

DOI: <https://doi.org/10.34069/AI/2022.54.06.10>

How to Cite:

Ivaniuk, H., Kuzemko, L., Venhlovskaya, O., Vovchok, Y., & Antypin, Y. (2022). The use of digital tools in interdisciplinary projects of students' personal and professional self-development. *Amazonia Investiga*, 11(54), 94-108. <https://doi.org/10.34069/AI/2022.54.06.10>

The use of digital tools in interdisciplinary projects of students' personal and professional self-development

Використання цифрових інструментів у міждисциплінарних проєктах особистісного і професійного саморозвитку студентів

Received: June 12, 2022

Accepted: July 15, 2022

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Abstract

The article reveals the problem of using digital tools in the context of blended and distance learning. The purpose of the study - to prove the effectiveness of using digital tools in interdisciplinary projects of students' personal and professional self-development. Different approaches in modern scientific discourse of above mentioned problem are highlighted. Groups of digital tools that should be used at each stage of the interdisciplinary project is specified and characterized. The article contains author's practical developments and examples on using digital tools to fulfill the tasks of educational disciplines, which are integrated in interdisciplinary projects, implemented in the process of researching the scientific topic "Psychological and pedagogical support of personal and professional development of future teachers in the implementation of new educational standards". The results of the empirical study of the effectiveness of using digital tools in interdisciplinary projects are

Анотація

Стаття присвячена актуальній проблемі використання цифрових інструментів в умовах змішаного і дистанційного навчання студентів. Мета дослідження полягала у з'ясуванні ефективності використання цифрових інструментів у міждисциплінарних проєктах особистісного і професійного саморозвитку студентів педагогічних спеціальностей. Висвітлено різні підходи у сучасному науковому дискурсі до розв'язання проблеми використання цифрових інструментів у міждисциплінарних проєктах особистісного та професійного саморозвитку студентів. Уточнено та схарактеризовано на поняттєвому рівні групи цифрових інструментів, які доцільно використовувати на кожному з етапів міждисциплінарних проєктів. Стаття містить авторські практичні розробки та приклади використання цифрових інструментів для виконання завдань навчальних дисциплін, що інтегруються у міждисциплінарних проєктах особистісного і професійного саморозвитку

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2020), the Professional Standard for the Profession «Preschool Education Teacher» (Order No. 755-21, 2021). Therefore, one of the priority tasks to be implemented by higher education institutions is to make future teachers familiar with a wide range of digital tools and to develop their ability to choose those that are effective in determining their individual personal and professional needs.

The scientific problem mentioned above is considered in the light of the new educational strategy of training specialists in the pedagogical field in Ukraine. The article highlights the results of the study of the use of digital tools in interdisciplinary projects of personal and professional self-development of students of pedagogical specialties.

Theoretical Framework or Literature Review

The search for effective means and digital tools in the context of personal and professional self-development of future teachers is the subject matter of a number of Ukrainian and foreign scientists. In the studies on the given problem, the focus of researchers' attention is mostly on external factors, personal sessions, tools that are decisive for the personal and professional self-development of future teachers. The results of the analysis of theoretical sources, which reveal the essential features of the subject of the proposed research, give grounds to assert that the problem of digitalization is now a priority in both Ukrainian and global educational space. The importance of the researched problem is proved in a number of publications by Ukrainian scientists. Thus, general scientific approaches to the problem of digitalization of education are covered in the study «Modern problems of digital transformation of education» (Bykov, Spirin & Pinchuk). The authors of this paper identify and substantiate the trends in the introduction of ICT and digital technologies in education, analyze the conditions affecting the digitalization of education, outline priorities for the development of digital competence of educational entities (Bykov, Spirin & Pinchuk, 2020). Consistent scientific ideas that reveal various aspects of digitalization of education, the introduction of information and digital technologies in the educational space are highlighted by O. Spirin in the scientific and methodological work «Open electronic scientific and educational systems in research activity» (Spirin, et al., 2020). The results of studies presented by L. Hrynevych, N. Morse, V. Wember and M. Boyko in the work «The role of digital technologies in the development of the

ecosystem of Stem-education» are significant for the proposed research, where the authors highlight the theoretical and practical aspects of digital tools' implementation in the educational process of higher education institutions. According to the results of the collective research, groups of digital tools (tools for creating electronic content, tools for various purposes) have been identified and characterized, which contribute to ensuring the efficiency of the educational process (Hrynevych, Morze, Vember & Boiko, 2021, p. 15-16). Therefore, the generalizations made by the researchers are of scientific interest in the context of solving the scientific problem of using digital tools in interdisciplinary projects of students' personal and professional development in higher education.

According to the problem of the proposed article, the conclusions made by Ukrainian and foreign authors who study the use of digital tools while working with students are significant. Thus V. Khomenko, L. Pavlenko, M. Pavlenko and S. Khomenko in the article «Cloud technologies in the information - methodological support of individual learning activities of students» justify the need for cloud services such as Zoho, Microsoft, Google in the methodological support of individual learning activities of students (Khomenko, Pavlenko, Pavlenko & Khomenko, 2020). In the methodical work «Development of information and communication competence of teachers in a cloud-based learning environment» a group of authors (Hrytsenchuk (et al), Bykova, Ovcharuk (Eds.), 2019, 2019) identify the trends and characterize the progressive experience of the Baltic countries, the Netherlands, the Scandinavian countries, Great Britain, the European Union in the formation of information and communication competence of teachers in special conditions of digitalization of the learning environment.

