

AR masks in social media as a tool for assessing students' achievements

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Abstract

In today's educational environment, augmented reality is becoming an increasingly demanded and promising technology. Studies prove the success of its application due to the effect of implementation in the learning environment with the overlay of virtual objects that expand our three-dimensional space by visualizing and presenting interactive materials. However, its evaluative function in learning as an auxiliary tool integrated into social media is not sufficiently explored. Therefore, the purpose of this study is to determine the impact of AR masks in social media as an assessment tool on learners' academic achievement in the learning process. The research methods combined a questionnaire survey of students and teachers, the development and implementation of AR masks, and conducting a pedagogical experiment, which had a quasi-experimental format. The preliminary questionnaire survey involved 1,259 students and 76 teachers who expressed their attitudes towards the use of social media for learning purposes, prompting the consideration of methodological features in the developed AR masks were applied, involved 149 students who were divided into control and experimental groups. As a result of using AR masks, the average score of the experimental group increased from 73.8% to 79.8%. Based on the findings, it can be concluded that the use of AR masks in social media has a positive effect and significant potential to transform traditional assessment methods.

Keywords: Academic achievements, AR masks, Assessment, Social media.

DOI: 10.53894/ijirss.v7i4.6249

Funding: This research has been funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant Number: AP 23487342).

History: Received: 6 March 2025 / Revised: 7 April 2025 / Accepted: 9 April 2025 / Published: 16 April 2025

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Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: TS: Conceptualization, Formal analysis, Methodology, Writing – original draft. GA: Conceptualization, Writing – review & editing. AA: Funding acquisition, Project administration, Writing – review & editing. KT: Writing – review & editing. TM: Writing – review & editing.

Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Institutional Review Board Statement: The Ethical Committee of the NJSC "L.N. Gumilyov Eurasian National University", Republic of Kazakhstan has granted approval for this study on March 18, 2025 (Ref. No 7.). **Publisher:** Innovative Research Publishing

1. Introduction

The development of the education system is increasingly innovative in all its aspects, including the process of assessing students' achievements. After all, the assessment of academic achievements helps to determine the level of students' preparation and, based on it, to build the necessary knowledge and skills in a structured way.

Immersive technologies, which can expand our three-dimensional space and have the effect of introducing users into a virtual environment, have become an innovative and promising solution in the field of education. Numerous scientific studies are conducted to identify the effects of virtual and augmented reality technologies on human perception, learning material assimilation, and the development of spatial thinking [1, 2]. Network and cluster analysis of 21,667 literature pieces on virtual reality and 9,944 on augmented reality in the Web of Science Core Collection database showed that augmented reality is more modern, effective in various directions, has an interdisciplinary character, and is better adapted to educational purposes [3].

The implementation of augmented reality (AR) in social media has further expanded its use as an engaging tool and popularized it in the entertainment space due to its ability to superimpose virtual interactive elements on the physical environment. Developing various AR masks and superimposing effects has become mainstream among most users and influencers of the alpha and Z generations [4]. However, this has more of an entertainment nature than an educational one, so there is very little scientific research on the implementation of AR masks in social media that aims to assess learners' learning achievements.

Assessment of learning achievements is a form of evaluation in the form of a point or rank, determined in accordance with the officially approved scale for recording the results of learning activities, i.e., a numerical (letter, point) indicator characterizing the level of mastery of knowledge, skills, and abilities. There are different types of assessment, including current, formative, and final [5-7]. In addition, assessment has various functions such as educational, diagnostic, motivating, developing, corrective, predictive, and controlling [8]. In the past, the controlling function of assessment, i.e., checking the knowledge of learners, was dominant, while the modern educational approach implies enlightening, comprehensive-developmental, and supportive functions characteristic of formative assessment [9]. Therefore, our study aims to use AR masks in social media as an auxiliary tool for assessing students' learning achievements.

Scholars claim that "The Metaverse will change the future of social media" [10], thereby actualizing the research on user interactions on social media. The analysis of statistical data from world authoritative portals, which are periodically updated, helps to identify the ratings of social media in the world and in Kazakhstan. According to the Statcounter portal, for the last year (January 2024 - January 2025), the most popular social media platform in the world is Facebook, with its monthly figures not steadily decreasing at 62.51% [11]. The SimilarWeb portal also analyzes the ratings of the most popular applications in the Google Play Store and Apple App Store by country. In the category "Social Media" in Kazakhstan, by the end of 2024, TikTok was the most popular in the Google Play Store, with Instagram in second place [12]. According to the versions of the world portals Statista [13] and Appfigures [14], TikTok is also the top and leading platform in Kazakhstan.

