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## Self-Educational Competence as an Integral Part of the Professional Competence of Future Agricultural Students

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**Abstract.** The author analyses the content of the development of self-educational competence of students of agricultural educational institutions using interactive computer technologies. High speed of science development quickly renders any knowledge acquired by students in high school obsolete and reveals the urgent need for the development of self-educational competence. In conditions of widespread computerisation and active use of the latest modern technical developments in everyday life, the use of interactive computer technology appears to be the most effective and promising line of self-educational competence development among university students. Four components of self-educational competence are identified: knowledge; motivation; activity; communication. In accordance with these components, criteria, indicators, and tools were developed to determine the self-educational competence development of university students through interactive computer technology. The pedagogical experiment took place from 2017-2019 based on Chernyatyn College of the Vinnytsia National Agrarian University. The survey covered 87 students of four faculties, 26 people were in the control group and 61 people in the experimental group. To standardise the initial results of diagnostic tests and questionnaires, percentiles were used. Upon calculating percentiles for each component of self-educational competence, a table of standardisation was composed. Four levels of component development of self-educational competence were identified: low, below average, above average, and high. The purpose of the formative phase of the experiment was the model testing of self-educational competence development in university students through interactive computer technology. The analysis of indicators of transition of students to a high level of development of self-educational competence demonstrated that the process of development of self-educational competence of students of experimental group passes more effectively than at students of control group. The reason was the experimental work performance to implement structural and functional models for self-educational competence development of university students through interactive computer technology

**Keywords:** educational process, self-educational activity, agrarian students, educational institutions

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## Самоосвітня компетентність як складова професійної компетентності майбутніх студентів-аграріїв

**Анотація.** Автором проаналізовано зміст формування самоосвітньої компетентності студентів аграрних закладів освіти за допомогою інтерактивних комп'ютерних технологій. Висока швидкість розвитку науки швидко робить знання, набуті студентами в середній школі, застарілими і виявляє нагальну потребу у формуванні самоосвітньої компетентності. В умовах широкої комп'ютеризації та активного використання новітніх сучасних технічних розробок у повсякденному житті використання інтерактивних комп'ютерних технологій видається найбільш ефективним і перспективним напрямом формування самоосвітньої компетентності студентів університету. Виділено чотири компоненти самоосвітньої компетентності: знання; мотивація; діяльність; спілкування. Відповідно до цих компонентів розроблено критерії, показники та інструменти для визначення формування самоосвітньої компетентності студентів університету за допомогою інтерактивних комп'ютерних технологій. Педагогічний експеримент проходив з 2017–2019 років на базі Чернятинського коледжу Вінницького національного аграрного університету. Опитування охопило 87 студентів чотирьох факультетів, 26 осіб були в контрольній групі та 61 – в експериментальній. З метою стандартизації початкових результатів діагностичних тестів та анкет використано проценти. Після обчислення процентилів для кожного компонента самоосвітньої компетентності була складена таблиця стандартизації. Визначено чотири рівні компонентної сформованості самоосвітньої компетентності: низький, нижче середнього, вище середнього та високий. Метою формуючого етапу експерименту було модельне тестування формування самоосвітньої компетентності студентів університету за допомогою інтерактивних комп'ютерних технологій. Аналіз показників переходу студентів на високий рівень сформованості самоосвітньої компетентності показав, що процес формування самоосвітньої компетентності студентів експериментальної групи проходить ефективніше, ніж у студентів контрольної групи. Причиною стала експериментальна робота з реалізації структурно-функціональної моделі формування самоосвітньої компетентності студентів університету за допомогою інтерактивних комп'ютерних технологій

