Salud, Ciencia y Tecnología - Serie de Conferencias. 2025; 4:1311
doi: 10.56294/sctconf20251311

ORIGINAL

Using Adobe Creative Cloud to create multimedia content in higher education institutions

Uso de Adobe Creative Cloud para crear contenido multimedia en instituciones de educación superior

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Cite as: Snihur O, Maleyka Jamshid A, Golubytskyi S, Hrechko A, Prockopets K. Using Adobe Creative Cloud to create multimedia content in higher education institutions. Salud, Ciencia y Tecnología - Serie de Conferencias. 2025; 4:1311. https://doi.org/10.56294/sctconf20251311

Submitted: 08-05-2024 **Revised:** 15-08-2024 **Accepted:** 12-12-2024 **Published:** 01-01-2025

Editor: Prof. Dr. William Castillo-González

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ABSTRACT

Introduction: digital content is a powerful tool for enhancing students' interest in the learning process. The aim of the work is to determine the effectiveness of using Adobe Creative Cloud to create multimedia content in higher education institutions (HEIs).
Method: the research employed the methods of observation, deduction, Thurstone scale, calculations of priority coefficient, knowledge coefficient and Student's coefficient.
Results: it was established that during training, Adobe Creative Cloud can be used to conduct theoretical and practical classes and develop students' creative skills. It was established that charts ($p(c)$=1,2) and illustrations ($p(c)$=1,1) have the greatest importance in the created content for students' perception. Textual information is less important for the perception of educational materials ($p(c)$=0,73). The students were found to perceive learning using Adobe Creative Cloud at a high level, which is associated with not overloading students with unnecessary materials and ensuring visual perception. The authors determined that students of Group 1 (Software Engineering) and Group 2 (History) achieved high academic results — (J=1,01), (J=1,0), respectively.
Conclusions: the practical significance of the work is the possibility of expanding students' approaches to building professional competence on the basis of content created using Adobe Creative Cloud.

Keywords: Multimedia Technologies; Practical Possibilities; Creative Development; Information Visualization; Spatial Thinking.

RESUMEN

Introducción: el objetivo del trabajo es determinar la efectividad del uso de Adobe Creative Cloud para crear contenido multimedia en instituciones de educación superior (IES).
Método: la investigación empleó los métodos de observación, deducción, escala de Thurstone, cálculos de coeficiente de prioridad, coeficiente de conocimiento y coeficiente de Student.
Resultados: se estableció que, durante la formación, Adobe Creative Cloud se puede utilizar para realizar clases teóricas y prácticas y desarrollar las habilidades creativas de los estudiantes. Se estableció que los

gráficos ($p(c)$=1,2) y las ilustraciones ($p(c)$=1,1) tienen la mayor importancia en el contenido multimedia creado para la percepción de los estudiantes. La información textual es menos importante para la percepción de los materiales educativos ($p(c)$=0,73). Se encontró que los estudiantes perciben el aprendizaje utilizando Adobe Creative Cloud a un alto nivel, lo que se asocia con no sobrecargar a los estudiantes con materiales innecesarios y garantizar la percepción visual. Los autores determinaron que los estudiantes del Grupo 1 (Ingeniería de software) y del Grupo 2 (Historia) obtuvieron altos resultados académicos: (J=1,01), (J=1,0), respectivamente.
Conclusiones: la importancia práctica del trabajo es la posibilidad de ampliar los enfoques de los estudiantes para desarrollar competencias profesionales a partir de los contenidos creados con Adobe Creative Cloud.

Palabras clave: Tecnologías Multimedia; Posibilidades Prácticas; Desarrollo Creativo; Visualización de Información; Pensamiento Espacial.

INTRODUCTION

In the modern education system, it is a common practice to use innovative technologies as the basis for providing materials or a tool for independent learning.[1] The presentation of information has one of the greatest influences on its perception, therefore the mechanisms of creating a multimedia context in educational institutions are a current research issue.