The researchers' scientific conclusions on the effectiveness of such environment are of practical value and meet the current needs for effective distance and blended learning in higher education establishments (Hrytsenchuk (et al), Bykova, Ovcharuk (Eds.), 2019). Accordingly, the group of researchers (Rzhevskaya, Dobroskok & Zaimova) reveals the features of the use of network tools (Skype, Zoom, Webex, Google G-Suite, Workplace by Facebook, Cliqtalk, Padlet) in order to organize virtual interaction of students and their cooperation in the process of learning and exchanging ideas (Rzhevskaya, Dobroskok, & Zaimova, 2020). In line with this issue, scientific and practical

interest are the highlighted ideas on the use of the proposed network tools, which we consider as a separate group of digital tools in interdisciplinary projects of personal and professional self-development of students. Similar ideas are carried out in the article «Aplicación de herramientas multimediales colaborativas para la generación de contenidos digitales destinados a la educación secundaria», in which the authors (Drubich, Carena, Anderegen, Bustos, Fornari, Alegre, & Culzoni) identify digital tools needed by teachers of higher education institutions and future teachers to create educational materials (Drubich, Carena, Anderegen, Bustos, Fornari, Alegre, & Culzoni, 2017). It is important to note that if students master the skills to use such digital tools as blog, digital repository, virtual classroom, forum, video, etc., it will enable them to develop digital content that will promote their personal and professional self-development.

The collective research «New strategy for teacher's training in the context of European integration» partially focuses on the problem of using digital tools in interdisciplinary projects of personal and professional self-development of students. Intermediate results on the formation of digital skills of future teachers are covered by a group of authors (Ivaniuk, Kuzemko, Novyk) in the article «Training «Designing a multimedia environment for secondary and preschool education» as a means of developing digital skills of future teachers». Five digital skills that are important for personal and professional self-development of students of higher education are specified and characterized: use of digital devices and ICT, search and critical evaluation of digital content, modification and creation of digital resources, information exchange and organization of digital communication, learn and teach the use of ICT (Ivaniuk, Kuzemko, & Novyk, 2020).

In the broad research field of the subject of our scientific research, the findings of E. Bukor on the influence of the environment on the formation of professional experience of future professionals, their choice of ways to gain professional experience, the development of internal motives for professional activity are significant (Bukor, 2015). Given the subject of the proposed article, the considerations made by B. Malm on the formation of a system of professional values and beliefs, leadership qualities, empathy in the personal and professional development of teachers are important. According to the results of international experience, the researcher concludes that in the course of higher education,

future specialists should develop the ability to self-realization and study the audience with which they will work, implement an individual approach to working with students and their parents (Malm, 2009). In line with the targets set by the scientist for personal and professional self-development of students, now in the educational process it is quite essential to master knowledge and skills to use digital means (tools) that promote effective self-realization and personal and professional self-development of students in the period of social challenges. In her scientific work B. Malm concludes that to overcome difficulties in the professional activity teachers need to have reflective skills, the ability to cooperate with all participants in the educational process, to work on their own professional development (Malm, 2020). Analysis of these studies in line with the author's approaches to the problem of self-realization and professional self-development of students provides grounds for actualizing the scientific problem of digital tools, especially in interdisciplinary projects.

In the context of the proposed article the following scientific papers that reveal the technology of interdisciplinary projects of personal and professional self-development of future professionals are of great interest. Thus, M. Brassler and J. Dettmers in their publication reveal the features of the formation of interdisciplinary competence of students in the course of their interdisciplinary projects. The authors of this study emphasize that the formation of actualized competence in future professionals is significant because it contributes to the complex performance of their job functions (Brassler & Dettmers, 2017). It should be noted that the authors of the above work do not disclose tools, mainly digital ones in connection with the formation of professional functions of future teachers. M. Warr and R. West are consistent with the above authors' ideas, who note that the involvement of students in interdisciplinary projects contributes to their personal development. The authors prefer the disclosure of the implementation of pedagogical goals in the process of implementing interdisciplinary projects by students, but do not reveal the main tools for their implementation (Warr, & West, 2020). Similar ideas are presented in a study by E. Mancas (Mancas, 2011), which focuses on preparing future teachers to design the use of interdisciplinary projects while working with students. Despite the fact that in the pedagogical sense the work has practical significance, the author did not highlight the use of digital tools.

General problems on how practically electronic digital technologies are used in professional education are covered by a group of authors (Vaganova, Zheltukhina, Sinina, Tsarapkina, & Koloulina,) in the work «Electronic gaming technologies in professional education» (2021). Some aspects of the above study show the impact of digital tools on the formation of the student's competitiveness. Contextual interpretation of digital technologies (TikTok, hashtags, Instagram, YouTube) is presented in the study «Discourse analysis and digital technologies: (TikTok, hashtags, Instagram, YouTube): universal and specific aspects in international practice» (Izotova, Polishchuk & Taranik-Tkachuk, 2021).

