Oksana Karabin,
PhD (Candidate of Pedagogical Sciences), associate professor,
ORCID: 0000-0001-8759-948X
Oksana Romanyshyna,
Doctor of Pedagogy, associate professor,
Department of Computer Science and Methods of Teaching,
Ternopil National Pedagogical University,
2, M. Kryvonosa Str., Ternopil, Ukraine

FUTURE DESIGNERS' INFORMATION COMPETENCY FORMATION IN THE PROCESS OF PROFESSIONAL TRAINING

The article deals with theoretical and experimental study of the formation of information competency of future designers in the process of professional training. During the empirical study, the levels of informational competency maturity of future designers in the process of professional training (high, sufficient, satisfactory, low) were assessed, basing on the following components of informational competency of future designers: motivational, cognitive, informational and instrumental, operational and activity. The assessment of the levels of informational competency maturity was conducted according to the following steps: motivation to master the information competency; perspective planning of information competency formation in the learning process; creation of theoretical and practical information training; mastering strategic tasks of information competency formation. On the basis of the conducted pedagogical experiment, statistically significant positive changes in the levels of future designers' informational competency maturity in the experimental group were found. The reliability of the results of the study was confirmed by Student's t-test for independent samples.

Keywords: informatization of education, information technologies, computerization of training, information competency, components, innovative technologies.

Introduction

Under conditions of a dynamically changing world, the informatization of education is of fundamental significance, which is aimed at the training of a qualified highly skilled specialist who is competitive at the labor market, competent, responsible, capable of effective work in a specialty at the level of world standards [4, p. 27].

The Law of Ukraine "On Higher Education", the Program for the Implementation of the Bologna Declaration in the System of Higher Education and Science of Ukraine, and the National Strategy for the Development of Education in Ukraine for 2012-2021 reflect the conceptual provisions of the modern system of higher education. In the National Doctrine of the Development of Education of Ukraine in the XXI Century the following priorities of the state policy concerning national education are highlighted: the formation of national and universal values; integration of education and science; development and introduction of educational innovative technologies; integration of Ukrainian education into the European and world information space [8].

Formation of information competency of future designers is considered as an integral part of reforming the system of higher education. Its main task is to train an educated specialist in accordance with the requirements of the information society armed with a professional level of knowledge, abilities with the acquired skills of mastering modern information technologies.

A future designer is a specialist in the field of designing the objective world, creating products necessary for human life, the one who possesses profound knowledge, capable of realizing his/her ideas about needs of the society in a concrete material object. Professional education is the basis through which the creative potential of a student-designer is realized [9, p. 8], which as a component of the system of national education is now becoming a factor in the socio-economic, intellectual and spiritual development of the society. Its attributes are "the continuity of knowledge and competence as a guarantee of personality self-development, the formation of competitiveness throughout life" [6, p. 26].

The information competency of the individual is the ability to work with the great amount of information, with its different types, to find and select necessary material, to classify and generalize it, etc. [1, p. 75].

Information competency, as well as its structure, is a dynamic phenomenon, since it is open to external and internal influences, and therefore it is necessary to create a model of its development, which would meet the requirements of time. The information society is developing dynamically, so a modern higher education should train specialists being able to adapt to the conditions of market relations and changing technologies. This is especially true in the field of professional training, which involves the perfect mastery of modern information and computer technology, taking into account the extremely high pace of emergence of new tools and software. Intensive devel-

opment of IT inevitably leads to the informatization of higher education, the need to improve the quality of training specialists with a new type of thinking and culture that meet the requirements of the modern information society, causing contradictions between the level of the development of the information environment and the quality of training specialists in the field of implementing modern socio-cultural communication; between the volume of constantly increasing information and the individual's ability to perceive, process, assimilate, transfer and use it in work [11, p. 82-83].

Aim and Tasks

The paper aims to provide theoretical substantiation and experimental verification of the effectiveness of certain components of the formation of future designers' informational competency in the process of training.

The following tasks are set:

1) to reveal and theoretically substantiate the basis of the information component of professional education of future designers and to characterize their basic knowledge, skills and abilities in the field of information technologies.

