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ORIGINAL RESEARCH PROJECTS

ORYGINALNE ARTYKUŁY BADAWCZE

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The Cognitive Component of Academic Teachers' Attitudes Towards E-Learning – Research Report

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Abstract
The content of the article was directed at determining the level of the cognitive component of university teachers in relation to the use of e-learning in the process of academic education. The purpose of the research being carried out was to determine the dependence of the cognitive component of academic teachers' attitudes toward e-learning in higher education on the implementation of a distance learning course in Poland. For the purpose of our own research, a survey method was chosen, while the technique used was questionnaire surveying. The research tool used to determine the cognitive component was a test consisting of a set of 30 purposefully selected single-choice questions with three possible answers.

The test consisted of three main parts, and each part contained questions on basic knowledge and specific aspects of the issues discussed. The questions were created to verify the mastered content, which was implemented during a training course designed for university teachers on the use of e-learning in the process of educating students. They were used to determine the scope and depth of knowledge possessed by academic teachers regarding the use of e-learning in the academic learning environment.

Based on the analysis of the study, it can be noted that the implementation of training courses to improve the teaching and information and communication skills of academic teachers at the University of Rzeszow brought an increase in the level of the cognitive component. The task of academic teachers is to self-improve their workshop. The role of lecturers is

to constantly update their knowledge using various e-learning technologies for this purpose. A key role is the awareness of the need for lifelong learning in a rapidly developing reality.

Keywords: e-learning, human attitudes, cognitive component, distance learning.

Introduction

The information society of the 21st century is made up of people who demand that a modern university meets its new educational needs. The present time obliges man to function properly in the world of modern technologies, and the continual development of technology resonates in every area of life. Knowledge alone is not a sufficient component of current education, as the key factor is both the efficient use of it and the generation of new knowledge based on it (Allo, 2020; Komalasari et al., 2021). When analysing the contemporary image of higher education institutions, one can certainly notice shortcomings in this respect, which are manifested, among others, by the assimilation of ready-made knowledge provided by the teacher (Albiladi & Alshareef, 2019, p. 235).

The aforementioned "dysfunctions" of the education systems are a clear signal to seek alternative forms of education. Technological progress dictates the need to introduce changes in education (Siemieniecka, 2008; Mishra et al., 2020).

The solution to the problem affecting the Polish academic community may be the use of information technology in teaching programs as an alternative form of education, known as distance learning or e-learning (Juszczyk, 2002, p. 32). This type of teaching is successfully used in many European countries at every educational level: starting from primary school, and ending with didactics in higher education (Huda, 2017; Siemieniecka, 2017). E-learning is currently the most dynamically developing way of departing from the traditional form of education, which creates many invaluable opportunities (Walat, 2004; Borba, 2016).

Generally speaking, it can be noted that e-learning (distance learning) is the name for all didactic activities that are essentially based on e-learning technologies. The main tools used in e-learning are PCs or laptop computers, palmtops and smartphones (Ong et al., 2004; Mays, 2015; Kurniawati & No-

viani, 2021). It is important that in an innovative form of teaching, even using the most advanced information technologies, they should be treated only as tools that help to solve specific problems (Najdu, 2003, p. 58). The key task of teachers here becomes the permanent updating of their skills both in the field of the traditional function of transferring information and values (Rakic et al., 2020, pp. 198–199), the ability to quickly respond to the emergence of new needs, and to shape appropriate attitudes (Juszczyk, 2002; Pachisia, 2022). The latter of these tasks is a key aspect of this research.

The nature of attitudes in the context of academic education

The term "attitude" was used for the first time in the nineteenth century by the philosophers Herbert Spencer and Alexander Bain, who identified it directly with the mental state of readiness to listen, to learn something, which is a condition for acquiring real knowledge (Mika, 1981; Rashid & Yadav, 2020). Some of the precursors dealing with the issue of attitudes were William Isaac Thomas and Florian Znaniecki, who used this term to describe the processes of individual awareness that determined both the current and potential reactions of each person to the social world (Marody, 1976, p. 12). In the view of these authors, an attitude is always towards some value, and they define value as "any fact having empirical content, available to members of a specific social group, and a meaning according to which it is or can be the object of action" (Thomas & Znaniecki, 1918; Naidu, 2003).

The next step in analysing the explanation of the term "attitude" is to highlight its main components. Referring to the aforementioned Stanisław Mika, it can be seen that the definition he proposed clearly separates the three most important components of an attitude: cognitive, emotional and behavioural. This is supplemented by the words of Abraham Oppenheim (Oppenheim, 2004, p. 204), who believes that "attitudes are strengthened by beliefs (cognitive component), are most often associated with strong feelings (emotional component) and generate specific behaviours (behavioural component or component of the propensity to act)" (Alharbi & Drew, 2004; Howe & Krosnick, 2016). The first two are of key importance in the formation of an individual's attitude and its subsequent changes (or stabilisation), while the third

component is usually perceived as a tendency to act or react towards a specific object (Garczarek-Bąk, 2017; Halim et al., 2021).

