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## Influence of gamification and audio materials on the effectiveness of perception of educational material in online learning

Diana Kamaladin\*

Qamalladin University

050040, 33 Bukhar Zhyrau Str., Almaty, Republic of Kazakhstan

### Abstract

**Relevance.** Online education in the Republic of Kazakhstan (RK) has transitioned into higher education. To date, a unique experience of working in synchronous and asynchronous formats has been acquired, teacher training courses have been organised to improve work using IT technologies, and new online training programmes and courses are being developed and implemented on an ongoing basis.

**Purpose.** This paper contains the results of a pilot study, the purpose of which was to identify to what extent individual means of information delivery influence the attention and perception of educational material by students in the process of online learning.

**Methodology.** The research methodology included a review of empirical research on the topic, a series of online surveys, experimental methods, questionnaires, and self-reports of students. The pilot study was experimental in nature.

**Results.** The analysis of results showed that the effectiveness of using gamification and audio materials in online learning is contradictory: on the one hand, the use of these technologies by students is evaluated positively – the cumulative positive assessment by students of their adaptability to new learning conditions was 76.1%, but on the other hand, 20.2% of students believe that the effectiveness of their own academic work in the online learning rate has increased, and 14% believe that the effectiveness has decreased.

**Conclusions.** Gamification and audio materials as a means of delivering information in the educational process can only partially replace the personal contacts of a student and a teacher, increase the visibility of educational materials, and make it more interesting for the majority of the audience. However, gamification and audio materials are not suitable for everyone. Teachers are recommended to implement the considered teaching tools differentially, depending on the preferences of the students themselves.

**Keywords:** educational process; game; presentation; higher education; IT technologies.

### Introduction

The regime of blended learning (distance learning and conventional approaches) is becoming increasingly widespread in higher education in Kazakhstan, although its impact on the experience of students and teachers has yet to be studied. With the rapid expansion of the transnational education market, more and more universities are expanding their online education offerings. Last but not least, this is because in the conditions of online learning,

university teachers have the opportunity to use various teaching methods and tools, as well as opportunities for deeper involvement of students in the educational process, increasing their attention and perception of educational material by means of multimedia and digital technologies.

During the pandemic, higher and postgraduate education organisations in Kazakhstan provided a 100% transition to distance learning. To ensure its quality, digital infrastructure has been improved in all universities of the

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\*Corresponding author



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country, server power and Internet speed have been strengthened, and the digital competence of teachers has been increased [1; 2]. As of 2022, 100% of Kazakhstan's universities have access to LMS digital educational platforms. However, the effectiveness of the use of new technologies in education has not been sufficiently studied in Kazakh science. The effectiveness of online education in higher education consists of many factors, but among the main ones, as a rule, are: accessibility, involvement, motivation, attention and perception of educational material by students [3-6].

The relevance of the empirical assessment of the impact of gamification and audio materials on the effectiveness of online learning in Kazakh universities is conditioned by the need for wider application of innovative teaching methods in the educational process, the result of which should be the development of new competencies, comprehensive training of students, obtaining a better education and improving the interaction between students and teachers. The academic community of Kazakhstan does not yet have a clear understanding of how gamification and audio materials affect the effectiveness of online learning. With the digitalisation of higher education, the use of gaming techniques and audio materials is increasing, but the success of new techniques is still limited and insufficiently substantiated theoretically and empirically. In particular, the gamification of online learning is a rather difficult phenomenon to study, since it requires an interdisciplinary approach that includes pedagogical, socio-psychological, and cultural knowledge, analysis of the contribution of information and communication technologies (ICT) and the competencies of teachers in the IT field.

Gamification can be used to increase the level of involvement and motivation of students, it improves logical and cognitive skills, critical thinking, increases digital literacy, and deepens communication skills, which is confirmed by researchers from different countries [7-11]. But the number of empirical studies where the effectiveness of gamification has been unequivocally proven is not large. Scientists note that when applying the gamification method in the educational process, it should be borne in mind that any game is still a personalised user experience [12-14]. There is a high probability that students who are accustomed to the playful form of presentation of the material may inadequately perceive traditional forms of learning, which become less attractive to them. Unlike gamification, the use of audio materials in pedagogical practice has a rather long tradition. In the educational process, they act, as a rule, as an auxiliary and illustrative supplement, contributing to the maintenance of students' interest in the topic of classes. In individual training, in combination with visual means of various types, audio materials can play an even more important role than in mass training. They can act as a means of transmitting the actual content of the topic, while the student plays a more or less passive role and simply listens to the material; as a means of managing the educational process in the form of a textbook; as a means of active learning (for example, language labs).

The use of audio materials in the educational process has been studied more deeply. Among the works affecting the formation and development of new learning tools, including in the form of audiobooks and other audio files,

are the empirical studies by D.C. Richardson *et al.* [15], L.J. Silbert *et al.* [16], F. Sukalla *et al.* [17] and other researchers. Despite the fact that in recent years there have been changes in higher education in Kazakhstan aimed at introducing digital technologies into the educational process, there is a rejection by part of the pedagogical community of gamification as a teaching method. In order for the use of gamification and audio materials in higher education to become more "legitimate", it is necessary not only to develop appropriate methodological tools, but also empirical research proving their effectiveness. This will contribute, on the one hand, to deepening knowledge about the impact of these technologies on the online learning process, and on the other hand, it will improve the quality of training of future specialists, meeting the needs of the modern labour market.