The educational process is facilitated by the use of multimedia technologies, which, with the help of computer models and virtual technologies, make it possible to transfer material in the form of video recordings, animations, virtual presentations, etc.[2] Multimedia content in the educational process allows adapting information to individual students, ensuring the perception of both visual and audio information.[3] He should be aimed at conveying learning material for students to understand, not just to attract attention. However, the quality of the content that will meet the students' needs should be taken into account. Creating high-quality information design is possible using the Adobe Creative Cloud programme.[4] A wide range of functions affects the creation of presentations that are consciously perceived. Adobe Creative Cloud presents information not in the form of simple text, but with a visual replacement with the purpose of creating associations.[5]

Multimedia content maintains students' interest and optimize learning. The perception of information in a non-standard format increases up to 95 % based on exciting visual elements.[6] However, it is necessary to vary the amount of visual materials that will not distract students from the perception of the main material.[7] Such content should be aimed at the development of logical thinking, as well as visual perception.[8] With the help of Adobe Creative Cloud, students can independently submit educational material that affects creative development. The use of modelling approaches affects the improvement of students' qualifications, expanding practical opportunities. Different graphics affect the quality of the transformation of educational information, which will be more effectively perceived.[9]

The study of the theoretical framework of the research revealed the prevalence of approaches to determining the advantages of content in the educational process. However, the use of Adobe Creative Cloud among students is understudied. This requires a more specialized study. The aim of the work is to determine the effectiveness of using Adobe Creative Cloud to create multimedia content in higher education institutions.

The research objectives were to:

- Develop mechanisms for using Adobe Creative Cloud to create a educational content in the educational process;
- Determine the elements of interactive content that had the greatest impact on students' perception of information;
- Determine the level of students' perception of the used ways of implementing the educational process;
- Determine the level of students' professional development.

Literature review

Microsoft Office and Adobe Creative Cloud are software that increase the effectiveness of the educational process. The authors Jalil et. al.[10] believe that the use of native features of Adobe Creative Cloud allows for the creation of educational content that can be adjusted using mobile devices. This approach has the potential to provide a positive perception of the materials, which improves memorization of the materials and affects overall performance.[10] Sujinah et al.[11] believe that Adobe Flash Creative Cloud can be used in the educational process for creating digital tests. The tests can be created on the basis of providing primary

information analysis, design development. This approach allows students to focus on important details, which affects the overall success of the educational process.[11] The researchers Hamzah et al.[12] note that multimedia content allows for collaborative learning, which affects the improvement of students' thinking skills. It can be the basis for a general understanding among students, enhancing motivation and establishing social tolerance.[12] Despite numerous studies on various approaches to the formation of multimedia content, approaches to the implementation of specific programmes for the creation of multimedia content remain unexplored.

Based on research by AlShaikh et al.[13], it was established that artificial intelligence (AI) contributes to the integration of multimodal experiences in the educational process. The use of AI is possible on the basis of the development of the principles of cognitive theory, which involves active delivery of educational material and allows you to focus on particular educational materials. Such tools can be OpenAI Whisper and Google Large Language Model, the development of which involves combining expert and automatic indicators[13]. The authors Rossiter et al.[14] believe that the use of the mobile resource Pocket Tutor contributes to the solution of educational problems in the higher education system. It can be the basis for the development of self-learning skills, focusing on a multilateral approach. The application provides synchronous interaction of students, eliminating the abstract perception of materials. However, the authors did not investigate the issue of using multimedia content for different groups of students, which allows them to perceive information in the presented format.[14] The authors Michos and Petko[15] note that multimedia technologies in the educational process influence the development of design thinking. Audiovisual multimedia content affects the possibility of improving the initial experience of students, which is associated with a combination of cognitive, productive, socio-cultural features.[15]

Digital technologies influence the possibility of collaborative learning implemented through the use of created multimedia content, as indicated in the study of Giday and Perumal.[16] Digital technologies contribute to dynamic learning, focusing on the quality of the information used, simplicity and usefulness. Based on the obtained data, it was established that this approach to learning enhanced students' motivation due to the diverse content.[16] The authors Dahlan et al.[17] note that multimedia technologies enable the development of more personalized educational content. The use of video learning elements (animations, film charts) enhances students' interest, which encourages active perception of materials and the development of critical thinking. So, interactivity affects the improvement of pedagogical and learning outcomes.[17] However, the issue of determining the progress in student motivation, which ensures active perception of materials, remains unexplored.

The authors Saluky and Bahiyah[18] note that asynchronous video is an effective teaching tool, as it allows students to have free access to educational materials. Active interaction between students can be provided through the use of quizzes, interactive discussions.[18] The authors Alier et al.[19] believe that multimedia learning helps to increase communication between students and influences purposeful learning. The approach can be used as a tool for evaluating information, which reduces the burden on teachers and helps students to learn information. However, it is worth focusing on educational ethics, which involves the use of technology to support the educational process, and not to change it.[19]

The analysed articles gave grounds to state that multimedia technologies are a common tool for implementing the educational process. However, consideration of specific software is not a common issue, which causes contradictions in revealing the depth of the learning process. The study of the capabilities of Adobe Creative Cloud in the educational process is limited enough, requiring to find mechanisms for their adaptation.