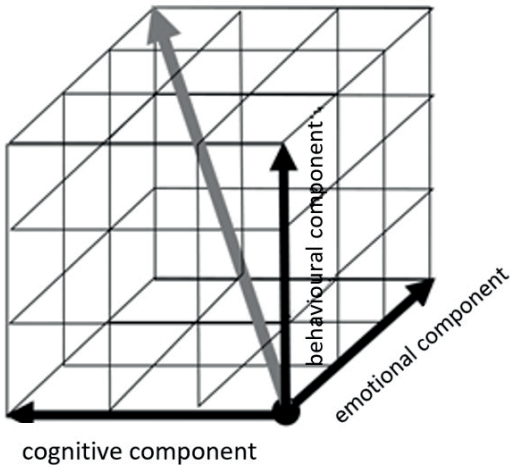

Figure 1. Structural components of attitudes towards e-learning (their resultant indicates the intensity of the development / evolution of attitudes in a given direction: cognitive, emotional or behavioural)

Source: Author's research.

The "cube" in the Figure 1 indicates the intensity of individual components of attitude, on the basis of which their names are determined.

In this article, an analysis of the results of research, the first of the mentioned components (cognitive) of the attitude of academic teachers towards the use of e-learning in the educational environment, will be presented.

The cognitive component of attitudes to e-learning

The cognitive component is one of the three essential components of a complete understanding of human attitudes. When exploring the concept of "cognitive component," it is worth paying attention to the components distinguished by various authors (Howe & Krosnick, 2016, p. 335). According to Tadeusz Mądrzycki (1976, p. 19), the cognitive component of an attitude may include relevant information concerning the subject of the attitude, belief, as-

sumption (or doubt). Soumyatanu Mukherjee (2009, p. 56) points out that it is conditioned both by assumptions and information (knowledge) about the subject of the attitude. A similar position is taken by Mahlon Smith (1947, p. 512), who, when distinguishing the cognitive component, emphasises that it concerns the source of information (knowledge) about the subject of the attitude. Agnieszka Szczygielska and Joanna Wrzesińska (2009, pp. 16–19) define the knowledge of an individual as a cognitive component with varying degrees of certainty about what is true and good, and what is false. According to Mirosława Marody (1976, p. 19), the cognitive component includes both beliefs and knowledge about the object of the attitude. When analysing the above definitions, it can be noted that most authors mainly base the cognitive component on knowledge and beliefs about a specific subject or object (Estrada et al., 2011, p. 12).

Summarising the considerations on the theoretical analysis of the cognitive component of human attitude and knowledge in the field of e-learning, which is closely related to this component, the following definition was created for the purposes of our own research: the cognitive component of the attitude defines the knowledge of academic teachers in the field of e-learning, necessary in the process of academic education. The knowledge possessed by academic teachers in the field of e-learning was verified in accordance with the assumptions of the Polish Qualifications Framework (PQF), which is the reference system for qualifications awarded in Poland. According to the PQF, in order to determine the completeness of the cognitive perspective along with its dependencies, the knowledge of academic teachers should be examined both in terms of its scope and depth of understanding (Mahoney & Hall, 2017, p. 300).

Confirmation of the correctness of the choice of the method of measuring cognitive component can be found in the words of Beata Marciniak, who notes that the study of knowledge in relation to a specific object of an attitude can be verified in terms of recreating its scope and depth (Marciniak, 2014, p. 155). When analysing the provision contained in PQF, it can be noticed that the scope and depth of understanding of knowledge are "selected facts, objects and phenomena, as well as methods and theories relating to them, explaining the complex relationships between them in the field of basic general knowledge forming the theoretical basis and selected issues in the field of detailed knowledge" (Scott, 2011, p. 195).

In connection with this definition, in order to obtain a multidimensional and comprehensive analysis of the cognitive component of the attitude, the above-mentioned scope of knowledge was divided into three main parts:

- *theoretical issues in the field of e-learning* – questions related to the definition of e-learning (including explication of basic concepts, methodology of creating courses, legal framework of academic e-learning),
- *design of an e-learning course* – questions on the methodology of creating an e-course for the educational needs of higher education (including background design, inserting components, editing pages, modelling tasks to check students' knowledge),
- *support for the course on an e-learning platform* – questions regarding the use of the course on the educational platform (including placing the course, assigning users, monitoring students' knowledge achievements).

By analogy, each of the scopes of knowledge presented above strictly relates to a specific depth of understanding (questions in the field of basic and detailed knowledge) possessed by academic teachers. The substantive reference for testing this knowledge is provided by the software along with the *WBTServer* e-learning platform.