The purpose of the study was to identify empirically to what extent individual means of information delivery influence the attention and perception of educational material by students in the process of online learning.

## Literature Review

The active development of the electronic educational environment began about 10 years ago, and today it covers schools, colleges, institutes, and universities. Although the academic community as a whole recognises that the use of the latest information and communication technologies (ICT) and digital devices facilitates the development of variable training programmes and solves issues of differentiation and individualisation of training considering individual needs, physical and intellectual capabilities of students, there are many conflicting opinions in world science regarding the use of gaming, computer, and other new learning technologies.

One of the first academic publications on the topic of gamification belongs to A. Antonaci *et al.* and refers to the 1980s [7]. The first documented use of the term "gamification" dates back to 2008, but the term did not become widespread until 2010. Nowadays, researchers continue to use other definitions, as well as introduce new ones, such as "funware", "productivity games", "surveillance entertainment", "playful design". [18]. Nevertheless, "gamification" has managed to gradually institutionalise not only as a household term, but also as a scientific term.

In modern literature, gamification is studied mainly in three fields of science: marketing [19; 20], management [2; 21], and education [22-29]. In education, the gamification method is widely used in primary, secondary and higher education, as most studies confirm that this technology increases the effectiveness of learning. The game is one of the oldest ways to develop, teach, and stimulate creativity. The main value of gamification is that it is an indicator of voluntary participation in the educational process [30]. Games not only attract new participants, they encourage the daily use of the game by students, introducing them to a new digital culture. Researchers distinguish three types of gamification in the field of education [28]:

- deep, when the student is completely immersed in the world of the game;
- light, when only the elements of the game are used in the learning process;

– intermediate, i.e., combining the principles of the other two approaches.

The convergence of gamification with other learning technologies allows enriching students with new knowledge, opens up opportunities for experiments, and presents educational material in a more perceptible form. Gamification has different meanings and connotations content-wise. For example, S. Deterding *et al.* divided gamification into three categories: gaming technologies, gaming practices, and game design [18]. Regarding the design of game design, these authors draw attention to the fact that this process consists of five levels:

- interface design patterns;
- game design patterns or game mechanics;
- design principles, heuristics, or “lenses”;
- conceptual models of game design units;
- game design methods and design processes.

To increase the effectiveness of gamification in the learning process, V.A. Koleno & E.V. Filatova suggest observing a number of principles [24]:

- organisation of the game environment;
- distribution of playing roles between students, considering their individual characteristics;
- compliance with the rules of the game;
- mastering the skill of collective decision-making;
- time regulation;
- constant updating of information and forms of its presentation;
- mandatory participation of each student in the entire game cycle.

Thus, gamification is more than the use of game elements in training: a simple implementation of game elements does not guarantee a result. The choice of game elements and their design should be related to the problem being solved, the target audience, and compliance with certain rules [31].

Interest in audiobooks is also increasing in higher education. Audio reading has already become an alternative to reading from paper and an interactive screen. Audiobooks have features compared to a printed book: they help save time, make reading more comfortable for the audience, and allow perceiving familiar stories in a new way. Thus, M. Rubery suggests that “audiobooks do not require the same level of concentration as printed books,” on the other hand, the researcher noted the development of “attentive listening” techniques [32]. Evaluating listening to an audiobook in comparison with reading, the researcher also notes that “this is a passive activity” compared to traditional reading, which requires active behaviour, including, for example, decoding and interpretation.

L.J. Silbert *et al.* have proved that listening to the narration recreates the same basic pattern of brain activity as the story, suggesting that listening to the story is qualitatively and quantitatively similar to experiencing the events of the speaker himself [16]. If watching a video is a more passive process due to the fact that there are fewer opportunities for personal interpretation, then the spoken words have a single modality, namely listening. What is heard is directly transmitted to the listener, even without additional interpretation of the information. Oral narration requires more active participation from the listener. Conceptually, narrative engagement is a

phenomenological experience of narrative processing that can be expressed in a self-report.

F. Sukalla *et al.* established the connection between involvement in audiovisual narration and physiological indicators [17]. In the study by D.C. Richardson *et al.*, participants reported greater involvement in watching videos compared to listening to auditory scenes, they had stronger physiological responses to auditory stories, including a higher heart rate, greater electrodermal activity, and even higher body temperature [15]. But according to these experimenters, the results obtained are physiological evidence that the stories were more cognitive and emotionally attractive when presented in an auditory format. The data obtained indicated that more cognitive and emotional processing of information was involved when listening than when watching a video. In its simplest form, a rapid heartbeat was an indicator of increased effort. In fact, the listener mentally models the narration, while the viewer passively processes the visualisation.

M. Ababkova & V. Leontyeva suggest that special attention should be paid to controlling and measuring educational materials that can be evaluated from the standpoint of student perception [33]. Researchers have found that when passing online tests on the discipline “Fundamentals of Marketing”, 10% of 120 students made mistakes related to the inattentive reading of assignments; 5% did not complete an additional task that was not included in the main test (while the question remained open about whether they saw it or did not look at the screen, after completing all the test tasks).