METHOD

Research design

The first stage became the basis for conducting the entire study and the possibility of achieving the set goal. The authors proposed ways of using Adobe Creative Cloud in the educational process. The training included lectures and practical classes, which contributed to the effective use of Adobe Creative Cloud for 7 months (September 2023 - March 2024).

The second stage of the research was to determine students' views on the most effective elements of multimedia content. It was taken into account that all interactive elements had to be created using Adobe Creative Cloud. The level of perception of educational materials using Adobe Creative Cloud among students was determined based on the received information.

At the third stage of the study, the level of learning efficiency was determined, focusing on the knowledge gained by students. The effectiveness was determined based on the authors' developed ways to use Adobe Creative Cloud for creating a multimedia content. The assessment of the level of knowledge involved the division of levels into effective learning, average learning efficiency, and ineffective learning. The research procedure is shown in figure 1.

https://doi.org/10.56294/sctconf20251311

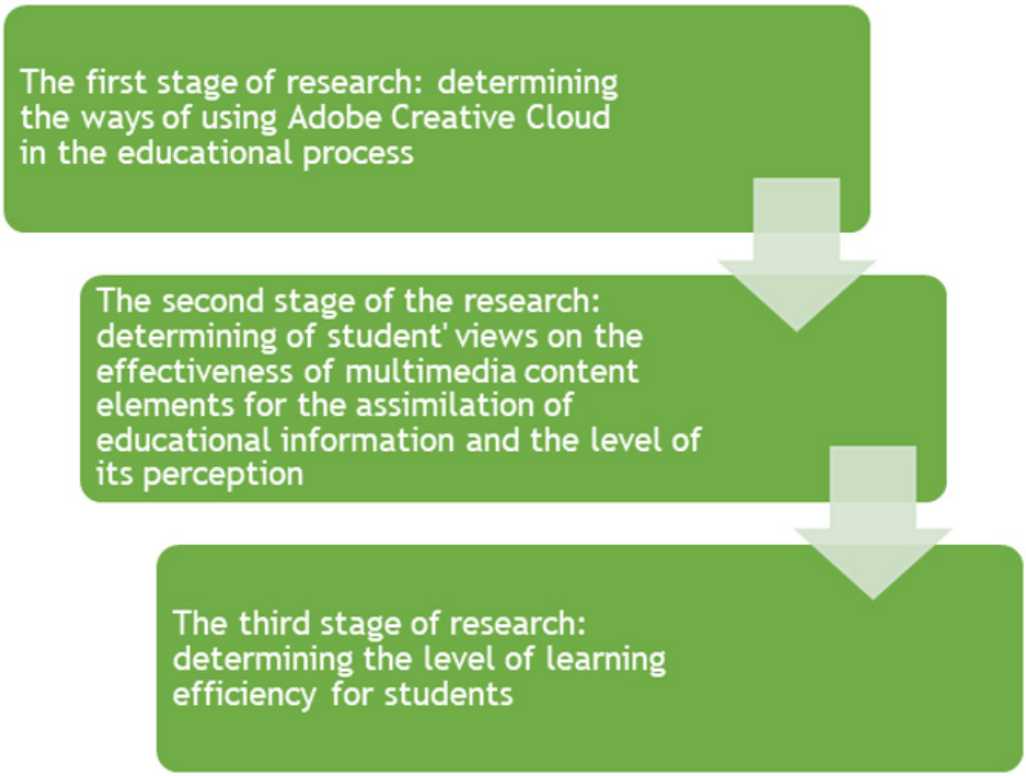

Figure 1. Stages of the conducted research

Sampling

The study involved 218 students of National Pedagogical Dragomanov University (Ukraine) and Western Caspian University (Azerbaijan). The students were divided into two groups of 109 people. Group 1 was represented by students studying at the Department of Software Engineering; Group 2 — students who studied at the Department of History. A purposive sampling method was used for the selection of students, which involved searching for students who meet the following criteria. The students were chosen among students of the 3rd years of study, which was characterized by the possibility of using Adobe Creative Cloud to study specialized subjects. In the first years, students study more general academic subjects, which does not allow to determine the level of further development of professional knowledge. Therefore, at the beginning of the study, 34 students from a possible 252, who were junior students, were excluded. Age and gender characteristics of the respondents were not taken into account during the selection. Only the year of study mattered.