2) to identify components, criteria, indicators of levels of formation of future designers' informational competency in the context of their professional training.

3) to verify the reliability of the results of the study by means of Student's t-test.

Research Methods

As part of the carried out research we performed an analysis of scientific sources on the issue; assessed levels of future designers' informational competency maturity in the process of professional training; designed a programme of the pedagogical experiment; reviewed a number of curricula for designers and standards of the following fields of knowledge: Culture and Art, Design, Graphic Design, Basics of Web-Design, Design and Ergonomics of User Interfaces, Interactive Animation, Motion Design.

In order to assess the level of future designers' information competency maturity in the process of training, Motivation for the Success Inventory by T. Ehlers (motivational component) was used and the author's test for a cognitive component as well as practical (information and instrumental component) tasks with four levels of complexity and themes of projects (operational-activity component) were applied.

The experiment (2015-2017) involved 168 future specialists who were randomly divided into experimental (n=85) and control (n= 83) groups, as well as 6 teachers. The experiment was conducted at Khmelnytsky National University and Ternopil Volodymyr Hnatiuk National Pedagogical University.

Theoretical Study Results

Ability to process information, work with its various types; to find and select necessary material, classify and generalize it, solve any informational problem related to professional activity on the basis of the acquired knowledge complements the information competency of a specialist [1, p. 75].

Considering this phenomenon in the professional and socio-cultural aspects, it should be noted that the basis of the information component of the professional education of future designers is information competency, which is interrelated with the information culture and implies students' knowledge and skills in the field of information technology. It has the ability:

- to search, store and process large amounts of information using modern information technologies;

- to use informational streams with well-formed basis of computer literacy;

- to work correctly with hardware, system and service software (operating systems, web programming languages, anti-virus programs, data archiving programs), application software (for processing text, graphic, audio, video information; for creating multimedia, interactive, animation, reference software products, training assessment test software products, use of expert and hypertext systems, databases, information retrieval systems, highly-specialized software for professional activities (programs interior design, design of individual parts: 3D Max, ArchiCAD, Compass 3D);

- to operate telecommunication systems, network technologies (rules of addressing resources on the Internet, main protocols of the Internet, types of channels of communication, types of network devices), Internet technologies (hypertext, web-sites, e-mail, wikipedia, blogs, forums, chats, ICQ, tele-videoconferencing, encyclopedias, wiki-encyclopedias, electronic libraries), cloud technologies (server computer resources, use of software as an online service: Google services);

- to use e-learning technologies, mobile-learning, smart leaning, machine learning, blended learning, data warehouse technology, methods of information modeling based on algorithmic structures [13; 14; 15].

Intensive development of IT inevitably leads to the informatization of higher education, the need to improve the quality of training specialists with a new type of thinking and culture that meet the requirements of the modern information society, causing contradictions: between the level of development of the information environment and the quality of training specialists in terms of implementing modern socio-cultural communication; between the volume of constantly increasing information and the individual's ability to perceive, process, assimilate, transfer and use it in professional activities [11, p. 82-83].

Based on the results of the theoretical review of scientific sources, it has been found that the following components are considered to be of special significance for the formation of the information competency of future designers: motivational, cognitive, informational and instrumental, operational and activity.

The motivational component determines the conscious desire to acquire knowledge for the formation of information competency, taking into account its significant need in the process of training future designers and is characterized by the awareness of aspirations, needs and goals for the acquisition of information competency.

Indicators of this criterion are as follows: strong interest in mastering the information component of professional education; activation of the need to master modern information technologies; practical interest in the study of information disciplines, the formation of interest in the acquisition of information competency.

The cognitive component contributes to the conscious formation of theoretical and practical knowledge, skills and competences for the information competency of future designers. It is characterized by the mature cognitive activity on the improvement of information competency.

Indicators of this criterion are as follows: cognitive activity of comprehensive and creative development in accordance with the requirements of a modern information society; the maturity of information and specialized knowledge and skills capable of improving the information level of a future specialist; acquisition of theoretical and practical skills of mastering modern information technologies and computer equipment.