The study by J. Zaletelj & A. Košir suggests an approach to the automatic assessment of students’ attention during lectures in the classroom [34]. In this case, the experimenters used two-dimensional (2D) and three-dimensional (3D) data obtained by the Kinect One sensor to create a set of functions characterising both the face and the properties of the student’s body, including the point of view and body position. The results showed that the Kinect-based attention monitoring system is able to predict both students’ attention over time and the average level of attention, which can be used as a tool for unobtrusive automatic analytics of the learning process.

Thus, in modern science, an array of empirical data has been formed on the impact of new technologies on the attention, motivation and perception of students, where the need for a wider application of these technologies in the educational process is argued. At the same time, additional empirical studies are needed to prove the feasibility and effectiveness of the use of gamification and audio materials in online education in higher education.

## **Materials and Methods**

The research methodology included a review of empirical research on the topic, a series of online surveys of students of Kazakhstani universities, experimental methods, questionnaires, and self-reports. The pilot study was of an experimental nature, since similar studies had not been conducted in Kazakh universities before. The object of the study was students’ ideas about online learning and the effectiveness of using gamification and audio content in the educational process. The study involved first to fourth-year students at Almaty Management University, Al-Farabi Kazakh National University, and International IT

University. The universities were selected according to the criterion of the most active introduction and use of new information and communication technologies (ICT) and distance learning platforms among universities of the Republic of Kazakhstan, as well as by position in the National Ranking of Universities of Kazakhstan, the Times Higher Education Impact Rankings, and other international rankings [35].

The results are measured using a five-point Likert scale, computer technologies and neuromarketing technologies (eye tracking and face reading). To fulfil the purpose of the study, the following initial hypotheses were formulated:

1. Hypothesis 0: Students' perceptions of online learning are generally positive.
2. Hypothesis 1: Gamification improves the attention and perception of educational material by students.
3. Hypothesis 2: Audio content improves the attention and perception of educational material, since when

listening, students need to spend extra effort to imagine what they heard.

4. Hypothesis 3: Gamification influences the attention and perception of educational material by students as effectively as audio content.

The study was conducted from March to June 2022 and included several stages. At the preliminary stage, a Questionnaire was drawn up "Students' ideas about online learning", consisting of 25 questions, and the total number of students studying in the surveyed Kazakh universities was determined. It was 26,000 people: Almaty Management University (4,400), Al-Farabi Kazakh National University (20,000), and International IT University (4,000). With the general population N=28,400, the adjusted sample population was 500 respondents (Table 1).

**Table 1.** "Control measurement" of the intermediate sample

Indicator	Almaty Management University	Al-Farabi Kazakh National University	International IT University	Total
Share of universities in the general population (%)	15.5	70.4	14.1	100
Estimated number in the final sample population (people)	160	700	140	1,000
Estimated number in the intermediate sample population (people)	110	300	90	500
Actual number in the intermediate sample population (people)	95	322	83	500

To calculate quotas, the percentages of the number of university students to the total number of students were derived. It was assumed that each of these universities held classes in an online format. Invitations were sent to students to take part in the survey on social networks and by e-mail. Previously, an online survey of half of the respondents was conducted to identify a statistical pattern based on whether the respondent participates in the online learning format at their university. As a result, the actual number of the intermediate sample population was clarified and amounted to 500 people: Almaty

Management University (95), Al-Farabi Kazakh National University (322), and International IT University (83). Using a pre-compiled questionnaire, an online survey of students was conducted for their ideas about online learning. Then the questionnaire was adjusted considering the previously received answers of students and included 10 questions (Table 2). According to the instructions, it was possible to choose only one answer option. Each answer option (except Q3) was assigned an ordinal number from 1 to 6, depending on the number of answer options.

**Table 2.** Questions and answers of the Questionnaire "Students' ideas about online learning"

No.	Questions	Answer options
Q1	Your gender.	1) male; 2) female.
Q2	Year of study.	1) first; 2) second; 3) third; 4) fourth.
Q3	Please indicate your speciality.	
Q4	What are your feelings and emotions about having to switch to online learning?	1) interest in something new and unusual; 2) confusion, uncertainty about my involvement in the learning process; 3) anxiety; 4) joy; 5) there were no special feelings and emotions; 6) other.
Q5	How have you adapted to the new conditions of online learning?	1) excellent; 2) good;

		3) satisfactory; 4) bad.
Q6	Is it convenient for you to study online?	1) yes, convenient (I like it); 2) yes, but difficult; 3) no, it is very difficult; 4) no, too easy; 5) difficult to answer.
Q7	How do you assess the work of the teaching staff in the framework of online learning?	1) excellent; 2) good; 3) satisfactory; 4) bad.
Q8	How has your interaction with the supervisor changed with the transition to the remote format?	1) it has become more productive, there is an opportunity to quickly discuss problems, solve current issues; 2) it has not changed; 3) it has become less productive.
Q9	How do you assess the effectiveness of your own academic work in the current semester in the online learning format?	1) it became more efficient; 2) it has not changed; 3) work efficiency has decreased slightly; 4) work efficiency has decreased significantly; 5) difficult to answer.
Q10	What technical problems do you personally face the most in the process of online learning?	1) technical interruptions in the process of reproduction of the material; 2) bad feedback; 3) sound problems; 4) problems with loading the presentation by the teacher; 5) frame delay (poor speed); 6) there were no problems.