METHOD

The development of ways to implement Adobe Creative Cloud (Figure 2) in the educational process involved the use of a general theoretical method of analysis, methods of observation, and deduction. Based on the analysis, observation and deduction method, the authors determined how it is possible to use Adobe Creative Cloud in the educational process, focusing on the programme functions. The study involved students of different majors (Software Engineering, History), the authors came to the conclusion of the need to apply ways to use Adobe Creative Cloud in creating a multimedia context for different groups of classes. Therefore, the authors focused on ways to use Adobe Creative Cloud to conduct theoretical classes, practical classes and develop students' creative skills. For example, the presented subjects were the basics of programming, algorithms and data structures, software architecture (Group 1). For students of Group 2 — historiosophy of the history of Ukraine, methodology of historical knowledge, historical didactics, etc. The process involved the verification of knowledge already acquired by students.

The Thurstone scale (Appendix A) was used to involve students in determining the most influential elements of multimedia content in the research process. Students had to assign points from 1 to 5 to each educational element (diagrams, colours, illustrations, video materials, text). The process involved determining the elements that primarily influenced the perception of information on the basis of a point assessment. The scored point estimates affected the possibility of calculating the priority coefficient (developed by the authors) (equation 1).

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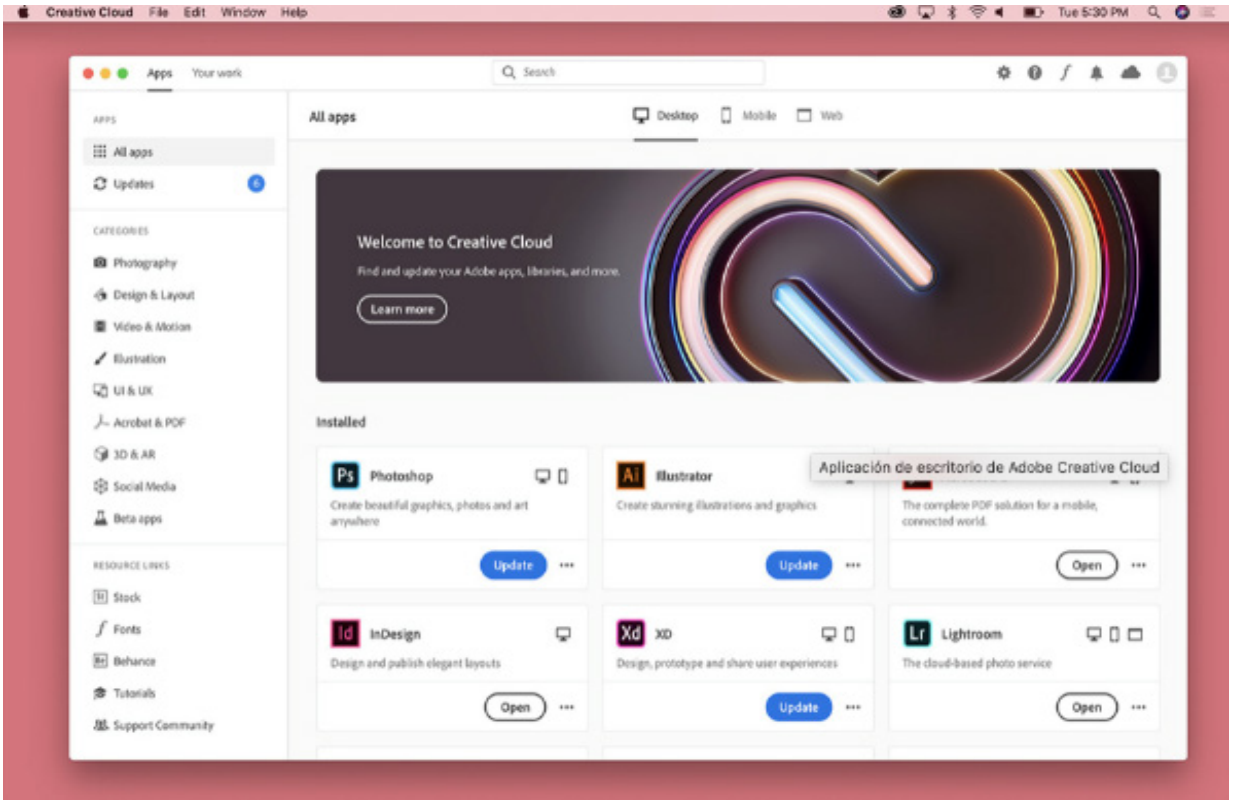

Figure 2. Adobe Creative Cloud software digital tools
Source: Adobe Creative Cloud[20]

$$p(c) = \frac{s+d}{p_i}, \qquad (1)$$

s – an assessment that corresponds to the perception of educational materials for a separately selected parameter;
d – the difference between the studied indicator and the most influential one;
p_i – the maximum positive impact from a separate indicator (equal to 5).