The DataReportal portal annually provides analytical data on the digital development of Kazakhstan. All the latest data, analysis and trends are collected to help understand how people in Kazakhstan will use digital devices and services in the coming year. In January 2024, there are 14.10 million social media users in Kazakhstan, representing 71.5 percent of the total population. In terms of the gender of social media users in Kazakhstan, 48.9% are male and 51.1% are female [15]. In terms of age categories, 49.8% are 18-24 years old users, 46.1% are 25-34 years old users, 2.3% are 35-44 years old users, 0.8% are 45-54 years old users and 0.9% are 55 years old and above (Figure 1) [16].



Age categories of social media users in Kazakhstan.

All this became the prerequisites for conducting a scientific study on the use of AR masks in social media to assess students' learning achievements. After all, this aspect of the learning process is of great importance in the evolution of the digital space [17] due to its advantages such as Associative, Constructivist, Social Constructivist, and Situative [18]. Moreover, providing instant feedback, learner autonomy, supporting collaborative learning, ensuring validity, integrating assessment types, and increasing validity and reliability [19] reinforce the relevance of the study.

In a large-scale study involving 200351 people conducted in Australia, the effects of augmented reality on Facebook were successfully applied to teach children about road safety [20]. The authors see great promise in investigating the use of a diverse set of measurement tools to assess children's knowledge and study actual social media behavior, which correlates with the goals of our study. In another study, where AR masks in social media were used as entertainment and self-expression, helping in socialization and improving the self-esteem of adolescents. AR masks are sources of inspiration if we consider it as a creative tool that promotes creativity, uniqueness, and regulation of one's emotions [21]. The authors of the study also conclude that AR masks should be developed for educational purposes. The playful appeal of AR masks in social media can serve as one of the factors [22] that increases the interest of its users, thus satisfying their learning needs. It can be observed that the application of AR masks in social media as an assessment tool for learners' academic achievement is a research perspective in many scientific publications, and this is reflected in the objectives of our study.

The purpose of this study is to determine the impact of AR masks in social media as an assessment tool on learners' academic achievement in the learning process.

Research questions:

- Identifying the attitudes of academic community actors towards an innovative form of assessment in the form of AR masks in social media;
- Development and implementation of AR masks in social media that help in the assessment of students' academic achievements.

The following sections of the article present the methods of the study, the results obtained, and the conclusions.

2. Methods and Materials

The research design included several phases that covered different aspects of assessing learners' academic achievement. It also had a quasi-experimental format, the point of which is to compare the experimental and control groups and thus help to determine the impact of AR masks in social media on learners' academic achievement.

The consent of the participants was obtained and their confidentiality was ensured during the study. Participation in the experiment was voluntary and had only scientific interests. Also, ethical aspects were taken into account and the rules of data processing in experimental work were followed and principles of scientific ethics were observed. The studies involving human participants were reviewed and approved by the Ethical Commission for the examination of scientific research works of the NJSC "L.N. Gumilyov Eurasian National University". Written informed consent to participate in this study was provided by the participants.

In the preparatory stage of the study, a survey was conducted among students and teachers of L.N. Gumilyov Eurasian National University in order to find out the general picture of the use of social media for various purposes. The survey involved 1,259 students and 76 teachers of the university. The survey's socio-demographic block contained questions about students' age, gender, course, and language of study. The survey for faculty included academic/research degree, length and direction of service, and language of instruction. Subsequent blocks of questions were focused on identifying the purpose, frequency, and types of social media use by students and faculty.

Then the discipline was defined, on the example of which the assessment materials, test tasks, scenarios, and AR masks will be developed. The discipline "Information and Communication Technologies" is a mandatory component for all educational programs of the Bachelor's degree, which, in turn, helps to expand the field for experimental work. The choice of this discipline was conditioned by its target learning outcomes, assuming active participation of students in social and linguistic communication with the use of modern educational technologies, including ICT, in their professional activities. Moreover, AR technology adheres to the principle of object visualization feedback, so a universal and visually rich subject or thematic section was chosen. The assessment materials are filled with visualization, accompanied by sound effects, and their multimedia capabilities extend the three-dimensional space. The use of gamification elements in AR masks not only makes assessment materials more exciting but also promotes active participation of learners and the emergence of game competition. This, in turn, reduces stress levels and allows for a departure from formality, performing the functions of formative assessment.