Informational and instrumental component determines the maturity of practical and operational abilities of future designers for information activities. The criterion is information skills of information activities.

Indicators of this criterion are as follows: mastering practical tools of work in the information environment; acquiring foundations of computer literacy for adaptation for informational activity; practical readiness for the introduction of information technology to implement complex information and professional tasks.

Operational and activity component contributes to the effective formation of information competency of future designers. Its criterion is active qualities of future designers aiming at achieving professional goals.

Indicators of this criterion are as follows: acquiring profound knowledge and skills in the field of information technology; mature informational competencies of performing professional tasks; maturity of information and activity qualities for the implementation of practical goals.

In order to assess the levels of future designers' information competency maturity, methods of conversation, observation, and testing were used. At the same time, the main goals were as follows: informational development of future specialists; development of important information competencies; the level of information knowledge and skills in the process of training; the maturity of future designers' informational competence.

The evaluation of the level of future designers' information competency according to the distinguished components was carried out in accordance with the following practical steps: stage 1 - motivation for the acquisition of information competency, stage 2 - use of information flows with the mature computer literacy, stage 3 - mastering modern information technologies and computer equipment; stage 4 - engaging informational training in the field of professional activity.

Empirical Study Results

The analysis of the results of the summative assessment has shown that on average 39.15% of future designers have a low level of information competency maturity according to the determined components, 41.35% have a satisfactory level, 17.4% of future designers have a sufficient level, while only 2.1% of future designers have a high level of information competency maturity.

At the second stage of the experiment an experimental verification of the effectiveness of the components of the formation of future designers' information competency in the process of training was carried out. Using the methods of observation, questioning, testing, mathematical statistics, the levels of information competency development of future designers according to the determined components were reevaluated and compared with the results of the summative assessment.

The second (formative) stage of the experiment was conducted during two academic years (2015-2017). Levels of future designers' information competency maturity were evaluated according to the selected components in both groups, the rates which did not differ significantly.

Formation of information competency of future designers in the process of professional training in the CG was carried out according to traditional activities (use of typical theoretical and practical resources, the implementation of standard tasks of educational and research activities, self-study). As it was mentioned before, the EG teaching was conducted in stages stage 1 - motivation for the acquisition of information competency, stage 2 - use of information flows with the mature foundations of computer literacy, stage 3 - mastering modern information technologies and computer equipment; stage 4 - engaging informational training in the field of professional activity, according to the distinguished components (Fig. 1).
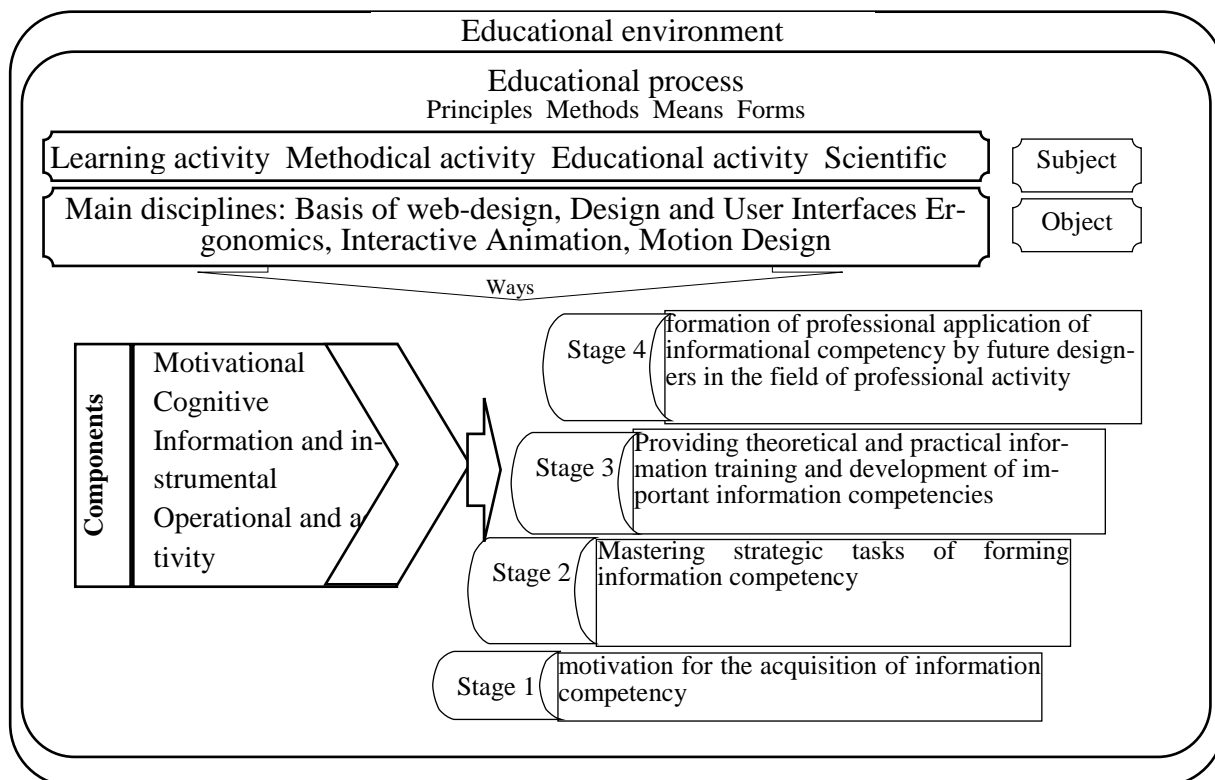
Fig. 1. Formation of Future Designers' Informational Competency in the Process of Training