The level of students' perception of educational materials was also determined using the Thurstone scale. [19] The results involved determining the impact of the multimedia context created using Adobe Creative Cloud, which involved memorizing information during classes. This contributed to the presentation of the results in a percentage ratio.

The effectiveness of the professional development of students was determined on the basis of the knowledge coefficient (developed by the authors). The reliability of the developed diagnostics is related to the use of points received by students in the learning process, which excludes the use of non-existent indicators for calculations. In addition, evaluations were made by teachers based on students' understanding of the information received and the ability to freely use it to solve the necessary tasks. The educational process provided for determining the level of students' professional knowledge before and after the research. The results were compared separately among students of Group 1 and Group 2.

$$J = \frac{t+p+c}{k-1}, \qquad (2)$$

t – assigned points for the level of assimilation of theoretical knowledge based on testing;
p – assigned points for the level of practical knowledge;
c – assigned points for the use of a creative approach by students when using Adobe Creative Cloud to prepare a separate topic;
k – the permissible number of points that can be scored by students during their studies.

https://doi.org/10.56294/sctconf20251311

Data analysis

The authors performed statistical calculations in order to confirm the reliability of the obtained results. The Student coefficient influenced the possibility of a better understanding of the processing of the obtained results, which allowed for a more thorough analysis.[21,22] The calculations also influenced the generalization of the obtained data and drawing logical conclusions.

$$t = \frac{M_1 - M_2}{\sqrt{m_1^2 + m_2^2}} \qquad (3)$$

M_1, M_2 – average difference between the analyzed indicators;
m_1, m_2 – the standard deviation observed between the indicators.

The Student's coefficient can be used during the statistical testing of the presented hypotheses. This coefficient became possible to use due to the choice of dependent variables. The use of Student's coefficient calculations allows you to determine the confidence intervals of the final indicators.

RESULTS

During the research, the authors developed ways to use Adobe Creative Cloud to create multimedia content in the learning process. (figure 3).

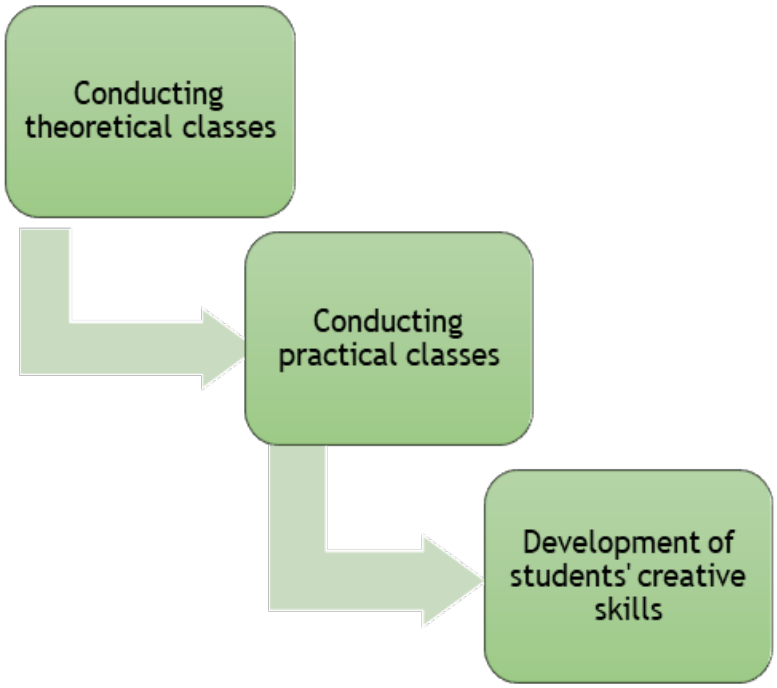

Figure 3. Ways to use Adobe Creative Cloud to create a multimedia content in the educational process

The process of using Adobe Creative Cloud for theoretical classes is the most common approach. During the research, it was envisaged to use a creative approach to create lectures. Information was presented using presentations with elements of video lectures. The creation of infographics involved the ratio of text and illustrations, as well as the use of colours that contribute to the concentration of students' attention (grey, white, yellow, blue). To present theoretical information, it is important to combine graphics, images, text, icons, which affects the possibility of harmonious perception of information. During the presentation of the theoretical material, it was planned to use clickable links, which affected the in-depth perception of information. The use of different colours also helps to distinguish different information. For example, history students can present a visualization of chronological events, combined with illustrations, which promotes better memorization.