Methodology of the conducted research

The main objective of our study was to determine the dependence of the cognitive component of academics' attitudes toward e-learning in higher education on the implementation of a distance learning course.

The research problem was as follows: What changes in the cognitive component of academics' attitudes will be induced as a result of a distance learning course?

Based on the problem, through analogies, the following research hypothesis was constructed: *the cognitive component of academic teachers' attitudes toward e-learning in higher education as a result of the course will change in the form of increased knowledge of the use of the remote form of education*.

The hypothesis presented above was determined on the basis of the analysis of pilotage studies of the cognitive component of academic teachers' attitudes towards e-learning implemented in the academic environment. The

said research, conducted from January to June 2018, consisted of observation of respondents during their use of e-learning technologies in the process of creating their own e-courses. In the first stage of these training courses, academics created very simple teaching materials, devoid of many key components. The initial observation of the academic teachers' knowledge and skills in using e-learning technologies showed that the group had only elementary knowledge, which often boiled down to, among other things, the correct explication of basic concepts, basic knowledge of the legal framework of academic e-learning or the basic elements from which an e-learning course should be properly constructed. In the final stage of the implemented course, it was observed that academic teachers significantly enriched their knowledge and skills. Among other things, the re-presenters pointed out the didactic aspect of creating courses in an e-learning environment, used correct terminology in the aforementioned field, and were able to efficiently administer the course on the platform. The courses they created became correct in terms of both content and methodology. For the purpose of the own research, a survey method was chosen. The technique used in the implemented own research was surveying, while the research tool used to determine the cognitive component was a test consisting of a set of 30 purposefully selected single-choice questions with three possible answers. The test consists of three main parts. Each contains questions on basic knowledge and detailed aspects of the issues involved. The questions were created to verify the mastered content, which was implemented during a training course designed for university teachers, on the use of e-learning in the process of educating students. They were used to determine the scope and depth of knowledge possessed by academic teachers regarding the use of e-learning in the academic learning environment (Table 1).

Table 1. Assignment of the scope of knowledge and the depth of its understanding used in the knowledge test

The extent of knowledge	Depth of understanding of knowledge	
	Basic knowledge	**Detailed knowledge**
Theoretical issues in the field of e-learning (Q. 1–7)	Theoretical introduction to the subject of e-learning (Q. 1, 2, 4, 5)	Issues related to academic e-learning (Q. 3, 6, 7)
Designing an e-learning course (Q. 8–21)	The basics of creating an e-learning course (Q. 8, 9, 10, 11, 12, 13, 14)	Creating e-courses for academic purposes (Q. 15, 16, 17, 18, 19, 20, 21)
Administration of the course on an e-learning platform (Q. 22–30)	Basic functionality of e-learning platforms (Q. 22, 23, 24, 25, 26)	Additional functions for managing the learning process on the platform (Q. 27, 28, 29, 30)

Sources: Author's research.

The research was conducted in parallel with the ongoing project of the National Centre for Research and Development, entitled "Unified integrated programme of the University of Rzeszów – a path to high quality education" POWR. 03.05.00-00-Z050/17. The study covered 320 academic teachers from four colleges of the University of Rzeszow in Poland.

Analysis of research results

The overall analysis of the research results concerned the determination of the results obtained before and after the implementation of a 30-hour course for academic teachers on the use of e-learning in the education process.

Table 2. A general summary of the results of the cognitive component studies conducted with the initial and final tests

Mean of the test results in the initial test (pts.)	Mean of the test results in the final test (pts.)	Increase the level of the cognitive component (%)	Significance level (p)
14.71	24.66	67.63	0.000

Sources: Author's research.

On the basis of the arithmetic mean for the obtained results (Table 2), it can be concluded that academic teachers in the initial test achieved almost 15 points, which represents around 50% correct answers. This means that many of them use various forms of information technology in their everyday didactic work, and therefore, by analogy, the respondents were able to answer some of the questions about e-learning.

Analysing the results of the research obtained in the final test, after completing a 30-hour course on the use of e-learning, it can be concluded that the mean clearly indicates an increase in the level of the cognitive component (25 out of 30 points that can be obtained, which translates into over 82% of correct answers). This indicates that the mean value of correct answers increased from 15 points for the initial test to 25 points for the final test, i.e. the course brought the desired results. The statistical significance level $p = 0.000$ allows us to reject the null hypothesis that there is no relationship between the course implementation and the results obtained in the test (Figure 2).

