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A PSYCHOLOGICAL RESEARCH OF STUDENTS' ACADEMIC MOTIVATION IN COLLABORATIVE LEARNING IN VIRTUAL REALITY

Abstract

The scientific article is devoted to the research of the influence of virtual reality on the academic motivation of schoolchildren in the context of collaborative learning. The purpose of the study was to identify differences in motivation based on gender and class. The data were collected using Lukyanova's scale of academic motivation, covering the personal meaning of the study, targeting and various motives. The results showed that virtual reality has a positive impact on academic motivation, especially for girls. Statistically significant differences in motivation have been found between boys and girls, as well as between different classes. A high level of motivation has been identified among younger students, which underlines the importance of an individual approach to the development of virtual educational scenarios depending on the age groups. These results are important for the development of effective educational strategies based on the integration of virtual reality into the learning process.

Keywords: academic motivation, collaborative learning, virtual reality, virtual environment, virtual classroom.

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ВИРТУАЛДЫ ШЫНАЙЫЛЫҚТА БІРЛЕСКЕН ОҚЫТУДАҒЫ ОҚУШЫЛАРДЫҢ АКАДЕМИЯЛЫҚ МОТИВАЦИЯСЫН ПСИХОЛОГИЯЛЫҚ ЗЕРТТЕУ

Аңдатпа

Ғылыми мақала виртуалды шынайылықтың бірлескен оқыту контекстіндегі оқушылардың академиялық мотивациясына әсерін психологиялық зерттеуге арналған. Зерттеудің мақсаты жыныс пен сыныпқа байланысты мотивациядағы айырмашылықтарды анықтау болды. Деректерді жинау Лукьянованың академиялық мотивация шкаласы арқылы жүзеге асырылды, ол оқудың жеке мағынасын, мақсатты бағытын және әртүрлі мотивтерін қамтиды. Нәтижелер виртуалды шынайылық академиялық мотивацияға, әсіресе қыздарға оң әсер ететінін көрсетті. Мотивациядағы статистикалық маңызды айырмашылықтар ұлдар мен қыздар арасында, сондай-ақ әртүрлі сыныптар арасында анықталды. Төменгі сынып оқушыларында мотивацияның жоғары деңгейі анықталды, бұл жас топтарына байланысты виртуалды білім беру мазмұнын әзірлеуге жеке көзқарастың маңыздылығын көрсетеді. Бұл нәтижелер виртуалды шындықты оқу процесіне біріктіруге негізделген тиімді білім беру стратегияларын әзірлеу үшін маңызды.

Түйінді сөздер: академиялық мотивация, бірлескен оқыту, виртуалды шындық, виртуалды орта, виртуалды сынып

ПСИХОЛОГИЧЕСКОЕ ИССЛЕДОВАНИЕ АКАДЕМИЧЕСКОЙ МОТИВАЦИИ ШКОЛЬНИКОВ ПРИ СОВМЕСТНОМ ОБУЧЕНИИ В ВИРТУАЛЬНОЙ РЕАЛЬНОСТИ

Аннотация

Научная статья посвящена психологическому исследованию влияния виртуальной реальности на академическую мотивацию школьников в контексте совместного обучения. Целью исследования было выявление различий в мотивации в зависимости от пола и класса. Сбор данных осуществлялся с помощью шкалы академической мотивации Лукьяновой, охватывающей личностный смысл учебы, целевую направленность и различные мотивы. Результаты показали, что виртуальная реальность положительно влияет на академическую мотивацию, особенно для девочек. Статистически значимые различия в мотивации были обнаружены между мальчиками и девочками, а также между разными классами. Высокий уровень мотивации был выявлен у младших школьников, что подчеркивает важность индивидуального подхода к разработке виртуальных образовательных сценариев в зависимости от возрастных групп. Эти результаты важны для разработки эффективных образовательных стратегий, основанных на интеграции виртуальной реальности в учебный процесс.

Ключевые слова: академическая мотивация, совместное обучение, виртуальная реальность, виртуальная среда, виртуальный класс.

INTRODUCTION

In the modern educational landscape, virtual reality (VR) is becoming an increasingly important tool, reformatting approaches to learning and stimulating the development of innovative methods of education. Virtual reality provides unique opportunities to create learning scenarios that promote shared learning and improve the educational process. In this context, the study of the impact of virtual reality on the academic motivation of students becomes relevant, especially in collaborative learning. The problem of effective management of academic motivation of schoolchildren remains relevant, since the success of education is closely related to the level of motivation and interest of students. Virtual reality, as an innovative educational tool, provides unique opportunities to create interactive educational scenarios that can have a positive impact on the motivation of schoolchildren.

The purpose of this study is to identify the impact of virtual reality on the academic motivation of schoolchildren in the context of co-education. Based on extensive literature and previous research, we aim to analyze the differences in motivation depending on the gender and level of schooling, to deepen the understanding of factors that contribute to increasing motivation in virtual educational environments.