Conducting practical classes involved the playback of video materials that reflected the sequence of performing the assigned tasks. The most important information was highlighted in the foreground during the practical classes for assimilation of earlier studied theoretical material with the help of Adobe Creative Cloud.

Ancillary details were indicated in the background, which eliminated overloading with information. It was planned to show several methods for solving the same problem in order to be able to implement practical tasks. This enables identifying not only a more effective way to fulfil the task, but also the most creative one. For example, students majoring in Software Engineering can more clearly control, design software systems, and understand the principles of testing software products. On the basis of materials created using Adobe Creative Cloud, history students could visually perceive individual historical events (fragments from documentaries, videos, etc.). This contributed to a better understanding and perception of information.

The development of students' creative skills involved the study of new topics by students, which became the basis for conducting laboratory, practical classes. The use of Adobe Creative Cloud tools made it possible to present a separate question from the studied topic in the most receptive form. The students used Adobe Creative Cloud to present their projects in a creative format, which affects the possibility of learning new information by other students. The creation of multimedia content by students involves taking into account high-quality visual processing, which reflects the possibility of implementing an individual approach to presenting information. This approach was aimed at students' understanding of educational algorithms and processes to freely use them for processing and revealing creative skills in students.

Based on the capabilities of Adobe Creative Cloud used in the educational process, it was determined among the students which elements had a greater impact on the perception of information. The results were obtained on the possibility of implementing theoretical and practical knowledge, as well as during the development of creative skills. The results were formed on the basis of the Thurstone scale and priority coefficient calculations (figure 4).

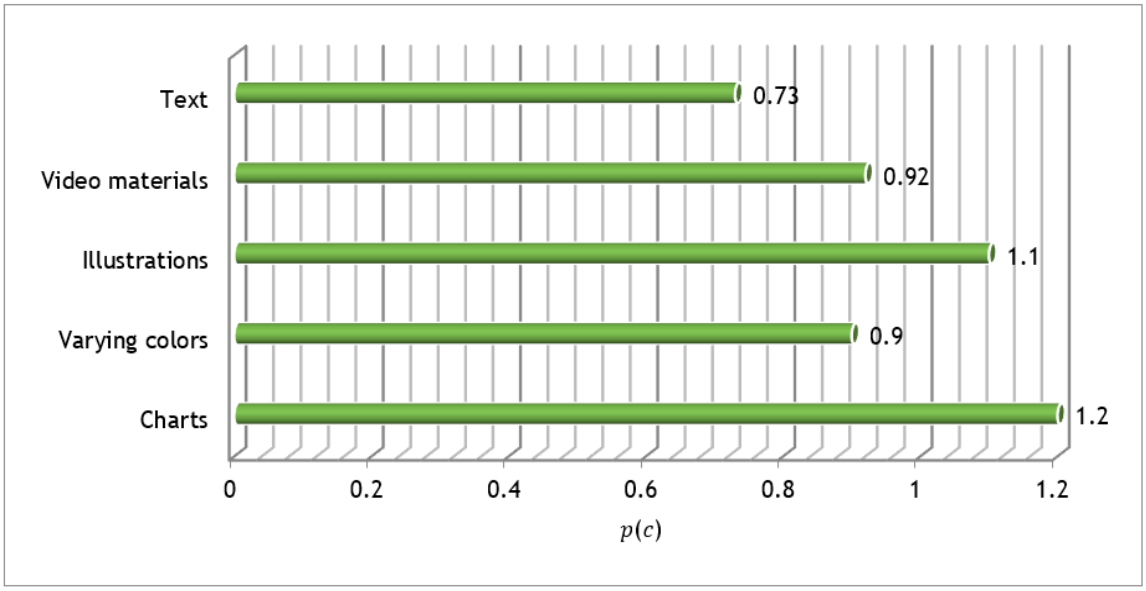

Figure 4. Elements of multimedia content that had the greatest impact on students' perception of information

On the basis of established data, it was found that charts had the greatest impact on students' perception of information. By using charts, the material was presented in an orderly form and the connections between the main ideas were displayed. The sequence of information submission was preserved in the charts, which affected the presentation of information from simpler to more complex. So, the students were able to better navigate the educational topic based on the provided information. Various images also had a positive impact on students' perception of educational information. Illustrations and vector images contributed to obtaining useful information and understanding of certain topics. With the help of illustrations, students could understand the basics of educational processes, which contributed to the development of figurative and spatial thinking.