A set of theoretical questions, questionnaires, tests, practical tasks and projects was developed to check the maturity of future designers' information competency in the process of training for the components.

To determine the indicators of the maturity of future designers' motivational component the method of questioning was applied, according to four levels of complexity with the definition of motivation to master information competency: deep motivation for intellectual information competency; practical interest in the activity in the information environment system; awareness of skills of implementing complex information-professional tasks in work.

In order to evaluate the indicators of the maturity of a cognitive component in future designers, we applied a four-level testing method. For the experiment, content modules of such disciplines as Fundamentals of Web-Design, Design and User Interfaces Ergonomics, Interactive Animation, Motion Design were selected. The tasks are aimed at assessing computer literacy; information knowledge and skills in the field of information technologies; practical skills of working with modern information technologies and computer equipment.

In order to determine the indicators of the maturity of information and instrumental component in future designers, practical tasks have been developed in accordance with the four levels of information activity and knowledge of information technologies. They are aimed at checking information potential for practical tasks; the integrity of the acquired knowledge and skills of information activities; systematic knowledge of the information culture to work in the information environment.

We also assessed the indicators of the maturity of the operational-activity component in future designers involved project activities, whose tasks corresponded to four levels of complexity and aimed at checking the system of professional and informational knowledge; creative and innovative skills for the development and creation of an information product; creative approach to effective tasks accomplishment.

The verification of the reliability of the research outcomes was carried out using parametric methods for comparing the results of the study, with the help of which the parameters of mean values and variances are compared. Statistical verification of the objectivity of the results in the groups under study was carried out with the help of the criterion of the reliability of the differences between the mean values of Student's t-test for independent samples (Table 1).

Table 1.

Dynamics of the Formation of Future Designers' Information competency of according to the Components

Levels of maturity	First stage of the experiment				Second stage of the experiment			
	CG, n=83		EG, n=85		CG, n=83		EG, n=85	
	n	%	n	%	n	%	n	%
High level	3	3.67	2	2.1	2	2.33	11	12.7
Sufficient level	15	17.54	15	17.4	15	18.1	36	42.8
Satisfactory level	33	39.86	35	41.35	34	40.87	27	31.2
Low level	32	38.93	33	39.15	32	38.7	11	13.3

Analysis of the results of the formative stage of the experiment has shown positive dynamics of the levels of information competency of future designers in EG: the number of the respondents with the high level has increased by 10.6%, with a sufficient level – by 25.4%, the number future designers with a satisfactory level decreased by 10.15%, and the number of students with the low decreased by 25.85%. it should be noted that the dynamics of the levels of information competency of CG respondents in the process of training who were taught according to the traditional are insufficient.