The essential features of professional and personal development of teachers, their links with career development are revealed in the study «Professional and Personal Development as a Basis for Successful Career of Teachers». However, the authors did not pay attention to tools that can promote productivity (Solomonova, & Gerasimova, 2019).

Scientific papers on related issues prove the insufficient study of the peculiarities of the use of digital tools in interdisciplinary projects of personal and professional self-development of students of pedagogical specialties.

The purpose of the study is to research the effective use of digital tools at different stages of interdisciplinary projects of personal and professional self-development of students of pedagogical specialties according to certain indicators.

Methodology

In the course of theoretical and empirical research, the effective use of digital tools in interdisciplinary projects of personal and professional self-development of students of pedagogical specialties was studied. The research was carried out between 2019 and 2021 at Borys Grinchenko Kyiv University. 232 students were involved in all stages of the study. The experiment involved 109 first-year students of Bachelor's level of higher education in the following specialties: «Preschool education» (52 people), «Primary education» (57 people).

The study covered four interrelated stages:

At the *first stage* (January 2018 – August 2019) the peculiarities of the application of interdisciplinary projects in the educational

process of higher education institutions were clarified. The essence, content and stages of the implementation of interdisciplinary projects of personal and professional self-development of students of pedagogical specialties were determined. A pilot study of personal and professional self-development of future specialists in preschool and primary education was conducted. Five indicators (value-motivated, cognitive, self-study (self-study, self-observation, self-development), procedural, self-movement) and levels (basic, medium, high) of personal and professional self-development of future teachers were substantiated. The essential characteristics of the value-motivated indicator are value orientations and personal meanings of self-realization, a choice of digital tools (web services, online and mobile applications, information resources, cloud technologies), for the personal and professional growth of future teachers. The cognitive indicator reveals the awareness of students of pedagogical specialties about the interdependence and interaction of self-development on their personal and professional development, the content of digital tools to build their own trajectory of self-progress. The self-study indicator is the students' acquisition of the skills to operate digital tools and develop the route of their own personal and professional development. We consider the procedural indicator as the ability and readiness of students to select the most optimal digital tools that will contribute to their self-development. The self-motivation indicator provides a study of the growth of personal qualities and professional skills of the future teacher.

According to the results of the pilot study, the essential characteristics of the basic, medium and high levels of personal and professional self-development of pedagogical specialties' students were clarified. The basic level of personal and professional self-development consists of reproductive values, in particular those formed in students by their previous experience. The predominance of personal values over professional values is characteristic for students who belong to the basic level. It should be noted that most often representatives of this group of students have difficulties selecting digital tools and using them. This is an inhibitory factor for their analysis and interpretation of personal growth.

Students who are assigned to the medium level of personal and professional self-development are mostly consciously aware of both personal and professional growth, demonstrate readiness to adapt to new professional and life conditions,

respond mobile to social challenges and educational transformations. Representatives of this group independently or under the guidance of a consultant select digital tools to solve tasks related to personal and professional self-development with the aim of acquiring new knowledge and skills. They actively defend their own ideas and argue them, use self-reflection.

A high level of personal and professional self-development is observed in students who demonstrate the ability and willingness to develop a road map of self-motivation. These students in practice demonstrate their own style of personal and professional communication, understand their own professional needs, know how to use digital tools for the development of educational products (blog, website, manual, methodical recommendations, didactic games, etc.), which are in demand for participants in the educational process. Students with a high level know how and are ready to work in a team and take responsibility for their own actions. They take an interest in various studies and analyze their results and implement them in the educational process of preschool and primary education institutions during internships.

At the second stage (September-December 2019) an interdisciplinary project «Portrait of Freshman» with the students of pedagogical specialties of first year study was designed and implemented (55 students were involved: 26 represented the Specialty «Preschool education», 29 represented the Specialty «Primary education»). In the process of project development and implementation, teachers and students used almost no digital tools, only at the stage of processing, presentation of results and at the students' personal request (requirements to use digital tools by students to perform project tasks were not set). Verification of the effectiveness of the project was carried out by the method of expert evaluations in accordance with the identified indicators and levels of personal and professional self-development of future teachers, by comparing the results before and after the project.

At the third stage (September-December 2020) the analysis of the use of digital tools was carried out and the content and technological support of the interdisciplinary project of personal and professional self-development of future teachers was improved. The project «Development in Cognition» was implemented, which involved 54 first-year students majoring in «Preschool Education» (24 people) and «Primary Education» (30 people). Verification of the

effectiveness of the project was carried out according to the method of the previous stage.

At the fourth stage (January-April 2021) the effective use of digital tools in interdisciplinary projects of personal and professional self-development of future teachers was tested by comparing quantitative and qualitative assessments of indicators at a high level in control group of students, implementation of the project «Portrait of Freshman» in 2019 and in experimental group, implementation of the project «Development in Cognition» in 2020. The statistical significance of the study results was verified by comparing the average values of high-level indicators in the control and experimental groups using Student t-criterion.