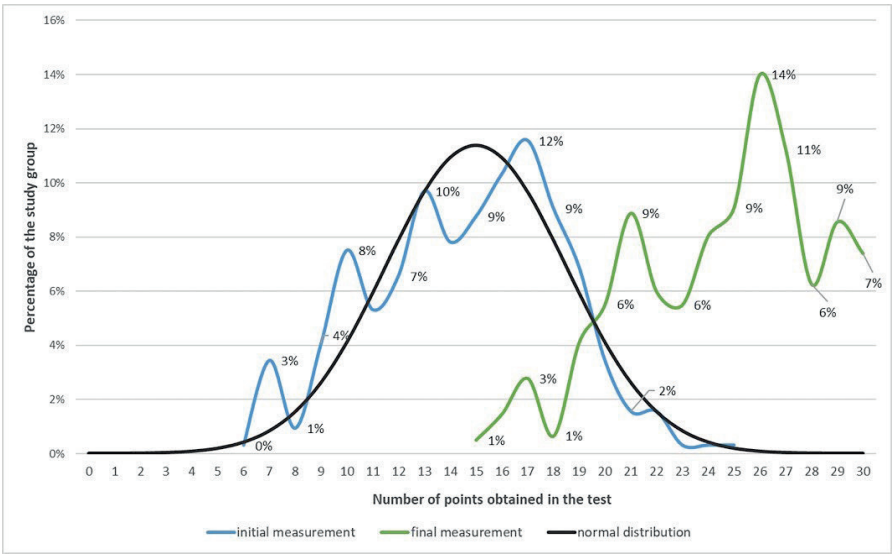

Figure 2. Graphical presentation of the initial and final test results

Sources: Author's research.

In Figure 2, it can be seen that the results of the initial test (blue line) are shifted from the results obtained in the final test (green line) by several points. In the initial test, most of the respondents (almost 12% of respondents) achieved a result of 17/30 points, and in the final test most frequently (14% of respondents), the academic teachers obtained 26/30 points. The shift by 13 points confirms that the training brought the desired effect in the form of increased knowledge. The black colour shows the ideal normal distribution for the results obtained in the test (analogous to the distribution of the results obtained in the initial and final tests, a standard deviation of 3.5 points was assumed). The results of the initial test are very close to the ideal distribution (the so-called symmetrical distribution), while the results obtained in the final test differ significantly from it. The values shifted to the right by 11 points indicate a left-skewed distribution. The median for the results of the initial test is 15 points (the value is identical to the ideal normal distribution), and for the final test – 25 out of 30 points.

The coefficient of variation, which can be used to determine the dispersion of the results of the answers in the group of respondents, was 25% in the initial test and 13% in the final test, which means that the respondents' answers at the end of the training activities were more focused.

Table 3. Summary of test results by gender

Gender	Initial test (pts)	Test final (pts)	Increase in the level of the cognitive component (%)	Significance level (p)
Female	14.69	24.75	68.48	0.000
Male	14.76	24.50	65.99	0.000
Mean	14.71	24.66	67.64	0.000

The grey colour shows the highest increase in the cognitive component.

Source: Author's research.

The analysis of the results by gender (Table 3) allows us to see significant differences in the number of points obtained from the initial test to the final test. On the basis of the calculated significance level, it can be concluded that the training brought the desired result in the form of an increase in the attitude component.

The value obtained by women (higher by more than 3.5%) may result from increased attention and concentration during the course (more memorised information).

Table 4. Summary of research results by age in terms of the results of the initial and final tests

Age	Initial test (pts)	Final test (pts)	Increase in the level of the cognitive component (%)	Significance level (p)
Up to 35 years	14.64	24.68	68.57	0.000
36–55 years	14.50	24.30	67.58	0.000
Over 55 years	15.18	24.87	63.83	0.000
Mean	14.77	24.62	66.66	0.000

The grey colour shows the highest increase in the cognitive component.

Source: Author's research.

The analysis in terms of the age of the respondents (Table 4) shows that the highest increase in the obtained results can be observed among young academic teachers (aged up to 35). The difference compared to other groups may be related to their more frequent use of e-learning technologies in both professional and private life. The analysis showed that with age the mean of the points obtained decreases; however, regardless of the age group, a significant increase in the level of the cognitive component was noted.

The visible increase in each of the groups may be related to the responsibilities of academic teachers, regardless of their age. These include, among others, efficient communication via e-learning technologies or "electronization" of their own teaching resources.

Table 5. Summary of the research results with regard to the employment unit in terms of the results of the initial and final tests

Faculty name (University of Rzeszow)	Initial test (pts)	Final test (pts)	Increase in the level of the cognitive component (%)	Significance level (p)
Medical Science	14.70	22.19	50.90	0.000
Social sciences	13.72	24.96	81.92	0.000
Humanities	14.72	24.70	67.80	0.000
Life sciences	15.70	23.94	52.48	0.000
Mean	14.71	24.66	68.15	0.000

The grey colour shows the highest increase in the cognitive component.