**Ключові слова:** освітній процес, самоосвітня діяльність, студенти-аграрії, заклади освіти

### INTRODUCTION

Modern higher education is undergoing changes due to the transition to a new educational paradigm. The ongoing transformations define new purposes of higher professional education, which consist in training personnel capable of productive, creative activities in their professional sphere and thereby ensuring the competitiveness of Ukraine in the world. According to Part 1 of Art. 5 of the "Law of Ukraine" On Higher Education", higher education is a set of systematised knowledge, competencies, and practical skills, ways of thinking, professional, ideological, and civic qualities, moral and ethical values, other competencies obtained in a higher educational institution (scientific institution) in the corresponding field of knowledge for a certain qualification at the higher education levels, which are higher in complexity than the level of full general

secondary education [1]. The connection of educational institutions with business and production becomes important, focusing on the graduates, certain requirements are put forward, these are internal – educational (state educational standards), and external – industrial (economic, socio-cultural). The high rate of science advancement makes the knowledge obtained by students in an educational institution quickly obsolete and discloses the urgent need to develop self-educational competence [2-4]. In the context of society informatisation and active use of the latest technical developments by young people in everyday life, the application of interactive computer technologies is considered the most effective and promising area for the improvement of self-educational competence among students of higher educational institutions.

Today, a number of problems related to vocational training can be noted in the Ukrainian system of professional agricultural education, the priority is to bring the content of education in line with the purposes of the state's educational policy. Notably, in western European countries and the United States, self-education is a relevant problem; in the United States, there are various forms of developing self-educational competence – reading special literature, listening to lectures, using other sources of scientific information. A good specialist, as a rule, follows the achievements of science, participates in scientific and practical conferences, seminars, while contributing to the theoretical base, distributing the results of their observations through presentations at conferences, publications in journals. Moreover, to grow professionally, assume a senior position, and progress career-wise, numerous papers and publications are taken into account. It is no coincidence that the motto “the public, otherwise you will die” is common in the United States [5].

Great Britain was one of the first to develop a self-training programme for employees of large corporations [6, p. 26]. In Germany, in higher education, a specific organisation pattern for students' self-education has been developed, the study of Information Technologies is “the basis for teaching students focused on continuing self-education after graduation” [7, p. 56]. To develop self-educational competence, many educational institutions in Germany hold events where “students read for students”, which notably affect the quality and structure of didactic training. This is confirmed by practical experience and results of pedagogical research [7, p. 57]. In addition to personal motivation, activating students' self-education contributes to better assimilation of knowledge, development of creativity.

Foreign teachers insist that the process of real long-term and high-quality knowledge acquisition occurs only as a result of the self-educational activities of students. Any initiative to test and refine knowledge should come from the student; the task of the teacher is to advise the necessary literature and clarify complex questions during interviews and consultations [8].

At present, independent knowledge acquisition is considered the most important component of life-long learning. The analysis of studies by Ukrainian and foreign researchers in the field of Higher Education allowed concluding that the development of self-educational competence is one of the main tasks of training students as future competitive specialists.

The stated subject is relevant and understudied in modern theory and practice, therefore, the *purpose*

*of the article* is to present the results of experimental work on the implementation of a model for the development of self-educational competence among students of higher educational institutions using interactive computer technologies.

## LITERATURE REVIEW

The self-educational competence from various standpoints is covered in the studies of many Ukrainian and foreign researchers, however, the development of self-educational competence among students of higher educational institutions using interactive computer technologies remains understudied. N. Bukhlova defines competence as “a person's possession of the corresponding competence, including one's personal attitude to it and the subject of activity” [9, p. 4]. M. Lakotsh states that “self-educational competence is a complex integrative property of the individual, which ensures the readiness to meet the individual and social needs of reality cognition based on mastering knowledge, skills, and abilities, methods of activity, and acquired experience. This is the readiness and ability of the individual for independent, systematic, purposeful reality cognition, mastering the social experience of mankind, self-fulfilment, self-development” [10]. The researcher claims that a “person's self-educational competence implies the presence of:

- value systems, awareness of the importance of education in modern life, personal responsibility for one's own life;
- knowledge systems about methods of cognition, information search;
- ability and desire to use them in training for the needs of their own self-education, in everyday life;
- active position” [10, p. 115].