At the subsequent stages of the study, the selected participants (N=30) were informed about the experiment. The experiment was conducted on a PC using an online testing platform. At the first stage, a pilot study of students' ideas about online learning was conducted (Questionnaire "Ideas about the use of gamification and audio materials in online learning"). At the second stage, to test hypotheses, the subjects – economics students aged 17-25 years (due to some technical errors, the final sample was 30 people) were distributed to view electronic presentations with animation and gamification elements, then the experiment was completed individually in a research laboratory.

The criteria for selecting participants in the experiment were: no glasses, no photosensitive migraine or epilepsy, and more than 5 hours of sleep the night before the experiment. A total of 11 additional participants were excluded from the experiment. The participants gave their written consent to the experiment. When viewing each presentation with gamification, the participants' psychophysiological measurements were recorded using eye tracking and face-reading technologies. Audio accompaniment was introduced with specific settings and was accompanied by viewing the same presentations, after which psychophysiological measurements were also carried out and questionnaires were filled out. Eye tracking was carried out using the iMotion – Tobii Pro Glasses 2 software product. This technology allowed determining the mental load on the subjects when using gamification and audio materials; the Tobii Pro Glasses 2 eyetracker, together with the Tobii Pro Lab software, made it clear where the student was looking first when demonstrating an electronic presentation. Tobii Pro Glasses 2 device consists of two main units: a head unit containing sensors and a recording

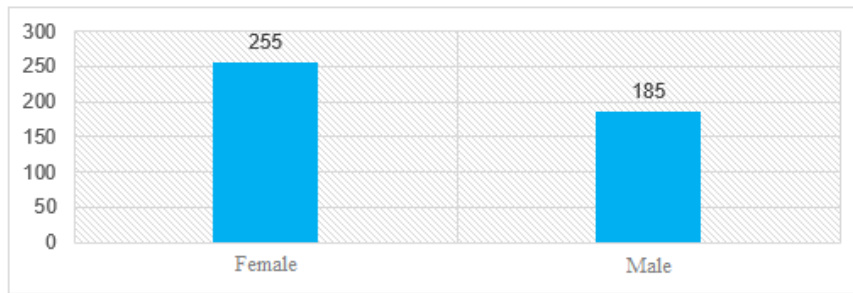
unit including an integrated system. The head unit has the structure of ordinary glasses and includes a set of infrared projectors and infrared cameras for simultaneous tracking of the position of both pupils using two methods of reflection of the cornea and dark pupil. The recording device is an integrated system connected to the head unit via an HDMI cable. It can send streaming video and data over a network (Wi-Fi or Ethernet) and saves recordings on a removable SD card. Before the experiment, the equipment calibration procedure was carried out, when the eye tracking device measured the characteristics of the user's eye and calculated the gaze movement data. The typical accuracy of determining the direction of the gaze is 0.25-0.5, it is almost impossible to achieve better accuracy due to the improvement of equipment. For the best systems of video recording of eye movements, the stability can be 0.01 [36].

The evaluation of microexpressions of the face (nonverbal signals, emotions) during the demonstration of an electronic presentation was carried out using face reading technology. This procedure included a video recording of the respondents' faces, which was then analysed individually for each participant. Further, the respondents' data were analysed together. The accuracy of emotion detection averaged 89%. The results obtained after viewing presentations using eye tracking and face reading technologies were compared with the data obtained when viewing presentations without the use of special equipment and software. For all self-reports, five-point Likert scales were used, two intermediate statements "completely disagree" (1) and "completely agree" (5) were located at the poles. The average value was the number "3", which corresponded to the answer "difficult to

answer”. At the final stage, to test hypotheses, the results of the study were analysed and summarised; the estimates obtained were compared; conclusions were formulated.

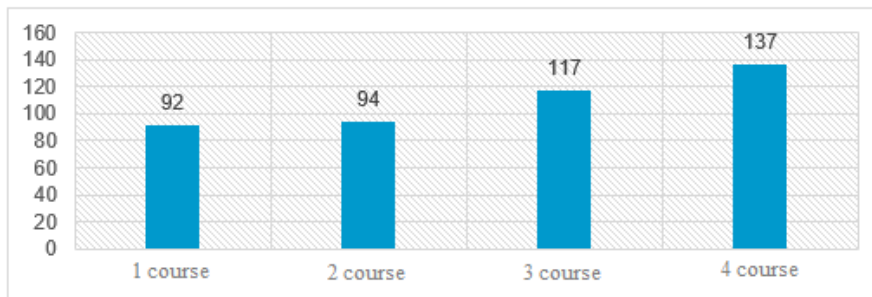
**Results**

At the preliminary stage of the study, after dropping out low-quality answers, the final sample included data on 440 students: 185 (42%) male and 255 (58%) female, which was 88% of the planned sample size (Figure 1).



**Figure 1.** Distribution of students by gender, people

Of these: students in the 1st year – 92 people (20.9%); 2nd year – 94 people (21.4%); 3rd year – 117 people (26.6%); 4th year – 137 people (31.1%). Distribution of students by the year of study shown on Figure 2.



