi.org/10.1111/bjet.12634>
- Zhou, M. (2016). Chinese university students' acceptance of MOOCs: A self-determination perspective. *Computers and Education*, 92-93, 194-203. <https://doi.org/10.1016/j.compedu.2015.10.012>

<http://www.ejmste.com>