Source: Author's research.

The high score of respondents representing life sciences (including biotechnology) may be conditioned by the frequent use of e-learning technologies in their research (Table 5). They are no strangers to advanced technologies, because in their daily work they use the latest devices, the operation of which largely requires advanced specialised knowledge. The lowest point value of respondents representing social sciences may result from the small share of e-learning technologies in their scientific work.

In the context of the increase in the level of the cognitive component, two units that achieved extreme results are important: College of Social Sciences (82%) and College of Medical Sciences (51%). The high increase in the level of the first of the presented units could be due to their great attention and scrupulous use of knowledge and skills acquired during the training. Some staff members also declared that they conducted classes with the use of a complementary form of education, i.e. e-learning. The lowest value obtained by the staff of the College of Medical Sciences may be due to the lack of visible prospects for using e-learning during their own teaching activities, and therefore their internal motivation in this regard was much lower. Regardless of the differences between units, each of them is characterised by an increase in the level of the cognitive component.

Analysis of the cognitive component of attitudes towards e-learning based on theoretical issues

Tasks related to the theoretical issues of e-learning were included in questions 1–7. This scope was divided into two parts in terms of the depth of knowledge: basic knowledge and detailed knowledge.

Basic knowledge concerned the introduction to the subject of e-learning, while the questions mainly focused on the definition and nature of e-learning understood as an alternative form of education. Verified basic knowledge was included in the questions: 1, 2, 4 and 5. Detailed knowledge concerned e-learning implemented in the academic environment, so it required the respondents to have comprehensive knowledge of theoretical issues related to e-learning in higher education. Detailed issues were included in the questions: 3, 6 and 7.

First, an analysis of the answers to the questions concerning the theoretical introduction to the subject of e-learning was performed (Figure 3). The respondents were asked the following questions:

- question 1 – clarification of the term "e-learning,"
- question 2 – explanation of the term "e-learning platform,"
- question 4 – key methodological criterion for an e-learning course,
- question 5 – items of a properly designed e-learning course.

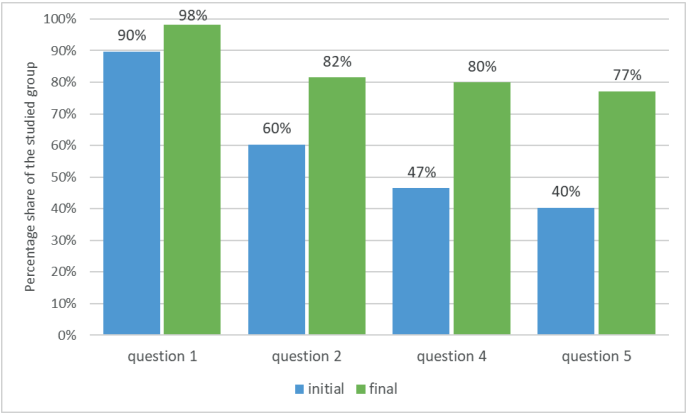

Figure 3. Comparison of the results obtained in the measurement of the initial and final tests

Source: Author's research.

The analysis of the respondents' answers shows that for each of them, the initial test results (blue bars) had significantly lower values than the final test results (green bars). The data presented in graphical form indicate an increase in the level of the cognitive component, manifested in the form of knowledge of academic teachers in the field of efficient use of terminology and the basics of a complementary form of education.

The overall values for both the pre-test and the final test in the field of basic knowledge indicate an increase in the cognitive component.

Next, the issues related to academic e-learning were analysed (detailed knowledge). The issues in this field were included in three areas:

- question 3 – percentage share of e-learning at the University of Rzeszow,
- question 6 – percentage share of knowledge tests in e-learning courses,
- question 7 – stages in building an academic e-learning course.

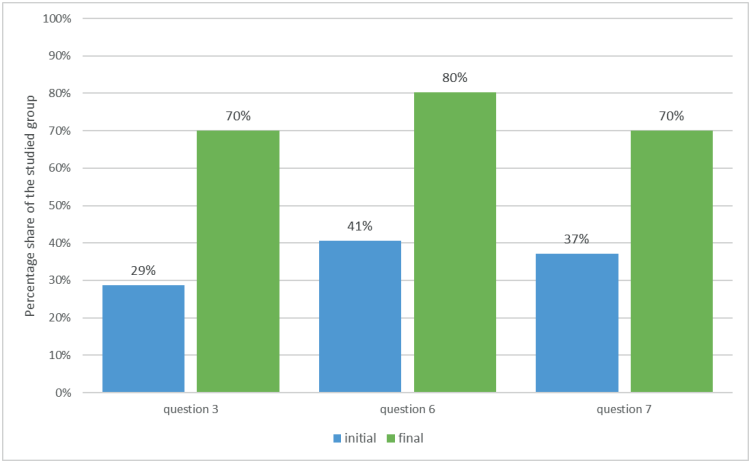

Figure 4. Comparison of the results of the initial and final tests.