**Figure 2.** Distribution of students by the year of study, people

An online survey (Questionnaire “Ideas about the use of gamification and audio materials in online learning”) was attended by students of various specialities: geography, journalism, information technology, logistics,

marketing, management, public relations, tourism, accounting and auditing, philosophy, finance, law. Based on the results of the online survey, a summary table of answers to questions Q4-Q10 was compiled (Table 3).

**Table 3.** Summary results of answers to the Questionnaire questions “Students’ ideas about online learning”

No.	Questions	Answers, %					
		1	2	3	4	5	6
Q4	What are your feelings and emotions about having to switch to online learning?	22.5	22.5	20.7	5.7	27.5	1.1
Q5	How have you adapted to the new conditions of online learning?	35	41.1	20.2	3.7	-	-
Q6	Is it convenient for you to study online?	33.9	25.5	20.2	16.8	3.7	-
Q7	How do you assess the work of the teaching staff in the framework of online learning?	22.9	45.7	24.5	6.9	-	-
Q8	How has your interaction with the supervisor changed with the transition to the remote format?	26.6	45.9	27.5	-	-	-
Q9	How do you assess the effectiveness of your own academic work in the current semester in the online learning format?	20.2	32	25.8	14	8	-
Q10	What technical problems have you personally encountered in the process of online learning?	18.6	18	6.1	16.8	8.7	31.8

The data in Table 3 indicate that students (27.5%) did not experience any special feelings and emotions during the forced transition to online learning, 22.5% indicated an interest in something new and unusual, but the same number noted that they experienced confusion and uncertainty about their involvement in the educational

process. The majority adapted well to the new learning conditions (41.1%), 35% rated “excellent”, and 20.2% rated their adaptation “satisfactory”. Only a third of respondents like online learning (33.9%), while 25.5% noted the complexity of online learning, and 20.2% – experience serious difficulties. The work of the teaching

staff in the framework of online training is rated “good” by students (45.7%), but 24.5% of students rated teachers “satisfactory”. Interaction with the supervisor with the transition to the distance format and the effectiveness of students own academic work have practically not changed, as indicated by 45.9% and 32% of respondents, respectively. Students gave “leadership” on technical

problems in the online learning process to interruptions in the process of reproducing material (18.6%) and poor feedback from the teacher (18%), while 31.8% did not feel technical problems at all. After using the game method and audio materials, the students compiled self-reports, the summary results of which are presented in Tables 4 and 5.

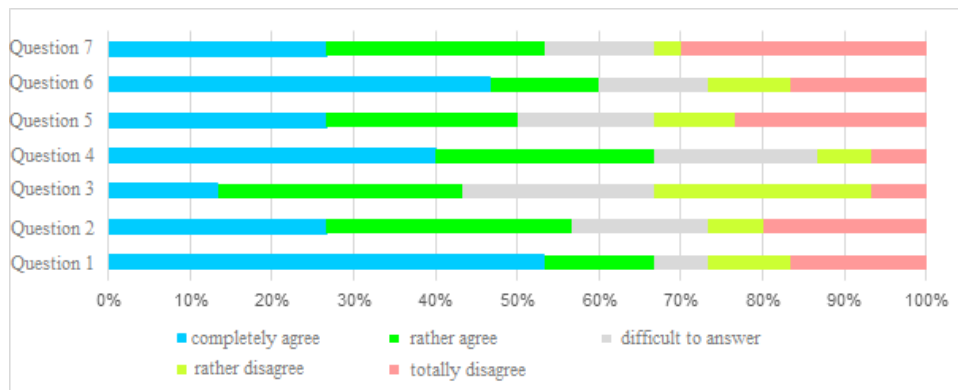
**Table 4.** Summary results of students’ self-reports on the use of gamification

No.	Statements	Answer options*, people				
		1	2	3	4	5
1	I highly appreciate the game as a learning method	16	4	2	3	5
2	The game allowed me to better understand the topic of the training material	8	9	5	2	6
3	It seems to me that I’m just wasting time when the game is being used	4	9	7	8	2
4	It is easier for me to perceive educational material with the help of a game	12	8	6	2	2
5	I still have a lot of questions after using the game	8	7	5	3	7
6	I appreciate the game, but sometimes I am not interested in it	14	4	4	3	5
7	I believe that the game is the best way to study educational material	8	8	4	1	9

**Note:** \* – 1) I completely agree; 2) I rather agree; 3) I find it difficult to answer; 4) I rather disagree; 5) I completely disagree.

The analysis of students’ self-reports showed that students in general highly appreciate the potential of gamification (16 fully agree with the statement “I appreciate the game as a learning method” out of 30 possible; 14 fully agree with the statement “I appreciate the game, but sometimes I’m not interested in it”). However,

for 17 of the 30 participants of the experiment, the game did not become a means to better understand the topic of the educational material, 12 students found it easier to perceive the educational material with the help of the game, and 15 had a lot of questions after the game (Figure 3).



**Figure 3.** Results of students’ self-reports on the use of gamification

Thus, the results of the analysis of students’ self-reports on gamification indicate a high assessment of the game as a teaching method. At the same time, about a third completely disagree with the statement that the game is the optimal way to study educational material. Self-reports on

audio materials showed slightly different results (Table 5): half of the respondents (15) highly appreciated the use of audio content; it allowed 12 students to better understand the topic; 10 students find it easier to absorb the learning material with it (Figure 4).