Results and Discussion

The study of theoretical sources on the topic made it possible to generalize the conceptual ideas that form the basis of research on the scientific problem of using digital tools in interdisciplinary projects of personal and professional self-development of students (pedagogical specialties). In line with the main problems of our scientific research, the essence of key concepts has been clarified and substantiated: interdisciplinary project of personal and professional self-development of students; digital tools. Interdisciplinary projects of personal and professional self-development are interpreted as a form of organization of the learning process, which provides an optimal combination of value-based individual and group research activities within the disciplines of educational training, internships, extracurricular activities, integrated professional knowledge and skills, methods of activity and personal abilities to self-realization and self-development.

By digital tools we mean a set of educational platforms and web resources, digital services, mobile and online applications that provide the ability to search, use, modify and create educational materials for effective research activities, which stimulates personal and professional self-development.

We found out that the implementation of an interdisciplinary project in a higher education institution is systematic, comprehensive collective work of all participants in the educational process. Therefore, it is extremely important to create a cohesive team of teachers from different disciplines who will communicate effectively with each other, with students and with the project coordinator. The development of

an interdisciplinary project requires a thorough selection by the coordinators of the strategic objectives of the project, the principles of integration of the content of academic disciplines; analysis and identification of components of integrated topics; identification of the key goal (integrator) of the project; prognostic determination of the type, structure and final result (product) of the project. To ensure the effectiveness of well-organized project activities it is necessary to select effective

digital tools that ensure the implementation of goals and objectives of personal and professional self-development of students at each stage of the interdisciplinary project.

The study of scientific works on the given problem in the article has led to the selection of digital tools that can be used at different stages of interdisciplinary projects of personal and professional self-development of students of pedagogical specialties. (Fig. 1).

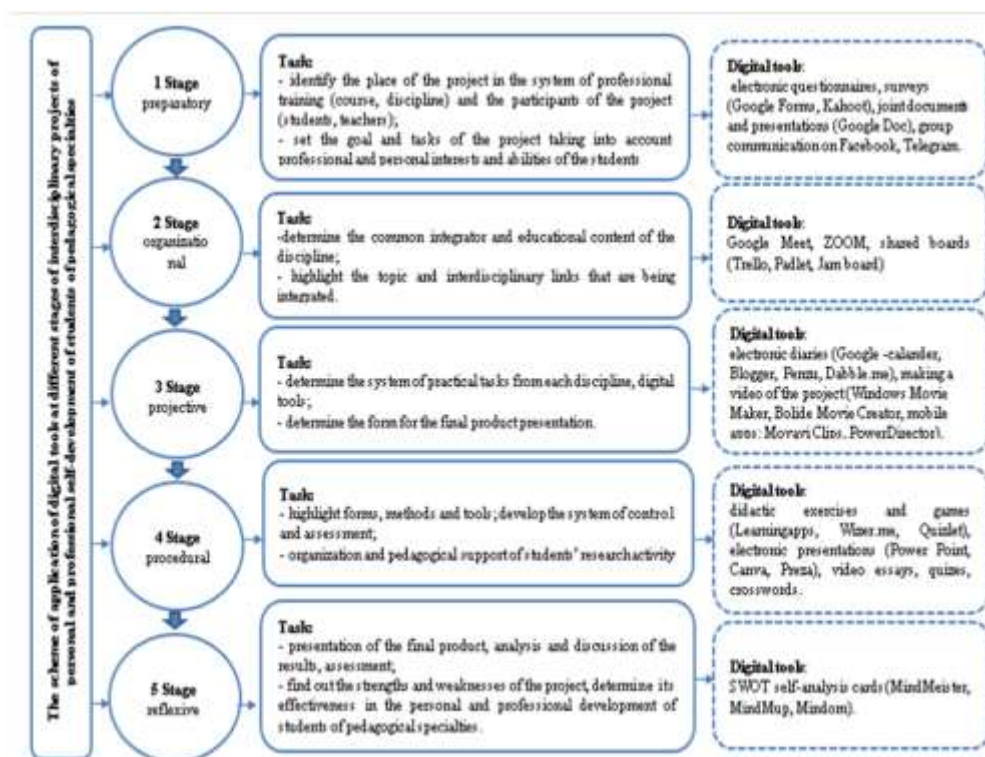


Fig. 1. The scheme of use of digital tools at different stages of interdisciplinary projects of personal and professional self-development of students of pedagogical specialties (own authorship)

The presented research focuses on the study of the effective use of digital tools in interdisciplinary projects in order to increase the motivation of students to personal and professional self-development; improve the forms and methods of teaching that involve individual and group research activities; diversification of forms of presenting the results of project activities (integrated personal and professional knowledge, skills and methods of activity).