Source: Author's research.

In Figure 4 it can be seen that for each question in the pre-test only 3 or 4 respondents out of 10 indicated the correct answer.

The probable reason for this may be that according to the specific knowledge, more knowledge of the topic is required in the field of academic e-learning.

Question 3, concerning the percentage share of classes conducted via e-learning technologies, showed the lowest value of correct answers to the initial test. This is a clear signal of a lack of knowledge of the key piece of legislation applied at the University of Rzeszow regarding the use of e-learning in the process of academic education. It highlights the need to develop the skills of staff of the University of Rzeszow in the use of complementary forms of education. The other two questions, which concerned the percentage share of content verifying knowledge in the e-learning course and the stages of creating the e-course, received slightly higher values. The results obtained by the respondents clearly indicate the need to conduct in-service training for teachers.

Analysis of the cognitive component of attitudes toward e-learning based on course design issues

The tasks concerning the issues related to the creation of the e-course constituted the largest thematic area of the entire test and were included in questions 8–21. The scope was divided into basic and detailed knowledge in terms of the depth of knowledge.

Basic questions related to the issues of creating e-learning courses via dedicated software (questions: 8, 9, 10, 11, 12, 13 and 14). Detailed knowledge related to specialist knowledge in the field of creating e-learning courses for academic purposes (questions: 15, 16, 17, 18, 19, 20 and 21). First, the questions concerning the basics of creating e-learning courses were analysed (basic knowledge). The issues that the respondents were asked about were as follows:

- question 8 – steps to begin creating a course
- question 9 – knowledge of the toolbar of the course creation software
- question 10 – using the text insertion component,
- question 11 – adding graphics to the course being created,
- question 12 – adding a screen/slide to a course
- question 13 – use of course navigation elements,

- question 14 – knowledge of the elementary task components.

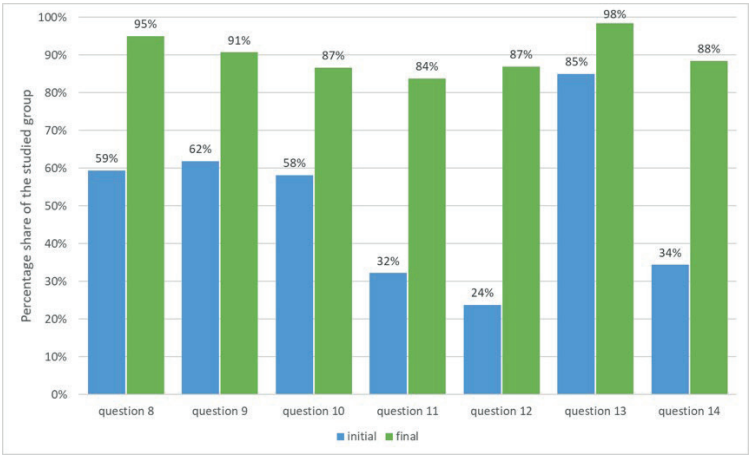

Figure 5. Comparison of the results obtained in the initial and final tests

Sourse: Author's research.

When analysing the data shown in Figure 5, it can be observed that, irrespective of the question, an increase in the level of the cognitive component was recorded, but a very large disproportion in the results obtained by the respondents was visible. Questions 12 and 13 deserve particular attention.

In the case of the first of these questions, the lowest percentage of correct answers (less than one in four respondents knew the answer) may be related to the fact that academic teachers very often use tools for creating multimedia presentations, such as *PowerPoint*, in which there is no clear separation of information screens and task-based displays. Lack of knowledge of the software in which tasks verifying the knowledge of students can be performed translates into the results obtained by the respondents.

The high percentage of correct answers to question 13 can, in turn, be explained by the standardised shape of the navigation components, which is presented in the form of arrows – pointing to the left (previous slide) or right (next slide). The navigation in one popular program for creating multimedia presentations (*PowerPoint*) and the *WBTExpress* editor are presented in

a similar graphical way. The next part of the analysis related to the issues of creating a course in an academic environment (detailed knowledge). Mastering knowledge makes it possible to create e-courses for academic purposes, and the issues were as follows:

- question 15 – component for creating multiple choice tests,
- question 16 – functionality enabling the preview of the course being created,
- question 17 – the structure of the e-learning course,
- question 18 – creating and modifying the background in a course,
- question 19 – creating actions enabling animation of an object,
- question 20 – creating hyperlinks to web resources,
- question 21 – exporting the course to an e-learning platform.

First, the results obtained in the initial and final tests were compared (Figure 6).