Considering all the methodological requirements and features to the evaluation materials, different 10 AR masks have been developed and published.

The development environment for the social media TikTok is Effect House. It supports various AR object overlay tools that are based on algorithms for recognizing and tracking faces, hands, body, various objects, segmenting them and dynamically processing them in real time through machine learning [23]. In addition, the ability to import, animate 3D objects, add physical properties, sound and multimedia effects to them makes AR masks stable and more realistic. Visual scripting, i.e. node-based system facilitates the creation of functionality logic without coding (Figures 2-3).



Figure 2. AR mask development process at Effect House.



An example of an AR designed mask at Effect House.

AR masks for social media Facebook and Instagram were developed in the Spark AR Studio platform from Meta companies [24]. It is also one of the most powerful tools, offering even plane tracking and world effects. The interaction logic and effects are based on Patch-as. They are visual components that are connected in the form of graphs (Figure 4).



Figure 4. AR mask development in Spark AR Studio.

The assessment materials were designed in different forms, such as multiple-choice quiz, true or false, rating, Fill-inthe-blanks, Matching Questions, and others. This helped to make them even more engaging and interesting (Figure 5).



Figure 5. Task "Try to guess the abbreviation for ICT".

In the main stage of the study, the control and experimental groups were determined according to the results of the entrance test in the discipline "Information and Communication Technologies". A total of 149 learners were selected, where 76 students were in the control group and 73 in the experimental group. These groups were determined based on similar Pretest results. A three-level scale was used for evaluation, where 0-49% low achievement, 50-74% average, and 75-100% high achievement.

The experimental group used the developed AR masks as auxiliary assessment tools during the whole semester of the course. At the end of the whole period of study, the students took a Post-test, which helped to identify the impact of the developed AR masks on the academic achievements of the students.

In the last stage of the study, the results of the pedagogical experiment were processed using the methods of mathematical statistics. In this case, the Pearson's chi-square formula χ^2 (1) was used to compare the critical and empirical values of the obtained results of the two groups.

$$\chi^2_{Emp} = N \cdot M \cdot \sum_{i=1}^{L} \frac{\left(\frac{n_i}{N} - \frac{m_i}{M}\right)^2}{n_i + m_i} \quad (1)$$

where:

N – represents the total number of participants in the experimental group;

M – represents the total number of participants in the control group;

 n_i – denotes the number of participants in the experimental group who received a score of *i*;

 m_i – denotes the number of participants in the control group who received a score of i [25].

Processing and analyzing the obtained data with the help of mathematical statistics allows to evaluate more accurate and objective the influence of the developed AR masks on the academic success of students, to determine the differences between the experimental and control groups, and to identify the interrelationships.

3. Results & Discussion

The results of the conducted research on the use of AR masks in social media as a tool of auxiliary assessment showed a positive impact on the academic achievements of students. The results are presented in a step-by-step manner, according to the methodology of the study.

The conducted preliminary survey of students and teachers reflected the general situation and prerequisites for the implementation of AR masks in the learning process.

A total of 1259 respondents participated in the student questionnaire, including 51.07% females and 48.93% males, studying at the undergraduate level between the ages of 16 to 31 years. An approximately equal ratio of females and males shows the gender balance of the sample. This helped to conduct an objective comparative analysis of the answers to the survey questions without bias towards one group, to exclude gender influence, as it is not a factor under study, and to increase the representativeness of the sample.

To the question "Which social media do you use?", which presents the top-rated social networks to choose from, the respondents indicated the frequency of their use: 830 respondents said they use TikTok all the time, followed by Instagram with 756 votes, and Facebook in third place with 509 votes. Scoop had the lowest numbers, as 1,213 respondents said they never used it. The social media Twitter(X) and Threads were also not popular among students (Figure 6). Thus, the study demonstrates that visually-oriented and short-format platforms such as TikTok and Instagram are the most sought-after among students, while less well-known or specific networks such as Scoop. It, Twitter (X), and Threads remain on the periphery of their interests. This confirms that students prefer to consume information in a fast and convenient format. In addition, it is possible to notice a decreasing trend of interest in discussion platforms among young people who choose more dynamic platforms.



What social media do you use?

The experience of using social media is also an important aspect of the study, and the questionnaire asked a relevant question influencing the digital literacy and information awareness of the learners. To the question "How many years have you been using social media?" 46% of respondents answered - more than 7 years, 43% answered - 4 to 7 years, 9% answered - 1 to 3 years, and only 2% answered - less than 1 year (Figure 7). This indicates that social media is an integral part of their daily life and educational environment. Moreover, it can be concluded that today's students start using social media at an early age, which contributes to the development of their digital skills and information awareness. Overall, the high level of engagement with digital platforms emphasizes the importance of social media as a tool for communication, learning, and self-development in the student population.