The study of the use of digital tools in interdisciplinary projects by higher education students was carried out in line with the personal-professional strategy of specialists' training, the main idea of which is to create conditions for students' abilities to self-realization and self-

development. The experimental study was conducted by teachers of the Department of Pedagogy and Psychology of Pedagogical Institute of Borys Grinchenko Kyiv University. The key visions for its implementation are done by teachers in the course of teaching disciplines, developing the content of educational (psychological and pedagogical) practices, organization of various forms of extracurricular activities. The study of the content of the following subjects «Pedagogy», «Psychology», «Anthropology» shows that the topics of lectures, seminars, practical classes, independent work is aimed at developing students' ability to know themselves, explore their own resources and opportunities, determine goals and needs in self-development, to build a map of personal growth in their profession. Therefore, higher

education applicants are involved in the implementation of interdisciplinary projects that are part of the content of academic disciplines. To prepare and implement this type of project, students master the skills of using different models of digital tools, in particular for establishing intergroup communication (Google Meet, ZOOM, Viber, social media groups), studying the needs, motives, interests and capabilities of project participants (Google Forms, Kahoot), definition of goals, tasks implemented at different stages of the project (Google Dok), joint activities (working with common boards (Trello, Padlet, Jamboard), compiling maps of self-development (MindMeister, Mindomo, MindMup), development and presentation of educational products PowerPoint, Canva, Prezi, QR-codes), video essays, SWOT introspection cards (MindMeister, Mindomo, MindMup). The ability of students to select the necessary digital tools and use them productively is an important component of their personal and professional development. It is significant that such projects are performed by students in the classroom and extracurricular activities on the basis of the Center for Self-Knowledge and Self-Development of the Pedagogical Institute during the first years of study. After all, for future teachers the first and second courses of study at the university are crucial for adaptation and professional self-identification, because it is during this period when the foundations of professional knowledge, skills, activities and personal abilities to self-realization and self-improvement are laid.

Some interdisciplinary projects implemented in 2018-2019 did not mean the widespread use of digital tools, as emphasis was placed on the students' formation of the ability to self-realization, to create the means of working in a team. As a result, students were not ready to use

digital tools during research activities for self-realization and self-development. Therefore, the task was to develop interdisciplinary projects of personal and professional self-development of students of pedagogical specialties with the use of digital tools that would help solve a number of problems:

- increase the motivation for independent research activities and the implementation of common tasks in the course of interdisciplinary projects that promote personal and professional self-development;
- develop digital skills necessary for successful self-development and future professional activity in modern preschool institutions with general secondary education;
- form integrated knowledge, skills and abilities for personal and professional self-realization and self-improvement.

In order to study the effective use of digital tools in interdisciplinary projects, a comparative analysis of personal and professional development of first-year students of the Pedagogical Institute, Specialties «Preschool Education» and «Primary Education» was based on the two projects: in 2019 – «Portrait of Freshman» (without the use of digital tools), in 2020 – «Development in Cognition» (used various digital tools at all stages of implementation).

Research on the use of digital tools in interdisciplinary projects of personal and professional self-development of students was based on five indicators (value-motivated, cognitive, self-study, procedural, self-movement) were studied. The obtained data are attributed to the input results of the empirical study (results of the ascertaining stage (Table 1)).

Table 1.
Levels of personal and professional self-development of students of pedagogical specialties (ascertaining stage)

<i>Indicators / Levels</i>	<i>Control Group (55 people)</i>			<i>Experimental Group (54 people)</i>		
	<i>basic</i>	<i>medium</i>	<i>high</i>	<i>basic</i>	<i>medium</i>	<i>high</i>
value-motivated	36	15	4	35	16	3
cognitive	39	13	3	39	12	3
Self-study	49	5	1	47	6	1
procedural	43	10	2	44	7	3
Self-movement	47	8	0	47	7	0

(own authorship)

Analysis of the results of the ascertaining stage of the study proved the need to develop technological support for personal and professional self-development of students, which were fulfilled in interdisciplinary projects. The purpose of these projects was to develop in future teachers integrated knowledge, skills and methods of studying their own personal manifestations and individual characteristics of others; development of abilities for self-analysis and self-improvement for successful personal and professional self-realization.

The objectives of the projects performed by freshmen are:

- raise students' awareness of the need for self-analysis (values, qualities, abilities, skills) for further personal and professional growth;
- form skills and methods of activity on preservation and strengthening of health (physical, mental, social and spiritual) both their own and others for establishment of partnership interaction in the educational environment;
- develop abilities and readiness for self-realization and self-improvement (study, analysis, results generalization of personal and professional achievements) for professional identification and development of own educational trajectory;
- teach creativity, independence, leadership skills, critical thinking and reflection for the

successful solution of professional problems in future pedagogical activities. These tasks are based on integrated content of disciplines: «Anthropology» (Modules: «Psychological Anthropology» and «Human Anatomy and Physiology with the basics of medical knowledge»), University Studies (Modules «Leadership», «Introduction to the Specialty»), «Pedagogy», «Foreign Language with teaching methods».

Stages of project implementation:

Stage 1 – organizational (project development, familiarization with the content of the project, distribution of tasks);

Stage 2 – diagnostic (students' self-diagnosis of features of physiological, mental, social manifestations (using diagnostic techniques, self-observations, questionnaires);

Stage 3 – generalizing (analysis, generalization of the results of self-diagnosis and surveys; interpretation of research results and development of their own strategy of self-development);

Stage 4 – presentation of results, discussion and analysis of project effectiveness.