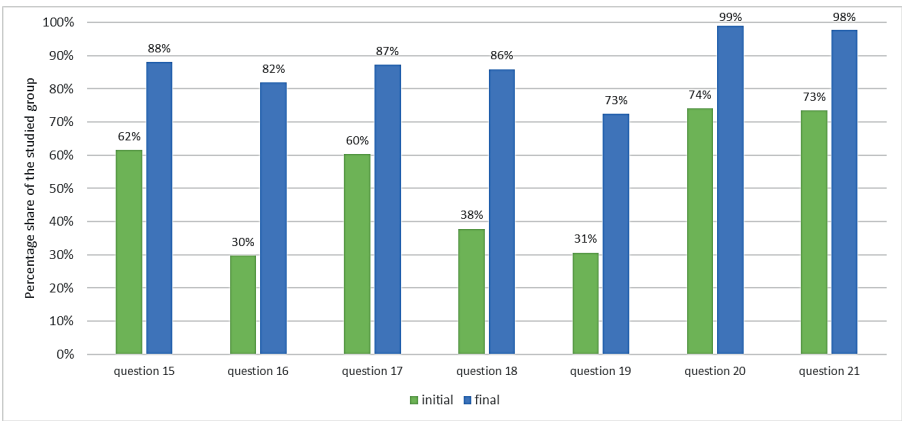

Figure 6. Comparison of the results of the initial and final tests

Source: Author's research.

The comparative analysis of the results should begin with the identification of two characteristic results of the initial test – answers to questions 16 and 20.

In the case of the first one (*preview of the course being created*), only 30% of the respondents knew the correct answer, indicating that academic teachers were not familiar with the use of e-learning software. This indicates the need to train academic staff. The analysis of the results of the answers to question 20 (*knowledge of the use of hyperlinks*) shows that almost 3/4 of the respondents answered correctly, and the likely reason for the high score is the use by the respondents of an office suite, in which links to network and local resources are created. Regardless of the question, each of them shows an increase in the level of the cognitive component, manifested in the form of knowledge of academic teachers in the field of creating e-learning courses for academic purposes, and in the case of some of the respondents the number of correct answers increased almost threefold.

Analysis of the cognitive component of attitudes towards e-learning on the basis of issues related to the administration of the course

The tasks related to the administration of the course constituted the third and last subject area of the test and were included in questions 22–30. The aforementioned scope was divided in terms of the depth of knowledge into two main parts: basic and detailed.

Basic knowledge was verified against the basic functionality of e-learning platforms used in education. The issues which the respondents were asked about were included in questions 22, 23, 24, 25 and 26.

Detailed knowledge concerned the full and comprehensive functionality of the management of the learning process on the e-learning platform in the academic environment via the *WBTServer* platform. Detailed issues were contained in questions 27, 28, 29 and 30.

First, the answers to the questions concerning the basic functionality of e-learning platforms were analysed:

- question 22 – creation of an e-course training path,
- question 23 – granting rights to the user of the e-learning platform,
- question 24 – assign a learning area to the course being created,
- question 25 – adding users (students) to the e-learning course
- question 26 – operating the course from the position of an academic teacher

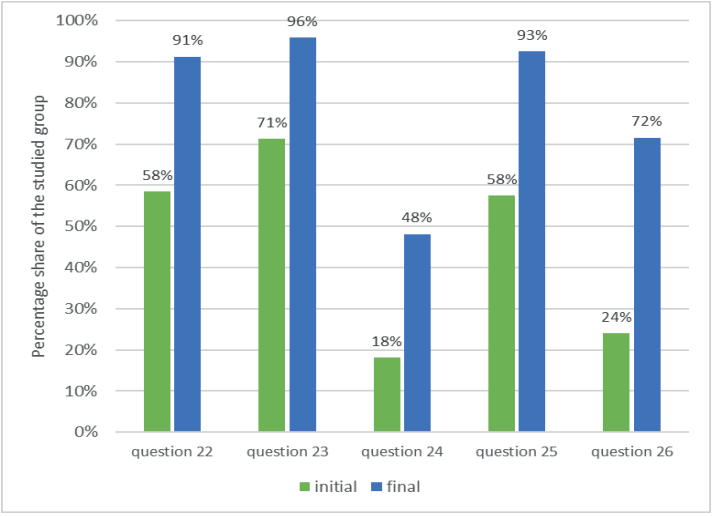

Figure 7. Comparison of the results of the initial and final tests

Source: Author's research.

The analysis of the research results of the respondents obtained in the initial test shows that, depending on the question, a large discrepancy was visible in the context of the number of correct answers.

In question 24 (*assigning courses created to a learning area*) one can observe the lowest value of correct answers (18%). The likely cause of the low score is the lack of identification of e-learning courses with traditional education, and therefore the respondents did not assume that they could also apply to specific learning disciplines. Moreover, the vast majority of academic teachers did not use e-learning platforms in their didactic work at all.