How many years have you been using social media?

The regularity of social media use was expressed by respondents as follows: 73% answered that they use it multiple times a day, and 14% multiple times a week. This shows that they rarely do without social media, accessing it several times a day for different purposes. Moreover, 33% of respondents strongly agree, and 26% agree with the statement that social media has become part of everyday life and has been widely integrated into their lifestyle or identity.

Thus, it was concluded that students have a positive attitude towards various social media and its use for learning purposes can arouse their interest in changing their daily routine.

76 respondents aged 24 to 69 years participated in the questionnaire survey of teachers. In terms of gender difference, 28.8% were men and 71.2% were women. 54.5% had a scientific degree and 45.5% had a master's degree.

Among teachers, the most popular social media they use in their professional activities was Facebook, as 34.8% use it constantly and 27.3% sometimes (Figure 8). This fact may indicate that Facebook provides convenient tools for educational activities, including the ability to create thematic groups, share learning materials, organize online discussions, and interact with colleagues and students. The high popularity of this platform may also be related to the fact that it is familiar to educators, has a wide audience reach and allows for an effective combination of formal and informal learning.



Figure 8.

Which social media you often use in your professional activity?

Teachers also have solid experience using social media in their professional activities. 38% have been using it for more than 7 years, and 30% for 4 to 7 years. Only 8% responded that they have less than 1 year of experience. This indicates that social media have become an important tool in the educational process, facilitating communication, knowledge sharing, and methodological support. A lack of experience using social media may indicate either a recent uptake of digital technologies or initial skepticism about their use in pedagogical activities.

Going deeper into the purpose of using social media for professional activities, most teachers prefer to follow new content related to their profession and also use it to search for information related to teaching. Teachers use social media on a daily basis to share important work-related information (Figure 9). If we consider from the point of view of working with information, we can conclude that its consumption prevails over its creation in the professional activities of teachers. Although social media can be an effective tool for disseminating educational and scientific materials, a significant part of teachers rarely or never do it. This may indicate a lack of digital content creation among teachers or limited skills in publishing and distributing educational content.



Figure 9.

Statements on the use of social media in professional activities.

Social networks play an important role in teachers' professional activities, but they are mainly used for information retrieval and work data sharing rather than for active creation of educational content.

The results of the questionnaire emphasize the need to develop social media as a tool used in the learning process and the need for a balanced approach to their use.

The main stage of the study consisted of a teaching experiment in which the learners took a Pre-test to determine the zero position of the control and experimental groups and a Post-test reflecting the impact of AR masks in social media as an auxiliary assessment tool.

According to the results of the Pre-test, groups with the same level participated in the experiment, where their mean values were 73.6% for the control group and 73.8% for the experimental group (Table 1).

Table 1.

Descriptive statistics of control and experimental groups before the experiment (Pre-test).

Description	Control group	Experimental group
Mean	73.60526316	73.89041096
Median	73.5	75
Moda	73	85
Standard deviation	11.87162325	12.46279089
Dispersion	140.9354386	155.3211568
Excess	-0.115047613	-0.624909966
Minimum	45	46
Maximum	93	95
Sum	5594	5394
Number of participants	76	73

Pre-test scores demonstrate that the control and experimental groups were in roughly equal conditions before the experiment began. This is confirmed by similar mean values, standard deviation and range of scores. Slight differences in

mode and median may indicate small individual variations, but in general, the experimental conditions can be considered balanced, which ensures the objectivity of the subsequent analysis of the influence of the studied factors.

One of the important indicators of Pre-test is the number of students in three levels of academic achievement. The number of students with a low level in both groups is equal to 3, the average level was shown by 37 students of the control group and 32 of the experimental group, and high results were shown by 36 students of the control group and 38 of the experimental group (Figure 10).



Figure 10.

Results of pre-test of control and experimental groups.

The results of the Post-test showed that in both groups there was 1 student with a low level, the average level was 42 students in the control group and 25 students in the experimental group, and the high level was 33 students in the control group and 47 students in the experimental group (Figure 11).



Figure 11.

Results of the post-test of control and experimental groups.