Conclusions

1. Based on the analysis of scientific sources, if has been found that the formation of information competency of future designers contributes to the improvement of professional training in accordance with the requirements of the information society. And this involves a high professional level of knowledge and abilities with mature skills of information competency.

2. During the research, components (motivational, cognitive, informational and instrumental, operational and activity), criteria and levels of maturity of future design-

ers' information competency in the process of training were determined.

3. Analysis of the results of assessing the levels of the maturity of future designers' information competency shows that 39.15% of them had a low level, 41.35% had a satisfactory level, 17.4% had sufficient one, and only 2.1% had a high level of information competency maturity.

According to the results of the formative stage of the experiment we could observe the dynamics in the experimental group, namely the number of future designers with a high level increased by 10.6%, with a sufficient level - by 25.4%, with a satisfactory level decreased by 10.15%, and the number of future designers with a low level has decreased by 25.85%. The reliability of the results of the study is confirmed by Student's t-test for independent samples.

Promising areas for further research involve the study of such aspects as pedagogical basis of e-learning in the educational process and the development of cloud technologies in professional training.

REFERENCES

1. Hendyna, N. Y. (1999). *Informatsyonnaia kultura lichnosti: diagnostyika, tekhnologiya formirovaniya: ucheb.-metod. posob. Ch. 1 [Information culture of the person: diagnostics, technology of formation]*. Kemerovo: KemHAKY [in Russian].

2. Hurevych, R. S. (2012). *Informatsiini tekhnolohii navchannia: innovatsiinyi pidkhid : navchalnyi posibnyk [Information Technology Learning: An Innovative Approach: Tutorial]*. Vinnytsia : TOV firma «Planer» [in Ukrainian].

3. Kademiia, M. Yu. (2010). Informatsiino-tekhnolohichna kompetentnist maibutnoho vchytelia trudovoho navchannia (tekhnolohii) [Information and technological competence of the future teacher of labor education]. *Zbirnyk naukovykh prats Umanskoho derzhavnoho pedahohichnoho universytetu imeni Pavla Tychyny – Collection of scientific works of Uman State Pavlo Tychyna Pedagogical University, 2,* 246-252 [in Ukrainian].

4. Karabin, O. Y. (2013). Formuvannia hotovnosti maibutnikh uchyteliv humanitarnykh dystsyplin do roboty v informatsiinomu seredovyshchi [Formation of readiness of future teachers of humanities for work in the informa-

tional environment]. *Candidate's thesis.* Ternopil [in Ukrainian].

5. Kizim, S. S. (2013). Formuvannia informatsiinoi kompetentnosti maibutnikh uchyteliv tekhnolohii zasobamy IKT [Formation of Information competency of Future Technology Teachers by ICT]. *Zvitna naukova konferentsiia Instytutu informatsiinykh tekhnolohii i zasobiv navchannia NAPN Ukrainy – Reporting scientific conference of the Institute of Information Technologies and Training NAPN of Ukraine.* Kyiv: IITZN NAPN Ukrainy [in Ukrainian].

6. Kravchenko, L. (2006). Tekhnolohii samorozvytku i samotvorennia natsionalnoho menedzhera osvity [Self-development technologies of a national education manager]. *Dydaskal, 4,* 105-108 [in Ukrainian].

7. Morze, N. V. *Formuvannia informatsiinoi kompetentnosti vchytelia suchasnoi shkoly. [Formation of information competency of the teacher of modern school.].* Retrieved from: http://www.ua.teach-it.net/materiali_programi/(offset)/10. [in Ukrainian].

8. *Natsionalna doktryna rozvytku osvity Ukrainy v XXI stolitti [National Doctrine of the Development of*

Ukrainian Education in the XXI Century]. (2001). Kyiv: Shkilnyi svit [in Ukrainian].

9. Prusak, V. F. (2006). Orhanizatsiino-pedahohichni zasady pidhotovky maibutnikh dyzaineriv u vyshchykh navchalnykh zakladakh Ukrainy [Organizational-pedagogical bases of training of future designers in higher educational institutions of Ukraine]. *Extended abstract of candidate's thesis* [in Ukrainian].