Other researchers define self-educational competence as “the presence of certain qualities and skills in a person that determine one's needs, readiness” [11; 12, p. 141] and the ability to “perform self-educational activities, the purpose of which is professional development and self-improvement” [13; 14, p. 83]. A similar opinion is expressed by R. Sahytova [15], who interprets “self-educational competence” as “a set of self-educational knowledge, skills, and abilities, interest in cognitive search activities that will contribute to the successful self-fulfilment of the individual in society. Since self-educational competence is complex, it contains such components as the desire for self-improvement; the ability to plan and implement self-education based on one's own needs; the ability to analyse and evaluate the information received; the possession of information and communication; the ability to solve

various problems by applying independently obtained knowledge; the ability to control and improve the results obtained during self-education activities” [15, p. 68]. N. Trofimova [16] and N. Kovalenko [17] emphasise the need to focus the educational process on stimulating students’ motivation to independently master knowledge, and the ability to apply it in future professional activities.

In accordance with the standards of the Law of Ukraine “On Higher Education” (2014) [1], all the elements of self-educational competence should be developed in students within the university education system and in the context of lifelong learning. The main purpose of the educational process in higher education institutions is “the comprehensive development of a person as the highest value of society along with their talents, intellectual, creative, and physical abilities, the establishment of values and competencies necessary for successful self-fulfilment, the education of responsible citizens who are capable of conscious public choice and focusing their activities for the benefit of other people and society, enriching on this basis the intellectual, economic, creative, cultural potential of the Ukrainian people, raising the educational level of citizens to ensure the sustainable development of Ukraine and its European choice” [1]. The implementation of state policy in this area is ensured by expanding its opportunities for independent knowledge acquisition.

In the study, self-educational competence is considered as a personal characteristic, student’s personal qualities (knowledge, skills, abilities, and readiness) that determine the effectiveness of one’s self-education.

## MATERIALS AND METHODS

The pedagogical experiment was held during 2017-2019 based on Chernyatyn College of the Vinnytsia National Agrarian University. The experiment involved 87 students of two departments: accounting and agronomic, engineering and technological, of which 26 people were part of the control group (CG) and 61 – the experimental group (EG).

The study included the following steps:

1. Theoretical analysis of Ukrainian training programmes for the development of self-educational competence.
2. Setting initial data and dividing students into groups (October 2017).
3. Current pedagogical control (December 2018, March 2019).
4. Final pedagogical Control (May 2019).
5. Theoretical analysis of the study (June 2019).

To obtain the necessary information, general scientific methods of the theoretical level of research were used, namely: analysis of training programmes, scientific and methodological sources, pedagogical modelling, pedagogical experiment, pedagogical observation.

At the formative stage of the experiment, the constructed model of developing self-educational competence among students of educational institutions using interactive computer technologies was tested. For that purpose, a training programme, test tasks, a criterion and diagnostic device, an electronic course in the Moodle distance learning system, and electronic questionnaires based on LimeSurvey software were developed. For statistical analysis of the experiment results, the Fischer criterion was used.

The current pedagogical control provided for working with students of the Chernyatyn College of the Vinnytsia National Agrarian University in studying the special course “Information Technologies”. Students of the following specialities took part in the experiment: “Technology of production and processing of livestock products”; “Agronomy”; “Agricultural Engineering”; “Landscape gardening”.

Diagnostic materials have been developed to test the pedagogical experiment:

1. To check knowledge on self-education competence, a questionnaire was developed, based on which an electronic test was created in the Moodle distance learning system. The test contains 12 questions, including 4 questions that test knowledge about the forms, methods, and means of self-education, 3 theoretical questions – about the essence, content, and structure of self-education, and 5 questions about the types of interactive computer technologies and the possibility of their use in self-education. For each question, a student can score from 0 to 3 points, therefore, according to the psychological component of self-educational competence, students can score a maximum of 36 points.

2. For checking the level of motivational component of self-educational competence among students of educational institutions using interactive computer technologies, diagnostic materials of R. Sahytova were taken as a basis [15, p. 45]. The questionnaire contains 12 questions, 3 points each (maximum 36 points), it diagnoses the establishment of motives for self-educational activities and the need to master the skills and methods of self-educational activities, the presence of a need for self-education and the personal importance of self-education.