Defined tasks and prognostic results from different disciplines, which provided interdisciplinary links, were also common to both projects. The difference was in the use / without use of digital tools in the process of their implementation (Table 2).

Table 2.

Application of tools in the process of implementation of interdisciplinary projects of personal and professional self-development of students of pedagogical specialties.

Discipline	Tasks of the disciplines to be integrated	Expected results	Tools for the implementation of the project «Portrait of Freshman»	Tools for the implementation of the project «Development in Cognition»
Anthropology: Human Anatomy and Physiology with the basics of medical knowledge	- awareness of knowledge, ways to maintain and strengthen their own physical health and others; - determining the duration and distribution of certain activities and recreation in the overall balance of the day	- understanding the individual characteristics of the body and ways of health; - ability to effective personal time management	<i>Self-monitoring cards</i> for the organization of various activities (being outdoors; physical activity; diet; alternation of activities and leisure; sleep duration, well-being) during the week	<i>Electronic diaries</i> (Google Calendar, Blogger, Penzu, Dabble.me - at the student's choice), note changes in activities per day, well-being (with the addition of photo, video) during the week
Anthropology: Psychological Anthropology	- mastering the methods of	- understanding their own personal	<i>Printed diagnostic tools</i> (questionnaires;	<i>Electronic questionnaires, surveys, tests for</i>

<p>Pedagogy: General pedagogy</p>	<p>studying the mental "I"; - study of own abilities, type of temperament, character; -study of the manifestation and course of mental processes and states; - determining the features of their own emotional and volitional regulation - determining the leading motives for choosing a teaching profession and personal and professional characteristics of a teacher-humanist; - study of ways to design and implement personal and professional development</p>	<p>manifestations and individual differences of others; - development of the ability to effectively solve problems of maintaining and strengthening the mental health of their own and others - understanding of personal qualities and values; - development of road maps of personal and professional self-development</p>	<p>tests; graphic tests; projective methods; design forms; self-efficacy registration forms according to the method "Self-efficacy scale") <i>Printed</i> questionnaires, questionnaires; a series of didactic exercises (to study values; skills); joint posters, posts (generalized characteristics of a modern teacher); individual roadmaps for self-development</p>	<p>diagnosis and self-diagnosis of personality manifestations (online tests to determine the type of personality, Luscher test, tolerance tests, etc.). Digital tools: Kahoot, Socrative, Plickers, Quizizz, Quizalize, Mentimeter, Google Forms <i>Electronic</i> questionnaires, surveys (Google Forms, Kahoot); didactic exercises and games (Learningapps; Wizer.me; Quizlet); common boards (Trello, Padlet, Jamboard); self-development cards (MindMeister, Mindomo, MindMup); QR codes</p>
<p>University studies: Leadership; Introduction to the specialty</p>	<p>- study of leadership qualities of the individual; - study of communication, cooperation and interaction skills; - awareness and formation of personal and professional competencies of the teacher</p>	<p>- Finding out the presence of personal qualities inherent in people with leadership skills; - awareness of their own purpose and motivation to learn; - understanding of their own personal and professional qualities, skills, needs, difficulties in learning, communication and interaction Determining the priority of one's own motives for learning a foreign language and developing on this basis ways of self-improvement of foreign language competence</p>	<p><i>Printed</i> questionnaires, tests; essay writing; preparation of self-presentations; development of joint posters, wall hangings, SWOT introspection cards; joint exercises and games</p>	<p><i>Electronic</i> questionnaires, surveys (Google Forms); joint documents and presentations (Google Dok, Google Presentations); electronic presentations (PowerPoint, Canva, Prezi) and video essays; SWOT introspection cards (MindMeister, Mindomo, MindMup)</p>
<p>Foreign language education: Foreign language with teaching methods</p>	<p>- determining the success factors of modern students, teachers; - diagnosing the level of motivation to learn a foreign language</p>	<p>Determining the priority of one's own motives for learning a foreign language and developing on this basis ways of self-improvement of foreign language competence</p>	<p><i>Printed</i> questionnaires, questionnaires, crossword puzzles, interactive tasks; joint posters, wall hangings, etc.</p>	<p><i>Electronic</i> questionnaires, surveys, quizzes, crosswords, puzzles, word clouds (Google Forms, Kahoot; Quizizz, Rebus1, Learningapps, WordArt); creating steps for self-development</p>

<p>Extracurricular activities: individual and collective consultations, trainings, master classes on the basis of the Center</p>	<p>- Formation of skills of self-knowledge and self-development; - development of tolerance, research skills, communication and digital skills, critical thinking and reflection.</p>	<p>Formation of skills of self-knowledge and personal-professional self-development</p>	<p>Carrying out of adaptive trainings and trainings of self-knowledge and self-development; master of personal and professional growth classes. Presentation of project implementation results (round tables, presentations)</p>	<p>through scribing (Sparkol; Powtoon); QR codes Conducting trainings and master classes (Google Meet, ZOOM); group communication on Facebook, Telegram and Viber; creation video on the results of the project (Windows Movie Maker, Bolide Movie Creator; mobile applications: Movavi Clips, PowerDirector)</p>
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(own authorship)

Based on the results of the interdisciplinary project «Portrait of Freshman» in 2019, a slide presentation of a freshman’s portrait at the Pedagogical Institute was created. The presentation was discussed during a round table with the participation of students, the Council of Student Government, teachers of the Institute. The effectiveness of the implemented project was evaluated in accordance with the selected

indicators of personal and professional self-development of future teachers on a set of scores corresponding to the basic, intermediate and high levels. To illustrate it, we will present quantitative indicators of the high level of personal and professional development of students on all indicators in comparison (ascertaining and control stages) (Fig. 2).