10. Spirin, O. M. (2009). Informatsiino-komunikatsiini ta informatychni kompetentnosti yak komponenty systemy profesiino-spetsializovanykh kompetentnostei vchytelia informatyky [Information-communication and informational competencies as components of the system of professional-specialized competencies of the teacher of informatics]. *Informatsiini tekhnolohii i zasoby navchannia – Information technologies and teaching aids*, 5(13). Retrieved from: http://www.ime.edu-ua.net/em.html. [in Ukrainian].

11. Yaremaka, N. S. (2016). Formuvannia informatsiinoi kompetentnosti maibutnikh menedzheriv industrii dozvillia u protsesi profesiinoi pidhotovky [Formation of information competency of future managers of the leisure industry in the process of training]. *Candidate's thesis.* Poltava [in Ukrainian].

12. Chaudhuri, P. Pal (2008). Computer Organization and Design. *PHI Learning.* PHI Learning Pvt. Ltd. [in English].

13. Ian, H. Witten, Eibe Frank Data Mining Practical machine learning tools and techniques. Morgan Kaufmann Publishers. – San Francisco, 2011. – 664 p.

14. Mehryar, Mohri, Afshin, Rostamizadeh, Ameet, Talwalkar (2012). *Foundations of Machine Learning.* MIT Press [in English].

15. Webster, Frank, and Robins, Kevin. (1986). *Information Technology: a Luddite Analysis.* Norwood [in English].

ЛІТЕРАТУРА
1. Гендина Н. И. Информационная культура личности: диагностика, технология формирования : учеб.-метод. пособ. Ч. 1 / Н. И. Гендина, Н. И. Колкова, И. Л. Скипор. – Кемерово: КемГАКИ, 1999. – 146 с.

2. Гуревич Р. С. Інформаційні технології навчання: інноваційний підхід : навчальний посібник / Р. С. Гуревич, М. Ю. Кадемія, Л. С. Шевченко : за ред. Гуревича Р. С. – Вінниця : ТОВ фірма «Планер», 2012. – 348 с.

3. Кадемія М. Ю. Інформаційно-технологічна компетентність майбутнього вчителя трудового навчання (технологій) / М. Ю. Кадемія // Збірник наукових праць Уманського державного педагогічного університету імені Павла Тичини, 2010. – Ч. 2. – С. 246-252.

4. Карабін О. Й. Формування готовності майбутніх учителів гуманітарних дисциплін до роботи в інформаційному середовищі : дис. ... канд. пед. наук : 13.00.04 «Теорія і методика професійної освіти» / Карабін Оксана Йосифівна ; Тернопільський нац. пед. ун-т ім. В. Гнатюка. Тернопіль, 2013. – 274 с.

5. Кізім С. С. Формування інформаційної компетентності майбутніх учителів технологій засобами ІКТ / С. С. Кізім // Звітна наукова конференція Інституту інформаційних технологій і засобів навчання НАПН України, 18.03.2013 р. : матеріали. – К. : ІІТЗН НАПН України, 2013. – С. 51-54.

6. Кравченко Л. Технології саморозвитку і самотворення національного менеджера освіти / Л. Кравченко // Дидаскал, 2006. – № 4. – С. 105-108.

7. Морзе Н. В. Формування інформаційної компетентності вчителя сучасної школи. [Електронний ресурс] / Н. В. Морзе. – Режим доступу : URL : http://www.ua.teach-it.net/materiali_programi/(offset)/10.

8. Національна доктрина розвитку освіти України в XXI столітті. — К. : Шкільний світ, 2001. – 24 с.

9. Прусак В. Ф. Організаційно-педагогічні засади підготовки майбутніх дизайнерів у вищих навчальних закладах України: автореф. дис. на здобуття наук. ступеня кандидата пед. наук: спец. 13.00.04 «Теорія і методика професійної освіти» / Володимир Федорович Прусак ; Вінницький державний педагогічний університет імені М. Коцюбинського. – В., 2006. – 23 с.