3. The activity component questionnaire contains 18 questions, including 9 questions that diagnose the ability and skills of using interactive computer technologies in activities aimed at achieving self-educational purposes. Other questions test the ability to independently plan and organise self-education; knowledge of ways to search, collect, and process information from various sources; the ability to set purposes and independently find ways to solve them. Each question of the questionnaire is rated 2 points, therefore, the maximum is 36 points.

4. The communicative component of students' self-educational competence is checked using a questionnaire consisting of 18 questions, 2 points each (maximum 36 points). The questionnaire diagnoses the ability to interact with other people and objects of the surrounding world; group work skills; the ability to reflect, self-control, self-analyse, and adjust self-education.

The above shows that the diagnostic material is compiled in such a way that each of the components has equal importance in the overall structure of self-educational competence of students of educational institutions using interactive computer technologies.

In studying the discipline "Information Technologies", a self-educational project-modular complex (SPMC) is introduced, consisting of four modules, mastering of which positively impacts the development dynamics of self-educational competence of students of educational institutions using interactive computer technologies.

## RESULTS AND DISCUSSION

The self-educational competence among students of higher educational institutions using interactive computer technologies is developed, according to the author, in the following areas: self-educational knowledge – knowledge in the field of self-education; self-educational motivation – motivation to improve self-education skills; self-educational activity – independent activity related to increasing the level of education, obtaining new knowledge, enhancing professional skills and abilities; self-educational communication–communicative actions in self-education [18; 19].

Based on the areas discussed above, the author identified four components of self-educational competence: psychological, motivational, activity, and communicative. In accordance with them, criteria, indicators, and tools for determining the development of self-educational competence among students of educational institutions using interactive computer technologies were developed. Didactic materials of the

discipline "Information Technologies" were transferred to electronic media, the discipline was supported by a corresponding course in the Moodle distance learning system; video and audio files with multimedia presentations were prepared for various types of lectures.

Special attention was paid to the students' self-educational competence using interactive computer technologies: working with search engines, electronic libraries, information reference books, portals, and other educational resources on the Internet [20]. Students studied the offers and opportunities of distance education institutions. Young students worked with software tools for organising distance learning on the example of the Moodle distance learning system: familiarisation with the interface of the course support system, studying control and training materials, interactive communication in the system with fellow students and teachers, planning the learning process. With the Smart programmes, students plan their self-educational activities, create projects that reflect the individual self-educational learning trajectory along with methods and means of project implementation using interactive computer technologies.

The main purpose of the special course "Information Technologies" for agricultural students is to obtain knowledge, skills, readiness for self-education using interactive computer technologies [21]. The special course is praxeological. The lecture part is devoted to discussing the purpose, content, and structure of self-education. It examines the forms, methods, and means of self-education activities, as well as software and hardware interactive technologies, opportunities, and features of their use for self-education purposes. Practical exercises with an electronic interactive whiteboard and a camera include tasks for connecting, configuring, calibrating, and studying the main features of working with an electronic interactive whiteboard, the capabilities of which are expanded by the camera.

Practical classes in the computer class were also focused on exploring the capabilities of the SMART Notebook programme, distance learning systems, virtual universities, computer simulators, and online libraries, getting acquainted with the basics of fast reading, time and project management. At the end of each training session, students receive tasks for independent work, the completion of which is discussed in the group at the next lesson. As a result of mastering the course, each student creates an individual self-educational trajectory, plans methods and means of its implementation using interactive computer technologies.

The primary score of self-educational competence development is defined as the sum of the primary scores of diagnostic tests and questionnaires of the four components of self-educational competence. A percentile was used since it allows standardising normally distributed scores and data with abnormal distributions. "A percentile is a measure used in statistics that indicates the value below which a certain percentage of observations in a group of observations falls" [22; 23]. After

calculating the percentile, a standardisation table was compiled. The fiftieth percentile ( $P_{50}$ ) corresponds to the central trend indicator. The 25<sup>th</sup> and 75<sup>th</sup> percentiles are also known as the 1<sup>st</sup> and 3<sup>rd</sup> quartiles, since they distinguish the lower and upper quarters of the distribution" [5; 24]. The correspondence of primary scores to the levels of self-educational competence development is presented in Table 1.