Question 23 (*granting permission to modify the course*) obtained over 70% of correct answers of the respondents in the initial test, and the reason could be a hint attached in the picture constituting part of the question. The invaluable role of concentration and increased attention in completing the test was confirmed.

The role of graphical information supporting the provision of the correct answer was illustrated in the case of the analysis of the answer to question 26 (*operating the course from the position of an academic teacher*). As a result of

the course, there was a three-fold increase in the number of respondents who indicated the answer correctly.

The next step towards the comprehensive analysis was a detailed discussion of the results for each of the questions regarding the administration of the e-learning course on the platform.

The next part of the analysis of the research results related to the additional functionality of managing the learning process on the platform (detailed knowledge). The issues in this area were as follows:

- question 27 – detailed verification of students' educational attainment,
- question 28 – chat communication module,
- question 29 – forum management on the *WBTServer* platform,
- question 30 – examination module on the e-learning platform.

Knowledge is essential when an academic teacher plans to use e-learning in a comprehensive manner in his teaching.

First, the test results from the measurement were compared with the initial and final tests (Figure 8).

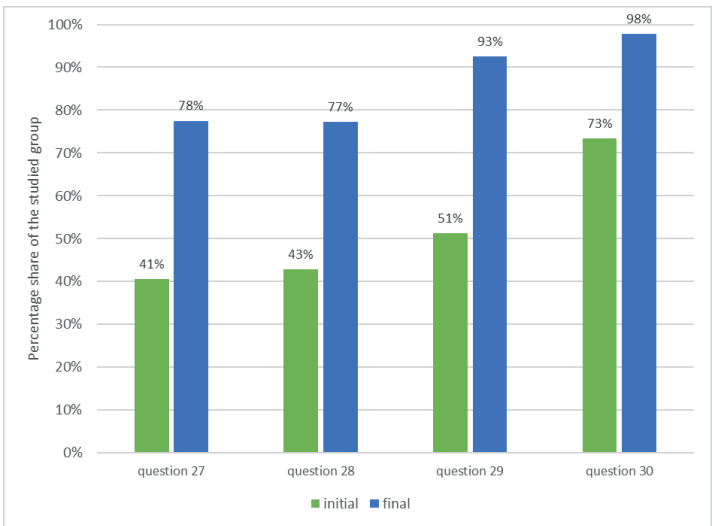

Figure 8.Comparison of the results of the initial and final tests

Source: Author's research.

Particular attention should be paid to question 27 on the control of student educational attainment, in which only slightly more than 4/10 respondents indicated the correct answer. The reason for this may be the lack of sufficient attention of the respondents, as the picture constituting the key element of the question contained hints on the basis of which the respondent could indicate the correct answer by means of deduction.

Question 30, with the highest number of correct answers, was related to the knowledge of the examination module on the e-learning platform. The respondents who carefully read the possible options for the answer when completing the initial test were able to answer this question without any problems. It is worth noting that 3/4 of the respondents indicated the correct option by eliminating two incorrect answers.

Conclusions and generalisations

When carrying out an overall analysis, it can be noted that the implementation of training to improve teaching and information-communication skills (understood as the ability to effectively use information technology in solving problems related to the profession of an academic teacher through effective searching and using information in the course of lifelong learning) of academic staff of the University of Rzeszow brought about an increase in the level of the cognitive component.

In the case of the division of results according to the gender of the respondents, it was observed that women gained better results for concentration and attention during the training. Moreover, for both women and men, the implementation of the training brought a measurable effect in the form of an increase in the cognitive component of attitude.

The analysis of the respondents' responses by age showed that the highest values were obtained by the youngest staff members (up to 35 years old), both in the initial and final tests. With age, the number of points obtained gradually decreased, which could have been due to the lower use of e-learning technologies. Moreover, in each age group studied, an increase in the level of the cognitive component was noticed as a result of the course.

The division of respondents according to the unit of employment showed that the lowest point value in the initial test was achieved by the respondents

of the College of Social Sciences, and the highest – by the College of Life Sciences. The significant disproportion may have been due to the fact that for people representing life sciences, e-learning technologies are an indispensable element of their scientific and scientific-didactic work, and the low score obtained by staff representing social sciences confirmed the lack of their use in their work.

The final test showed that a high level of attention, meticulous participation in the training and planning of the implementation of classes with the use of e-learning resulted in the highest increase in the cognitive component (by over 80%) in the staff of the College of Social Sciences. Lack of attention during the implementation of the course by the staff of the College of Medical Sciences translated into the lowest value of the increase in the level of the cognitive component. Similarly to the other mediating variables, regardless of the college, participation in the training resulted in an increase in the cognitive component of the attitude towards academic e-learning.

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