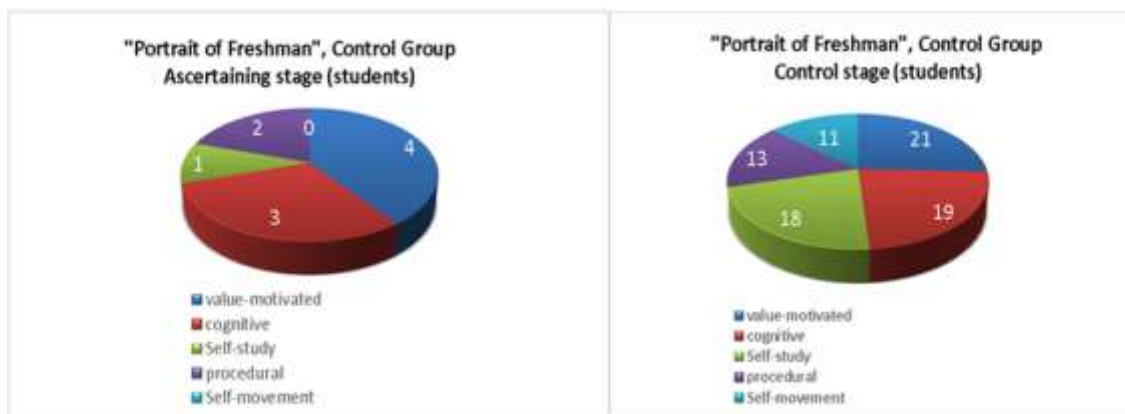


Fig. 2. Quantitative indicators of a high level of personal and professional self-development of students, results of the project «Portrait of Freshman» in 2019.

It should be noted that in the process of implementing this interdisciplinary project, digital tools were not used, and the obtained quantitative indicators served in further research as the results of personal and professional self-development of students of the control group.

The experimental group included 54 first-year students majoring in «Preschool Education» (24 people) and «Primary Education» (30 people), who joined the implementation of the interdisciplinary project of personal and

professional self-development «Development in Cognition» in 2020. This project involved the use and testing of the effectiveness of various digital tools (see Table 2). The peculiarity of this project of personal and professional self-development of future teachers was that the timing of its implementation coincided with the introduction of quarantine restrictions (October-December, 2020). As a result, most of the classes in disciplines, trainings and master classes in extracurricular activities were conducted online on the platforms Google Meet, ZOOM and in the

electronic learning environment of the University (Moodle platform).

An important task in the implementation of the project with the use of digital tools was the development of interesting and meaningful assignments by teachers. Therefore, each of them was developed in accordance with the integrated goal, taking into account the possibilities of group and individual work, which students performed both during the lesson (online work) and independently. Another important task of pedagogical support was the preparation of first-year students to work with digital tools and the development of their digital skills. Such work was carried out mainly in extracurricular time - a series of trainings and master classes were held on the basis of the Center for Self-Knowledge and Self-Development.

The final stage of the interdisciplinary project «Development in Cognition» was the creation of individual and group information messages in the form of videos, video presentations about students' own achievements as a result of self-analysis and self-development in the process of studying at the Institute. The future teachers posted their works on social networks and on the website of the Center for Self-Realization and Self-Development.

The effectiveness of the interdisciplinary project «Development in Cognition» in the personal and professional self-development of future teachers was determined according to the selected indicators, based on a set of scores. To visually demonstrate it, we will present quantitative indicators of the high level of personal and professional self-development of students (according to the results of the project in ascertaining and control stages) (Fig. 3).