Research issues in our research include:

RQ 1: How does the use of virtual reality affect the academic motivation of schoolchildren?

RQ 2: Are there any differences in motivation based on gender?

RQ 3: What are the dynamics of academic motivation in different classes?

By answering these questions, we aim to contribute to understanding the role of virtual reality in motivating schoolchildren, which can serve as a basis for developing more effective educational strategies and practices.

LITERATURE REVIEW

Studying the academic motivation of schoolchildren and its relation to the use of virtual reality in education has become an interesting research area (Özeren, S., & Top, E. (2023) [1], Ou Yang, F.-C., Lai, H.-M., & Wang, Y.-W. (2023) [2]. In recent decades, actively developing virtual reality (VR) technologies have attracted the attention of researchers in the field of education, providing new opportunities for creating innovative educational scenarios. In particular, domestic researchers Abildaeva G. S., Zhiendaeva N. B., and Tapalova O. B. [3], describe in their works the importance of the relationship between the motivation of schoolchildren and their potential for self-actualization. B., describe in their works the importance of the relationship between the motivation of schoolchildren and their potential for self-actualization. A wide corpus of studies in the field of education is engaged in analyzing various aspects of motivation. However, it should be emphasized that the relationship between motivation and the situation of digital transformation represents a characteristic feature of our study.

This literary review considers the articles devoted to the study of the impact of the use of virtual reality on the academic motivation of students.

One of the key works in this field is the study of Özeren and Top (2023) [1], which studied the effects of the application of augmented reality on academic achievement and motivation of high school students. The authors have found significant influence of augmented reality applications on academic motivation.

A study conducted by Ou Yang, Lai and Wang (2023) examines the effects of virtual educational robotics on academic satisfaction, computational thinking skills and academic achievements of schoolchildren in programming. The study highlights the positive impact of technology on motivation and performance [2].

A number of works also focus on factors affecting the overall motivation of schoolchildren. For example, a study by Datu, Yang (2021) examines the relationship between academic cheerfulness, motivation, and student success in Philippine high schools [4].

Taking into account the benefits of virtual reality for learning, articles Mukasheva et al. (2023) [5] and Çoban and Goksu (2022) [6] offer different approaches to the use of virtual reality to motivate students (schoolchildren) and their socialization, especially in the context of distance learning. Studies by Liu, Wang, Koszalka and Wan (2022) [7] and Zhang and Liu (2023) [8] draw attention to the effects of virtual classes and factors that influence cognitive load in virtual learning environments. Articles Elfeky and Elbyaly (2023) [9], Cohen et al. (2023) [10] and Fonseca and García-Peñalvo (2019) [11] consider various aspects of the impact of virtual classrooms and educational ecosystems on the development of students' academic motivation.

Summarizing research data, it can be noted that virtual reality provides significant opportunities to improve the academic motivation of students, especially in the context of innovative educational practices and collaborative learning environments.

RESEARCH METHODS

The study participants included high school students of different education levels. Grouping was made taking into account gender characteristics (men and women) and grade level (6th, 7th, 8th grades). A total of 682 schoolchildren participated in the study.

A total of 682 secondary school students represented in different age groups and grades participated in this study. Among them, 431 (43.2%) were female. The mean age of the participants was 13.1 years ($SD = 2.74$, $Me = 13$). The students were categorized by grade level as follows: 169 (24.8%) participants were 6th grade students, 232 (34%) were 7th grade students, and 281 (41.2%) were 8th grade students, corresponding to the 11/12 year Kazakh curriculum.

Lukyanova's academic motivation scale (Lukyanova M., 2001) [12] containing 18 qualitative items was used to measure academic motivation. Respondents were asked to complete sentences, which allowed both quantitative assessment of motivation level and qualitative analysis. The Cronbach's alpha coefficient was $\alpha = 0.742$, guaranteeing the internal consistency of the scale.

The online tool Google Forms was used to collect data. We provided the link to the questionnaire on Google Forms to the learners of the school. To do this, we used various electronic communication

channels such as email, WhatsApp and Telegram. This approach allowed us to reach a wide audience and ensure that as many learners as possible participated in our study.

We gave students instructions on how to complete the questionnaire and the importance of honest and accurate responses. We informed them that their participation was voluntary and anonymous and that their responses would be used for research purposes only.

The trainees completed the questionnaire by answering questions presented in Google Forms. Responses were automatically saved electronically, which facilitated subsequent data analysis.

After data collection, we analyzed the responses using appropriate statistical methods such as correlation analysis and linear regression to identify relationships between different variables and determine the statistical significance of these relationships.

Statistical tests included t-test to compare mean values between groups for gender, and one-factor analysis of variance (ANOVA) to determine differences between education levels. The χ^2 test was used to analyze categorical data.