**Table 1.** The level of students' self-educational competence

Level in points			
Low ( $<P_{26}$ )	Below average ( $P_{26}-R_{50}$ )	Above average ( $P_{51}-R_{75}$ )	High ( $>P_{75}$ )
$\leq 82.75$	(82.75; 94.25)	(94.25; 104.2)	$> 104.2$

The comparative distribution of students (as a percentage) by the levels of self-educational competence

at the ascertaining and developing stages of the experiment is presented in Table 2.

**Table 2.** Comparison of the levels of self-educational competence among students of educational institutions at the ascertaining and forming stages of the experiment

Group	Level of self-educational competence							
	Low		Below average		Above average		High	
	a	f	a	f	a	f	a	f
EG, %	29.5	3.3	26.2	4.9	26.2	11.5	18.0	80.3
CG, %	15.4	19.2	15.4	11.5	26.9	23.1	42.3	46.2

The table shows that the low level of self-educational competence of students decreased in the experimental group by 26.2%, while in the control group the low level increased by 3.8%. The high level of self-educational competence of students of educational institutions increased by 62.3% in the experimental group

and only by 3.9% in the control group. Hereinafter the number of students whose levels have changed at the formative stage of the experiment is calculated. The results are presented in Table 3, which indicate that the effect is 77.0% for the experimental group and 23.1% for the control group.

**Table 3.** Indicators of transition to a higher level

Group	No transition	Transition
EG	$\frac{14}{61} \approx 22.95\%$	$\frac{47}{61} \approx 77.05\%$
CG	$\frac{14}{61} \approx 76.92\%$	$\frac{6}{26} \approx 23.05\%$

According to the table of values of the angle  $\omega$  for different percentages [5],  $\omega_1 = 2,141$ ,  $\omega_2 = 1,003$ . Empirical value  $\omega_{emp}$  is calculated by the formula (1), where  $n_1$  and  $n_2$  are the numbers of students in the experimental and control groups, respectively [2, p. 65].

$$\omega_{kr} = \frac{1.64 \text{ for } P \leq 0.05}{2.28 \text{ for } P \leq 0.01} \quad (1)$$

The resulting value  $\omega_{emp}$  exceeds the corresponding critical value  $\omega_{cr}$  for the 1% level, therefore, differences in groups are significant at the 1% level.

In other words, in the experimental group, the number of transitions to the level is notably higher than in the control group. In terms of statistical hypotheses, it can be asserted that the null hypothesis  $N_0$  tends to deviate and the hypothesis of  $N_1$  differences is accepted at a high level of significance.

### CONCLUSIONS

It can be concluded that agricultural students of the control and experimental groups have substantial differences with a certain pattern – conducting research

on the implementation of a structural and functional model for the development of self-educational competence among students of educational institutions using interactive computer technologies. Statistical analysis of indicators of students' transition to a higher level of self-educational competence shows that the development of self-educational competence among students of the experimental group is more effective than that of the control group. The above indicates the effectiveness of measures taken to implement the developed structural and functional model for the improvement of self-educational competence among students of educational institutions using interactive computer technologies.

Thus, one of the main tasks for agricultural education is to prepare young people for the independent improvement of their knowledge, to stimulate the future specialist's desire and readiness for constant self-educational activities, to help them acquire the necessary skills and abilities. However, in the educational

programmes of higher educational institutions, special time is not allocated for students to master effective methods of self-education, as a rule, students master them spontaneously, through trial and error. This leads to chronic academic failure, decreased mental activity of students, and drains the nervous system. To solve this problem, the author developed a project-modular complex consisting of four modules, the main purpose of which is to develop the self-educational competence among students of educational institutions using interactive computer technologies. This course was tested at the Chernyatyn College of the Vinnytsia National Agrarian University.

Notably, the results of the experiment may depend on the individual characteristics of agricultural students, their propensity for subject and professional activities. Therefore, it is also of scientific interest to compare the results of experimental work among students of agricultural training areas for further research.

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### СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

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