10. Спірін О. М. Інформаційно-комунікаційні та інформатичні компетентності як компоненти системи професійно-спеціалізованих компетентностей вчителя інформатики / О. М. Спірін // Інформаційні технології і засоби навчання, 2009. – № 5(13). – Режим доступу до журналу: http://www.ime.edu-ua.net/em.html.

11. Яремака Н. С. Формування інформаційної компетентності майбутніх менеджерів індустрії дозвілля у процесі професійної підготовки : дис. ... канд. пед. наук : 13.00.04 «Теорія і методика професійної освіти» / Яремака Наталія Сергіївна ; Полтавський нац. пед. ун-т ім. В. Г. Короленка. – Полтава, 2016. – 289 с.

12. Chaudhuri P. Pal, Computer Organization and Design, PHI Learning, PHI Learning Pvt. Ltd., 15.04. 2008 р. – 916 p.

13. Ian H. Witten, Eibe Frank Data Mining Practical machine learning tools and techniques. Morgan Kaufmann Publishers. – San Francisco, 2011. – 664 p.

14. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar Foundations of Machine Learning, MIT Press, 2012. – 432 p.

15. Webster, Frank, and Robins, Kevin. Information Technology: a Luddite Analysis. Norwood, 1986.

Оксана Йосифівна Карабін,
кандидат педагогічних наук, доцент кафедри інформатики і методики її викладання,
ORCID: http://orcid.org/0000-0001-8759-948X
Оксана Ярославівна Романишина,
доктор педагогічних наук, доцент кафедри інформатики і методики її викладання,
Тернопільський національний педагогічний університет,
вул. М. Кривоноса, 2, м. Тернопіль, Україна

АНАЛІТИКА ДОСЛІДЖЕННЯ ПРОБЛЕМИ ФОРМУВАННЯ ІНФОРМАЦІЙНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ДИЗАЙНЕРІВ У ПРОЦЕСІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ

У статті розглянуто теоретико-експериментальне дослідження проблеми формування інформаційної компетентності майбутніх дизайнерів у процесі професійної підготовки, здійснено аналіз наукової літератури, стандартів галузі знань, розроблено теоретичні концепції експерименту, сформовано його програму, здійснено аналіз навчальних програм, проведено діагностичне обстеження та визначено реальний стан рівнів сформованості інформаційної компетентності майбутніх дизайнерів у процесі професійної підготовки. Інформаційна компетентність майбутніх дизайнерів у процесі професійної підготовки відіграє важливу роль, оскільки сприяє поліпшенню їх професійної підготовки та позитивно впливає на ефективність освітнього процесу. Вона невід'ємно пов'язана з інформаційною культурою та передбачає наявність у студентів знань, умінь та навичок у галузі інформаційних технологій і здатність ефективного опрацювання великих масивів інформації з використанням сучасних засобів інформаційних технологій. Відтак, для реалізації поставлених завдань, під час емпіричного дослідження було проведено визначення рівнів сформованості (високий, достатній, задовільний, низький) інформаційної компетентності майбутніх дизайнерів у процесі професійної підготовки, яке ґрунтувалося на основі виокремлених компонентів формування інформаційної компетентності майбутніх дизайнерів: мотиваційний, когнітивний, інформаційно-інструментальний, операційно-діяльнісний. Визначення рівнів сформованості інформаційної компетентності майбутніх дизайнерів за компонентами проводилося згідно виокремлених практичних етапів: зорієнтована мотивація до оволодіння інформаційної компетентності; перспективне планування формування інформаційної компетентності у процесі навчальної діяльності; формування теоретичної та практичної інформаційної підготовки; оволодіння стратегічними завданнями формування інформаційної компетентності. На основі проведеного педагогічного експерименту визначено статистично значущі позитивні зміни у рівнях сформованості інформаційної компетентності майбутніх дизайнерів в експериментальній групі. Достовірність результатів дослідження підтверджена за допомогою критерію достовірності відмінностей середніх величин t-критерію Стьюдента для незалежних вибірок.

Ключові слова: інформатизації освіти, інформаційні технології, комп'ютеризації навчання, інформаційна компетентність, компоненти, освітні інноваційні технології.

_____