The last stage of the study involved comparing empirical and critical indicators based on the obtained Pre-test and posttest results and descriptive statistics on the three levels of academic achievement using Pearson's chi-square formula χ^2 . It is known that with a three-level evaluation scale, the critical values for the significance level $\alpha = 0.05$ is 5.99 [25].

Empirical values were calculated from the data obtained:

on the results of the pre-test of experimental and control groups

$$\chi_{Emp}^2 = 73 \cdot 76 \cdot \left[\frac{\left(\frac{3}{73} - \frac{3}{76}\right)^2}{3+3} + \frac{\left(\frac{32}{73} - \frac{37}{76}\right)^2}{32+37} + \frac{\left(\frac{38}{73} - \frac{36}{76}\right)^2}{38+36} \right] = 0.703216359$$

on the results of the post-test of experimental and control groups

$$\chi_{Emp}^{2} = 73 \cdot 76 \cdot \left[\frac{\left(\frac{1}{73} - \frac{1}{76}\right)^{2}}{1+1} + \frac{\left(\frac{25}{73} - \frac{42}{76}\right)^{2}}{25+42} + \frac{\left(\frac{47}{73} - \frac{33}{76}\right)^{2}}{47+33} \right] = 7.079920068$$

The calculation results showed that before the experiment, the empirical value was less than the critical value, that is, $\chi^2_{Emp} = 0.703216359 < 5.99$. This indicates that the initial position of the experimental and control groups was the same. At the end of the experiment, the empirical value was greater than the critical value, that is, $\chi^2_{Emp} = 7.079920068 > 5.99$ (Table 2). Accordingly, the conclusion about the positive impact of AR masks in social media as an assessment tool on students' academic achievement in the learning process is accepted.

Table 2.

Empirical values of χ^2_{Emp} of control experimental groups.

1				
Group	CG (Pre-test)	EG (Pre-test)	CG (Post-test)	EG (Post-test)
CG (Pre-test)		0.703216359	1.446890479	5.087637558
EG (Pre-test)	0.703216359		3.000989288	2.812590299
CG (Post-test)	1.446890479	3.000989288		7.079920068
EG (Post-test)	5.087637558	2.812590299	7.079920068	

From the Post-test results, we can see that the scores of both groups increased, but the mean of the experimental group was 79.8% and increased significantly from the baseline (Table 3).

Table 3.

Descriptive statistics of control and experimental groups after the experiment (Post-test).

Description	Control group	Experimental group
Mean	76.36842105	79.80821918
Median	74	83
Moda	74	85
Standard deviation	11.64227023	12.07230248
Dispersion	135.5424561	145.7404871
Excess	-0.476701932	-0.425286638
Minimum	48	48
Maximum	95	97
Sum	5804	5826
Number of participants	76	73

Post-test analysis shows that both groups improved their performance, but the experimental group showed more pronounced growth, indicating the high effectiveness of the applied AR masks. The difference in mean values and higher median and mode scores of the experimental group confirm that the implemented approach led to a stable and meaningful improvement in learning outcomes.

The pedagogical experiment on the use of AR masks as a tool for auxiliary assessment showed that it methodically supports the level of knowledge of students in the chosen discipline and provides an accompanying approach throughout the entire period of training. Moreover, the students showed great interest in AR masks by creating different reels and trends, freely expressing themselves on social media.

Therefore, according to the expressed desires of the students, there was a need to increase the number of AR masks being developed and expand their disciplinary scope.

4. Conclusion

In conclusion, it is important to note that innovative forms of assessment should not only be based on modern technologies but also correspond to the daily interests of students. Much research has been devoted to the successful application of augmented reality technology as a teaching tool, but aspects such as its auxiliary assessment function and integration with social media require scientific and methodological attention. Therefore, the purpose of this article was to provide scientific insight into the use of AR masks in social media as part of the learning process and to identify their impact on students' academic achievement. Conducting a preliminary questionnaire to describe the current situation and the quasi-experimental format of the study ensured a multifaceted approach in compliance with all norms of scientific ethics. It was found that 65.9% of students choose TikTok to use regularly, while 34.8% of teachers prefer Facebook more. The regularity of social media use helped to identify it as an effective tool for supportive assessment, and 10 AR masks were developed with subsequent implementation in the experimental groups. A cohort of 149 participants in the teaching experiment showed a positive impact of AR masks on the academic achievement of 73 participants in the experimental group. The mean score of the group increased from 73.8% to 79.8%. Moreover, processing the data using mathematical statistics formulas confirmed this assumption. The research perspective will be to develop new AR masks for social media in other disciplines.

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