**Table 5.** Summary results of students’ self-reports on the use of audio materials

No.	Statements	Answer options*, people				
		1	2	3	4	5
1	I highly appreciate the use of audio content	15	10	3	2	-
2	Audio content allowed me to better understand the topic of the training material	12	8	5	3	2
3	It seems to me that I am just wasting time listening to audio content	1	-	6	10	13
4	It is easier for me to perceive educational material with the help of audio content	10	10	8	1	1
5	I still have a lot of questions after watching the presentation with audio content	-	2	8	8	12

6	I appreciate the audio content, but I did not like the presentation	1	1	-	15	13
7	I believe that presentation and audio content are the best way to study educational material	18	5	2	3	2

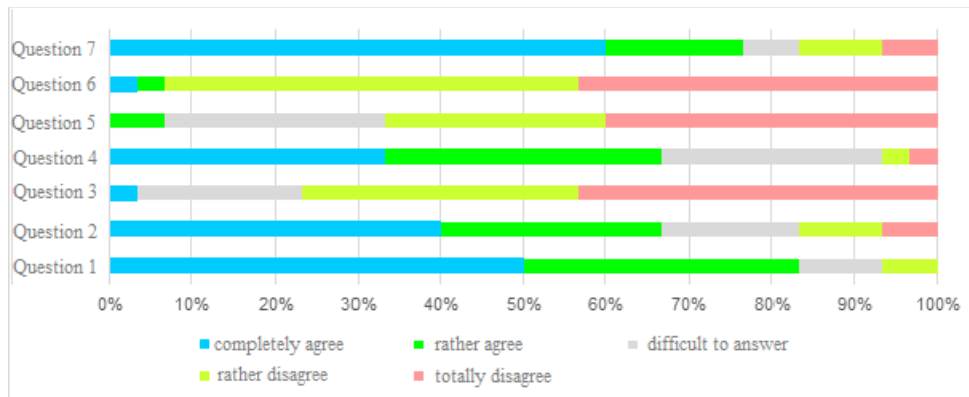


Figure 4. Results of students’ self-reports on the use of audio materials

The results of the analysis of self-reports on the use of audio materials, in general, showed that only half of the participants in the experiment unequivocally rate this technology highly. At the same time, most believe that presentation and audio content are the best way to study

educational material. The analysis of the statistics of microexpressions of the face as a whole confirmed the compliance of the data obtained with the results of students’ self-reports on the use of audio materials (Table 6).

Table 6. Summary descriptive statistics of significant indicators of facial microexpressions (N=30)

Indicators	M	SD	Mdn
Total emotions	28.4	13.87	28
Total positive	18.86	11.23	16
Total negative	8.4	7.18	7
Satisfaction	7.58	7.27	6
Engaging emotions	4.59	4.05	4
Contempt	2.08	3.07	1
Fear	0.67	1.27	0
Sadness	4.56	3.95	4

Note: M – arithmetic mean; SD – standard deviation; Mdn – median.

Results of students’ answers (N=440) to the Questionnaire “Students’ ideas about online learning” showed that the subjects are equally interested in something new (22.5%), but also insecure about their involvement in the learning process (22.5%) (Table 3). However, the majority of students (27.5%) do not experience any special feelings and emotions when switching to online education, which indicates experience and familiarity with new technologies. 20.7% are experiencing excitement, 5.7% were happy about the forced transition to the online format. The cumulative positive assessment by students of their adaptability to new learning conditions was 76.1%. 35% adapted “excellent”, 41.1% “good” and 20.2% “satisfactory”. The convenience of learning online was highly appreciated by a third of students (33.9%), 25.5% experienced minor difficulties, and 20.2% stated difficulties in mastering the material. At the same time, 16.8% did not experience any problems. Thus, the cumulative assessment of online learning (45.7%) indicates that students are experiencing certain difficulties.

About half of the respondents (45.7%) rated the work of teachers more positively than negatively, and 24.5% – rather negatively. These data indicate the need to improve

the professional qualifications of teachers working online. 45.9% of students noted that their interaction with the supervisor has not changed with the transition to the distance format, but 27.5% are convinced that it has become less productive. Only 20.2% of students believe that the effectiveness of their own academic work in the current semester in the online learning format has increased. At the same time, 14% believe that efficiency has decreased. Most often, students encounter such technical problems during online classes as: interruptions in the process of reproducing material (18.6%); poor feedback (18%); problems with loading presentations (16.8%). A third of respondents (31.8%) claim that they do not experience any technical problems. As a result, Hypothesis 0: “Students’ perceptions of online learning are generally positive” found only partial confirmation. The results obtained can be explained by the insufficient readiness of Kazakhstani students and teachers to study online. The analysis of students’ self-reports allowed for the conclusion that audio content improves attention and perception of educational material. However, the effectiveness of using gamification turned out to be lower compared to audio content. Thus, the hypothesis “audio content improves attention and perception of educational

material” was confirmed, but the hypothesis “gamification affects the attention and perception of educational material by students as effectively as audio content” was not confirmed.