Varying colours and using video materials had almost the same effect on students' perception. Different colours affected the ability to highlight the most important and secondary information. Video materials influenced the possibility of flexible learning, which provides clarity in learning. The text had the least influence on the assimilation of information, as it did not allow to identify the most important or secondary elements for the perception of the educational topic. Students needed more time to absorb conventional text information.

Among students, the level of perception of educational materials in classes due to the use of multimedia content created on the basis of Adobe Creative Cloud was determined. The results were obtained after seven months of training. The levels of perception were high, medium, and low, which excluded intermediate levels of knowledge (table 1).

https://doi.org/10.56294/sctconf20251311

Table 1. Level of perception of educational materials by students as a result of using Adobe Creative Cloud

Perception level	Group 1		Group 2		M	SD	*t*
	Assessment of perception	Percentage of students	Perception level	Percentage of students			
High level	37,5	82 %	35,5	85 %	4,21	0,44	0,872
Medium level	24,5	18 %	23,0	15 %	3,57	0,61	0,654
Low level	-	-	-	-	-	-	-

The use of Adobe Creative Cloud in the educational process had a positive effect on the perception and assimilation of information by students. The use of interactive tools influenced the possibility of better visual perception of materials, excluding overloading of students. Interactive tools contribute to the students' interest in learning information, focusing on its reinterpretation. Students' interest in the educational process allows them to study new materials and develop practical skills. A high level of information perception was realized with the help of interactive charts, schemes, videos, which allowed to attract students' attention. The medium level of perception of materials among students of two groups is observed during the study of the most complex topics. Students believe that it is necessary to ensure that such information is clarified by the teacher in order to increase the value of knowledge. More independent effort is required for complex topics, as graphic and video materials only contribute to the learning of simple topics.

Among students, the effectiveness of learning using Adobe Creative Cloud was also determined, focusing on the level of students' professional development. The results were obtained separately among students of different groups, which involved calculating the knowledge coefficient (table 2).

Table 2. The established level of students' professional development

Effectiveness of learning	Group 1		Group 2		M	SD	*t*
	J	Percentage of students	*J*	Percentage of students			
Effective learning	1,01	80 %	1,0	77 %	3,61	0,56	0,709
Average learning efficiency	0,62	20 %	0,73	21 %	3,32	0,69	0,681
Ineffective learning	-	-	0,47	2 %	-	-	-

Based on the information received from the students, it was established that this teaching approach is effective. The formation of professional knowledge was also influenced by the possibility of re-learning the material as a result of its display in electronic format. The absence of redundant materials in the educational process affected better understanding of information. Medium learning efficiency was obtained among a smaller number of students. It was related to the understanding of the theoretical material, but not enough accurate use of it in practice. To achieve high results, students need more time, developing creative thinking and the possibility of expanding the educational framework. The study was ineffective for a small number of students of Group 2, which is determined by the lack of 100 % attendance at classes and studying the material on their own. As a result of skipping classes, students were not interested in learning information.

DISCUSSION

The conducted research made it possible to state that mobile technologies influence the development of educational practice, focusing on the promotion of students' academic performance. Based on student results, it was found that most students prefer visual learning, which affects overall academic performance.[23] Our research established that the better assimilation of educational materials is influenced by the representation of information in the form of charts.

It is necessary to focus on diagnostic assessment to assess the level of students' professional knowledge. Educational procedures, informative content, peculiarities of information explanation are subject to evaluation. This approach is used to determine the initial potential of students and adapt educational materials to their level of knowledge.[24] Software has an impact on the ability to provide multimedia content for the educational process. Video content is a more effective learning tool that allows for full understanding of information.[25] Computer information technologies contribute to the transfer of information in higher education and influence the possibility of self-regulation of learning. Independent learning is associated with the possibility of regulating various processes, drawing up plans, and monitoring efficiency. Regulated learning has an impact on the development of cognitive skills by targeting students' mental resources.[26] The presented works describe the general impact of computer technologies on the reorganization of the educational process. In our article, the study was more specific, which involved the use of Adobe Creative Cloud during studies.