The data were entered into a statistical software package for analysis. The test results were analyzed in the context of the research questions posed.

The study met ethical standards and participants were made aware of the aims and procedures of the study and were given the opportunity to consent to participate. We approached the school administration and obtained permission to conduct the study among their students. We sent out informational letters to parents explaining the purpose of the study and asking for consent for their children to participate. Participants were made aware of their rights, the purposes and procedures of the study, and how their information would be used.

RESULTS

The study shows that co-education in virtual reality has different impacts on the academic motivation of boys and girls. The analysis showed that the level of final motivation and motivation components is significantly higher for girls compared to boys (Personal meaning of the study: $t(p) = 2.52$, $p = 0.012$; Goal: $t(p) = 2.77$, $p = 0.006$; Various motifs: $t(p) = 2.34$, $p = 0.020$; Motivation $t(t) = 3.02$, $p = 0.003$).

Table 1. Motivation Factors by Gender and Associated t-test Results

Motivation	Gender		t-test, p
	male	female	
Personal meaning of the doctrine	14.3±5.89	15.4±5.44	2.52, p=0.012
Goal-setting	15.5±6.87	16.9±6.32	2.77, p=0.006
Different motive	11.7±4.40	12.5±4.08	2.34, p=0.020
Final motivation	41.5±14.66	44.8±13.41	3.02, p=0.003

Conclusion: the level of final motivation and motivation components were reliably higher among schoolgirls compared to male students.

The results also revealed the influence of the learning class on the academic motivation of learning together in virtual reality. The level of final motivation is significantly higher among 6th grade students than 7th grade students (F-test = 3.62, $p = 0.028$). Post-hoc analysis showed that the differences in motivation are especially pronounced between 6th and 7th grades.

Table 2. Motivational Factors Analysis Across Grade Levels with F-test Results and Post-hoc Comparisons

Motivation	Grade	F-test, p	
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	6	7	8		Post-hoc
Personal meaning of the doctrine	15.2±5.75	14.2±5.53	15.5±5.60	3.43, p=0.033	7 vs 8
Goal-setting	17.6±6.52	15.7±6.34	16.2±6.69	4.23, p=0.015	6 vs 7
Different motive	12.7±4.13	11.8±4.28	12.2±4.18	2.28, p=0.104	-
Final motivation	45.4±14.21	41.7±13.82	44.0±13.81	3.62, p=0.028	6 vs 7

Conclusion: the level of final motivation was reliably higher among sixth graders compared to seventh graders. The Final Motivation Levels did not have significant differences between the sixth and eighth graders.

The results of a study conducted in the context of shared learning in virtual reality revealed marked differences in the level of academic motivation among different classes. Sixth grade students showed the highest levels of motivation, which indicates that virtual reality is attractive for younger students. High school students, especially 7th and 8th, had a higher percentage of students with reduced and low motivation, emphasizing the need for a differentiated approach to motivational strategies in the context of virtual learning. These findings highlight the importance of adapting virtual learning techniques to students' age to maximize their educational experiences.

Table 3. Distribution of Motivation Levels Across Grade Levels with Chi-square Test Results

Grade	Level of motivation					χ^2 , p
	1	2	3	4	5	
6	1 (0.6%)	48 (28.4%)	60 (35.5%)	60 (35.5%)	0 (0%)	18.9, p=0.015
7	0 (0%)	44 (19.0%)	71 (30.6%)	113 (48.7%)	4 (1.7%)	
8	0 (0%)	63 (22.4%)	108 (38.4%)	109 (38.8%)	1 (0.4%)	

DISCUSSION AND CONCLUSION

The results of our research provide valuable information on the impact of virtual reality on the academic motivation of schoolchildren in a shared learning environment. The first question of the study concerned the impact of virtual reality on the level of academic motivation of schoolchildren. The results confirm the positive impact of virtual reality, particularly for girls. This result can be an important factor in the development of educational programs using virtual reality technologies, taking into account gender differences in motivational aspects.

The second issue of the study was the difference in motivation based on the gender of the students. The analysis of the data revealed statistically significant differences in motivation between boys and girls, with the level of final motivation being higher among schoolgirls. These results can serve as a basis for more precise approaches to learning, taking into account individual characteristics and motivations of students of different gender.

The third question of the study concerned the dynamics of academic motivation in different classes. The results showed that the level of final motivation varies significantly between 6th and 7th grades,

which may be related to the age and cognitive characteristics of students. This underlines the importance of adapting virtual educational scenarios to the needs and characteristics of different age groups.

In general, our research points to the positive impact of virtual reality on the academic motivation of schoolchildren in a shared learning environment. This is particularly true for girls, which can be an important factor in the planning of educational programmes. It is important to note that these positive effects may be more pronounced in the lower grades, and additional motivational support strategies need to be considered in the higher grades. The results of our research provide the basis for further research and development of educational technologies aimed at increasing the academic motivation of students.

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