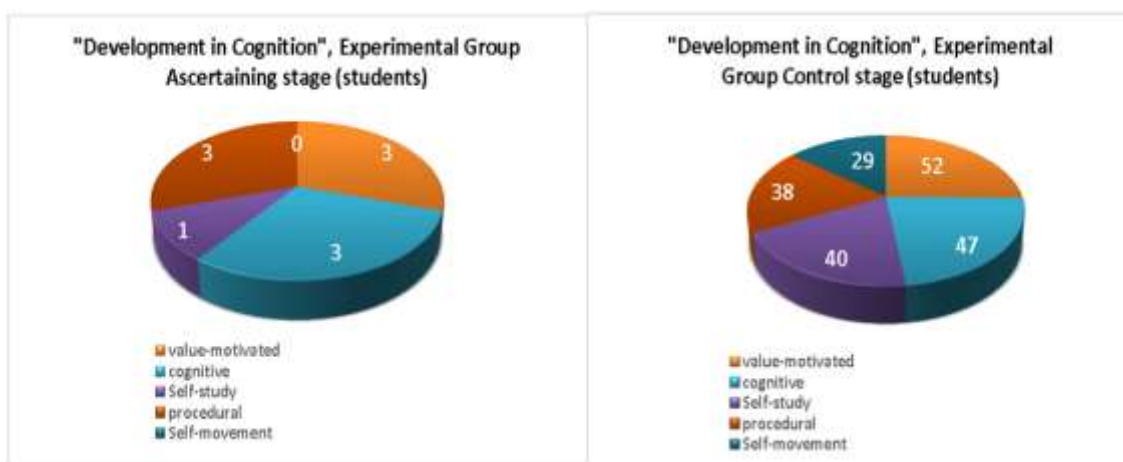


Fig. 3. Quantitative indicators of a high level of personal and professional self-development of students, results of the project «Development in Cognition» in 2020

Qualitative analysis of generalized indexes based on indicators of personal and professional self-development proved their significant increase in students of the experimental group (Table 3). It is worth noting a significant increase in the motivation of these students to perform the tasks of an interdisciplinary project using digital tools.

Integrated tasks of academic disciplines and forms of extracurricular activities with the application of these tools contributed to the intensification of research activities of students, the formation of digital skills and reflection, which is proved by the experts' assessments.

Table 3.

Comparison of levels of personal and professional self-development of students of pedagogical specialties (control stage)

<i>Indicators / Levels</i>	<i>Control Group (55 people)</i>			<i>Experimental Group (54 people)</i>		
	<i>basic</i>	<i>medium</i>	<i>high</i>	<i>basic</i>	<i>medium</i>	<i>high</i>
value-motivated	8	26	21	0	2	52
cognitive	9	27	19	0	7	47
Self-study	9	28	18	4	10	40
procedural	12	30	13	3	13	38
Self-movement	12	32	11	6	19	29
average index	10	28,6	16,4	2,6	10,2	41,2

(own authorship)

Since expert evaluation is largely subjective and does not provide an accurate assessment of the effectiveness of the studied phenomenon, we also used statistical methods. The statistical significance of the study results was verified by comparing the high-level indicators in the control and experimental groups using Student t-criterion for unrelated samples with an equal number of measurements.

As a result of calculations the empirical index of t - criterion ($t_{emp} = 5,7$) is received. According to the table of critical Student's t-criterion: $p \leq 0,05$ (2,31); $p \leq 0,01$ (3,36). The obtained empirical index of t (5,7) is in the zone of significance ($5,7 > 3,36$), which, in turn, proves a statistically significant difference in the growth of high-level indicators based on all indicators in the students of the experimental group in contrast to the control one.

Thus, we conclude that by comparing quantitative and qualitative indicators (value-motivated, cognitive, self-learning, procedural, self-movement) the use of digital tools in interdisciplinary projects of personal and professional self-development of pedagogical students is effective.

Conclusions

Theoretical analysis of sources on the researched problem allowed us to conclude that the training of specialists, including pedagogical specialties is relevant and in demand. In particular, the works of Ukrainian and foreign scientists briefly reveal some aspects of the use of digital tools, interdisciplinary projects in the educational process of students. However, the peculiarities of the use of digital tools in interdisciplinary projects of personal and professional self-

development of future teachers are insufficiently theoretically substantiated in the works of modern scientists and there is no empirical data on their effectiveness.

The article reveals the mechanisms of using digital tools in interdisciplinary projects of personal and professional self-development, taking into account their gradual implementation by students of pedagogical specialties. Digital tools (educational platforms and web resources, digital services, mobile and online applications) are singled out, the peculiarities of using these tools in the project «Development in Cognition» done by the author's team are highlighted.

According to the results of empirical research, the effective use of digital tools at all stages of implementation of interdisciplinary projects of personal and professional development of students (future teachers) is proved. The obtained results of comparative analysis of quantitative and qualitative indicators in accordance with certain indicators of personal and professional self-development of students (value-motivated, cognitive-cognitive, self-study, procedural, self-movement) at the ascertaining and control stages of empirical research proved the effective use of digital tools. The statistical value was verified by comparing the values of high-level indicators in the control and experimental groups using Student t-criterion. The research revealed the need for a flexible approach to the use of digital tools at different stages of the interdisciplinary project of personal and professional self-development. It has been found out that at the preparatory and organizational stages of the projects such digital tools are effective that help students learn the available thoughts and considerations in the information space, form students' own judgments about pedagogical

phenomena (electronic questionnaires, questionnaires, group communication on Facebook, Telegram); at the procedural stage, students apply more widely used digital tools that enhance their cognitive activity (online conferences, quizzes; shared boards; electronic crosswords, puzzles, games, word clouds); at the reflection stage, students actively use video presentations and video essays, posts that they have published on social networks; electronic blogs and websites.

The study identified digital tools that students can use for personal and professional self-development, but they are not fully disclosed in this article. We consider the following issues for further research - the use of educational platforms, web resources, social networks in the training of students of pedagogical specialties.

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