Multimedia content in the educational process should be aimed at improving students' performance and

correspond to their capabilities. Emphasis must be placed on research work that provides opportunities for analysis, design, and evaluation. Virtual reality technologies have led to ensuring homogeneity in education and provided an impact on the students' success.[27] Digital teaching focuses on multimedia elements, which ensures an increase in the quality of the curriculum. Artistic content is important for the quality of perception of information that is conveyed through presentations. The approach to designing presentations allows for a more detailed consideration of the educational process, which is associated with the perception of information in an interesting format.[28,29] The analysis of multimedia educational resources of the USA influenced the possibility of providing educational and research process. The creation of educational content should be based on mixing different materials. Presentation of information should reflect certain colour content, provide clarity of illustrations, which ensures not only visual perception of information, but also emotional mood. The combination of video materials with text improves the educational content and diversifies the visual structure of information presentation.[30] The presented works indicate individual elements for improving the presentation of educational information. In our article, attention was paid to various elements (diagrams, illustrations, video materials, text, colour change), which involved its inclusion in the implementation of theoretical and practical classes, development of creative skills.

Multimedia and digital approaches contribute to conscious learning for the improvement of students' professional skills. Presentation of information should be broad, which affects the acquisition of more diverse skills. Educational courses should take into account different levels of development, focusing on the students' basic knowledge.[31] Multimedia training has advantages over traditional training, as it enables conducting online training. Based on available and directed tools, it is possible to ensure not only the sharing of information, but also its editing.[32] Multimedia learning has a positive effect on students, thereby enhancing their learning motivation. This enables students to freely participate in discussions, reduce overload, and promote deeper understanding of the subject.[33,34]

The discussion of existing articles made it possible to determine that the studied content is aimed at the possibility of providing conscious learning as a result of the use of modern technologies. Our article explored the possibility of adapting Adobe Creative Cloud to create multimedia educational content. It was found among students that one of the best formats of multimedia content is the presentation of information using charts (1,2). It is possible to display primary and secondary educational information on different schemes, which affects the development of students' logical thinking. Illustrations are also important, allowing to develop figurative and spatial thinking (1,1). On this basis, it was established that students of Group 1 (Software Engineering) (37,5) and students of Group 2 (History) (35,5) mostly had a high level of perception of the educational process.

Limitations

The limitations of this study are related to the use of the Adobe Creative Cloud programme to create multimedia content for training, which does not allow for the inclusion of other tools. A comparison of various educational tools will provide a more in-depth study, focusing on the possibility of additional involvement of students from different groups. However, to compare different educational facilities, it is necessary to include a larger number of students. Changing the sampling approach of respondents would help to eliminate this limitation. For example, it is possible to conduct an orientation not only for students, but also for other respondents who attend additional educational courses.

Recommendations

Various multimedia content can be used to activate students' attention in the educational process. To create multimedia content, it is necessary to use high-quality tools that allow you to manage materials for better presentation. The use of Adobe Creative Cloud ensures the creation of multimedia content that will correspond to the educational programme and ensure students' interest in learning.

CONCLUSIONS

The obtained results give grounds to state that the aim was achieved, as the authors confirmed the positive impact of Adobe Creative Cloud on the educational process. In addition, the results were confirmed for two groups of students majoring in Software Engineering and History. Based on the conducted research, the capabilities of Adobe Creative Cloud to support the educational process were determined. It is possible to ensure the creation of informative presentations using the proposed tools in order to fulfil theoretical tasks with the help of Adobe Creative Cloud. During practical classes, it is possible to display the correct sequence of tasks. Important theoretical information for conducting laboratory and practical classes can also be presented in the most understandable format. Adobe Creative Cloud can be used to develop students' creative skills, which involves their learning of particular topics.

The conducted research makes it possible to conclude that 218 students better remember the material that is presented in an unusual form, which allows them to perceive key information. Therefore, charts are the best

element of multimedia content, separating the main information from the secondary information. Students can meaningfully perceive educational materials and use them to solve problems with the help of the software. But the results obtained are not limited to the research group of students, but can also be used to teach other students, which confirms the universality of the research.

The practical significance of the work is the possibility of adaptation of Adobe Creative Cloud in the educational process for the creation of multimedia content, focusing on the expansion of opportunities for learning materials. Research prospects are aimed at the possibility of using Adobe Creative Cloud in the educational process of students of different years of study.

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FINANCING

The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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APPENDIX

Using the Thurstone scale, determine the value of the elements of the multimedia content for learning the educational material (points must be assigned to each element from 1 to 5). The results are presented in table 1.

Table 1. Obtaining results based on the thurstone scale

Multimedia content element	**1 point**	**2 points**	**3 points**	**4 points**	**5 points**
Text material					
Video materials					
Illustrations					
Varying colours					
Schemes					

https://doi.org/10.56294/sctconf20251311