As a result of the introduction of the author’s methodology, the following conclusions can be formulated: contrary to stereotypes, the influence of gamification and audio materials on the effectiveness of perception of educational material in the process of online learning is not so obvious. Teachers and students, of course, can use these learning tools, but they can only be used as additional (auxiliary) tools for delivering information. Such teaching tools can only partially replace the personal contacts of the student and the teacher, and increase the visibility of educational materials. But gamification and audio materials are not suitable for everyone. In this regard, teachers are recommended to implement the considered teaching tools differentially, depending on the preferences of the students themselves. The following hypotheses were not confirmed: “Gamification improves the attention and perception of educational material by students” and “Gamification influences the attention and perception of educational material by students as effectively as audio content”.

## **Discussion**

The processes of digitalisation and globalisation affect all spheres of public life and influence the emergence of certain innovations. The educational sector is no exception. Due to these processes, the online learning format, which is implemented through the use of information and communication technologies, acquires special relevance and importance [37]. In this regard, it is worth considering in more detail some innovations and assessing their impact on the effectiveness of the educational segment. Students should have a lot of information, be able to apply their knowledge in practice and constantly develop in this line. It is very important that a high level of motivation and interest in learning is maintained at the same time. To solve this problem, it is proposed to combine gamification, audio materials, and e-learning. Firstly, modern technologies allow learning in a virtual environment, and educational institutions use corporate portals to organise distance learning. Secondly, electronic platforms provide a wide range of tools for creating content and its gamification. Thirdly, the virtual environment and computer games create a comfortable environment for students, which contributes to successful educational activities. In this regard, it is important to analyse the impact of gamification and audio materials on the effectiveness of learning.

According to E.C. Candel *et al.*, in modern conditions, the concept of “gamification” should be understood as the application of game format techniques, game design elements and techniques in a non-game context [38]. The authors of this study agree with this statement and add that the meaning of the “gamification” process is that it allows reusing the inherent elements when creating new products that are not directly related to games. According to A. Segura-Robles *et al.*, in the educational segment, this process is characterised by the implementation of an approach to increasing the motivation of students through the use of game elements and video games in teaching [39]. In this case, it is worth adding to the position of the authors

that the main goal is to achieve maximum involvement of students by increasing their interest in continuing the implementation of training.

Gamification of education involves the use of game elements to facilitate the process of studying the material and motivating students. C. Peláez & A. Solano noticed that people spend a lot of time playing computer games, and tried to use this passion for educational purposes [40]. One should agree with this statement; for students accustomed to technology, gamification can be an effective method of motivating and supporting interest in learning. The use of gamification allows one to find a balance between achieving educational goals and meeting the interests and needs of students. One way of gamification is to create online courses using interactive game elements, such as time constraints, competition, feedback, and the ability to repeat a task.

In pedagogy, there is a separate type of training based on the use of computer games. Students create their own programmes and games or use paid platforms to play. In this context, computer games are used as a learning goal. Gamification does not use computer games as such, but only individual elements of these games. These elements are especially popular among students when they are included in the game context. As noted by I. Oropeza *et al.*, gamification is based on several basic elements, such as a points system that displays progress in the game space, badges-rewards for achieving high results, and a leader board that displays the progress of participants in the game space in relation to other participants [41]. It is necessary to agree with the position of the authors and add that the use of gamification in additional education can help develop the skills and abilities of students in different fields of activity. Gamification uses the mechanics of computer games that can stimulate the highest level of neuropsychological activity in students. The mechanics of gamification is based on the psycho-emotional needs of students and helps to meet these needs to a certain extent. Thus, gamification is an effective method of enhancing the educational process. Among the main positive aspects of the application of gamification, it can be noted that the development of certain skills occurs without performing routine actions, which helps to increase motivation and interest in the subject being studied. It is worth noting that gamification is an effective and productive technology in the process of developing various types of speech activity in a foreign language and the development of lexical and grammatical skills and rules for their use in communication. Careful planning and preliminary testing of selected computer didactic games are the main components of the technology of using computer games in training [42; 43].

The importance of using audio materials in the educational process should also be mentioned. Listening is one of the ways of speech activity and an effective means of learning. It includes the perception and understanding of oral speech [44]. T. Bates writes that modern researchers consider listening and reading to be important perceptual types of speech activity that help to master the language, including the phonetic side, vocabulary, and grammar [45]. It is impossible not to agree with this position, as it also provides samples of natural speech that can be used as examples and support for creating students’ own

statements. In the process of introducing audio materials into training, skills such as analysis, comparison, generalisation, concretisation, internal pronouncing, and anticipation are used. Listening also helps activate memory and imagination. That is, it is an integral part of the learning process. The main purpose of using audio materials in teaching is to teach students to understand speech that sounds by ear, especially when it contains unknown vocabulary, the meaning of which can be understood by context [46; 47]. Ultimately, students should be able to understand any speech by ear in everyday situations and while communicating with native speakers. To achieve this goal, it is necessary to develop auditory memory, form language listening skills, and improve the ability to freely perceive speech by ear at any pace, including fast speech. It is worth highlighting three types of listening – selective, introductory, and detailed. The first one should be understood as the selective extraction of information by the student, that is, specific facts, details, features, and other things. The second type allows the student to learn the skill of extracting the most important information; that is, the student can ignore any details. The third type denotes the complete decoding of the essence and meaning of the audio material [48; 49].

S. Sapkota mentions that audio materials in the educational process should possess some characteristics [50]. Thus, it is worth agreeing with this, since it is very important that they be selected based on the age and psychological characteristics of the group of students, the step-by-step nature of the development of the skills of the auditory plan, increasing the level of motivation by choosing a specifically important and interesting topic for a group of students. It is important to mention that when using audio materials, it is necessary to transfer students from the initial level of understanding of texts to a higher one. It is worth noting that a student who does not have the skills to translate has been heard will not be able to use guesses, assumptions, forecasting, context, knowledge and understanding of the topic of the text in order to understand the general meaning of the listened audio material. These elementary skills must be mastered before moving to higher levels of working with audio material.

Based on the above, the successful development of listening depends on several factors. These include the level of motivation of students, the quality of the audio material presented, the clarity of goals and objectives for students, the nature of previous work at the stage of preliminary listening, the organisation of the final stage of work with audio material, on the type and form of listening, on the general level of language training of students, and other parameters. The specific features and difficulties of learning listening should be considered, and success in this process depends on the capabilities of students and learning conditions. Thus, gamification processes and audio materials are quite effective ways of implementing the educational process. They provide students with the

opportunity to increase their own level of motivation in learning, form communication skills, speech competence, and analyse a vast amount of information. This allows developing competitive future specialists who are able to master a wide range of information.

## Conclusions

The purpose of the pilot study was to identify empirically to what extent individual means of information delivery influence the attention and perception of educational material by students in the online learning process. The research methodology included a review of empirical research on the topic, a series of online surveys, experimental methods, questionnaires, and self-reports of students. The pilot study was experimental in nature. The object of the research is students' ideas about online learning and the effectiveness of using gamification and audio content in the educational process. The participants of the online surveys and the experiment were students of Almaty Management University, Al-Farabi Kazakh National University, and International IT University (N=440; N=30). The analysis of the results showed that the effectiveness of using gamification and audio materials in online learning is contradictory: on the one hand, the use of these technologies by students is evaluated positively – the cumulative positive assessment by students of their adaptability to new learning conditions was 76.1%; but on the other hand, 20.2% of students believe that the effectiveness of their own academic work in the online learning rate has increased, and 14% believe that the effectiveness has decreased.

During the experiment the hypothesis that “Students' perceptions of online learning are generally positive” was partially confirmed, and the hypothesis “Audio content improves attention and perception of learning material” was confirmed, but the following hypotheses were not confirmed: “Gamification improves students' attention and perception of learning material” and “Gamification influences students' attention and perception of learning material as effectively as audio content”. Gamification and audio materials as a means of delivering information in the educational process can only partially replace the personal contacts of a student and a teacher, increase the visibility of educational materials, and make it more interesting for the majority of the audience. However, gamification and audio materials are not suitable for everyone. In this regard, teachers are recommended to implement the considered teaching tools differentially, depending on the preferences of the students themselves.

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## Conflict of Interest

None.

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## **Вплив гейміфікації та аудіоматеріалів на ефективність сприйняття навчального матеріалу в онлайн-навчанні**

**Діана Камаладін**

Університет Камалладін

050040, вул. Бухар Жирау, 33, м. Алмати, Республіка Казахстан

### **Анотація**

**Актуальність.** Онлайн-освіта в Республіці Казахстан (РК) перейшла у вищу освіту. Нині накопичено унікальний досвід роботи в синхронному та асинхронному форматах, організовано курси підвищення кваліфікації викладачів для вдосконалення роботи з використанням ІТ-технологій, постійно розробляються та впроваджуються нові навчальні онлайн-програми та курси.

**Мета.** Ця стаття містить результати пілотного дослідження, метою якого було виявити, якою мірою окремі засоби доставки інформації впливають на увагу та сприйняття навчального матеріалу студентами в процесі онлайн-навчання.

**Методологія.** Методологія дослідження включала огляд емпіричних досліджень за темою, серію онлайн-опитувань, експериментальні методи, анкетування та самозвіти студентів. Пілотне дослідження мало експериментальний характер.

**Результати.** Аналіз результатів показав, що ефективність використання гейміфікації та аудіоматеріалів в онлайн-навчанні є суперечливою: з одного боку, використання цих технологій студентами оцінюється позитивно - кумулятивна позитивна оцінка студентами своєї адаптованості до нових умов навчання склала 76.1%, але з іншого боку, 20.2% студентів вважають, що ефективність власної навчальної роботи в умовах онлайн-навчання зросла, а 14% вважають, що ефективність знизилася.

**Висновки.** Гейміфікація та аудіоматеріали як засіб донесення інформації в освітньому процесі можуть лише частково замінити особисті контакти студента та викладача, підвищити наочність навчального матеріалу та зробити його цікавішим для більшості аудиторії. Однак гейміфікація та аудіоматеріали підходять не всім. Викладачам рекомендується впроваджувати розглянуті інструменти навчання диференційовано, залежно від уподобань самих студентів.

**Ключові слова:** навчальний процес; гра; презентація; вища освіта; ІТ-технології.