



LJUBLJANA SCHOOL OF BUSINESS

**MODERN APPROACHES TO KNOWLEDGE
MANAGEMENT DEVELOPMENT**

Collective monograph

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This collective monograph offers the description of sustainable development in the condition of European integration. The authors of individual chapters have chosen such point of view for the topic which they considered as the most important and specific for their field of study using the methods of logical and semantic analysis of concepts, the method of reflection, textual reconstruction and comparative analysis. The theoretical and applied problems of sustainable development in the condition of European integration are investigated in the context of economics, education, cultural, politics and law.

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**PREPARATION OF FUTURE TEACHERS OF TECHNOLOGY FOR THE
ORGANIZATION OF PUPILS' EDUCATIONAL ACTIVITIES IN THE MODERN
INFORMATION AND EDUCATIONAL CONDITIONS**

***Abstract.** It is determined that the competence in the field of activity, which combines practical expediency and creativity, is fundamentally important for a teacher of labor training and technology. Also the using of information and communication technologies for the organization of educational activities of student is very momentous thing in this case. Examples of updating the content of technological education within the current Ukrainian State Standard, which provides the links between different subjects, flexibility of the educational process and the use of information and communication technologies, are also offered. Methodological bases of use of innovations in the course of professional training of future technology teachers are suggested. It was concluded that due to the lack of clearly defined innovative creative training of student, the overall result of their training in the higher school and the level of activity of teachers' decreases. This indicates the need to make changes in the content of professional training of future teachers of technology for the education students of secondary school in modern information and educational conditions and the development of further researches*

Introduction.

The modern educational environment forms new tasks, goals and challenges. It's a logical and natural process, because the level of development of the world community in the XXI century also has its own distinctive features. Thus, it's inadmissible to stay away from innovative tendencies of world progress, its means, receptions and ways of realization. However, simultaneously, with the informatization of the educational process, scientific leaders pay attention to human values and the prerogatives of feeling beautiful and natural. On the one hand, labor training and education are increasingly out of sight of scientist. On the other hand, other scientists are conducting powerful scientific research with evidence of the benefits of forming positive qualities of the human personality only by means of work.

Increasingly, secondary schools pay attention to subjects, through the addition of which it is possible to form a full-fledged personality, who will be able to think creatively. And at the same time to save the ability to cooperate in a team, satisfy basic human needs. In this case, it is sometimes necessary to break the stereotypes of the modern educational system in order to receive simple life lessons, experience and practice by pupils. It is clear that the generator of these ideas should be a teacher whose activities are responsible also for such implementation. So, the realities of modern society place high demands on the personality of the future teacher of any profile.

For a teacher of labor training and technology, on the one hand, competence in the field of activity, which combines practical expediency and creativity, is fundamentally important. On the other point of view, taking into consideration the current trends of the labor market, a graduate of a pedagogical educational institution must be ready to work in conditions closed to the sphere of production or service.

This specialist must be able to quickly adapt to the new implementations, technological requirements and technical solutions. We mustn't forget that the dominant role in modern society is played by the process of its informatization, which involves mass involvement of methods and modern means of the collecting, processing, presenting, transmitting and storing information which is based on computer technology and information transfer. As a result, one of the main directions of informatization of society is the renewal of education on the basis of information and communication technologies of education.

So, the statements, mentioned above, indicate the relevance of the research topic "Preparation of future teachers of technology for the organization of pupils' educational activities in the modern information and educational conditions".

The purpose of this article is to substantiate theoretically, develop and experimentally test the content and methodological foundations of the professional training of future teachers of technology for teaching pupils in a modern information and educational conditions.

It can be admitted that there is significant amount of researches on this issue. Therefore the addition of information and communication technologies of students' teaching at pedagogical universities is relevant.

We studied the experience of many scientists in various spheres of pedagogical science in the process of our research. There some of them: regularities of formation of personal, professional qualities of the teacher of labor training and technologies (Hevko, 2017; Tereshchuk, 2007; Torubara, 2009); theoretical and methodical bases of implementation of modern information technologies of training in the teaching process of students of engineering and pedagogical faculty (Horbatyuk, 2009; Kukharenko, 2016; Tsidylo, 2015); formation of readiness of future teachers of labor education and technologies for the use of information and communication technologies (Havryshchak, 2011; Mamus, 2009; Petrytsyn, 2017; Urusky, 2016).

Researchers O. Andreev, V. Bykov, R. Hurevych, M. Kademiya, O. Romanyshyna consider research that involves the active use of information, communication and network technologies to be promising, as well as modern means of transmission and exchange of information. The pedagogical aspects of blended learning are revealed in the work of V. Kukharenko (2016); the pedagogical technology of designing of blended learning is offered and recommendations for application in educational process are also developed. The author provides the examples of the addition of blended learning at the university for the training of teachers of labor education and technology.

1. The actuality of updating of youth's labor training.

In accordance to the requirements of society, pupils must learn the features of modern manufacturing (the latest technologies) during labor training and technology. This aspect should pay attention to the knowledge of processing various constructional materials, principles of environmental activities, energy conversion, etc.

The study of the educational field "Technology" is provided by the State Standard of Basic and Complete Secondary Education in Ukraine. The main purpose of this subject is the formation and development of the design, technological, information, communication competencies in order to realize the creative potential of pupils. These aspects determine the substance and the prospects of technological education.

Therefore, the searching of ways solving the problems of technological training of secondary school pupils and future teachers should include not only native experience, but also an analysis of the development of foreign technological education. Due to the impossibility to characterize the peculiarities of teaching a similar subject in different countries because of the limited scope of the article, there are some examples and considerations on the feasibility of making changes in the educational process to train future native teachers of labor training and technology. These very examples are given below.

The experience of the Spanish school Montecastello, located in Vigo, is noteworthy. The management of this educational institution decided to make changes in their work curricula in 2018. Pupils of this school began to study the subject of housekeeping. This fact was considered as the main effective initiative in the fight against gender inequality and the involvement of schoolchildren in basic employment. The boys learnt ironing, sewing, cooking, as well as performing other household chores, such as plumbing and electricity, master carpentry in the offered classes.

The idea came when the school administration was looking for ways to promote gender equality among students. After the discussion, the project was discussed with the parents' and pupils' communities. The parents had no objections to the new discipline, but some children felt uncomfortable when they heard about sewing and ironing. Teachers and parents collaborated and encouraged students. Lessons were taught by volunteer teachers as well as parents of some pupils. Their motto was "Equality is known through action".

The experience of Spanish school demonstrated that the addition of the new subject is very useful for students to learn how to do tasks in order to be ready for future life. So children will be involved in household chores from the beginning and will like the labor.

Modern lessons should be a kind of testing base for the practical application of various subjects; interesting and at the same time accessible for mastering by all students.

Classes in labor training and technology should include links to different sciences. Using knowledge of chemistry, students can justify the choice of construction materials. Mastering the basics of physics contributes to the accessible study not only of the properties of materials, but also the principles of operation of machines and mechanisms, understanding and usage of physical laws that underlie their work. Knowledge of mathematics, biology, history, fine arts, basics of life safety, etc. is required in technology classes. Usually one subject complements another and this contributes to the successful assimilation of theoretical information and the implementation of practical tasks in technology classes.

Learning should be flexible and linked to further professional development, especially in senior classes.

Classes should be organized at a higher scientific and technological level. For example, the laws of physics can be studied on the example of the use of electric current in electrical installation or from the standpoint of mechanical strength in robotics. Students can calculate the optimal location of wiring and lighting system in a "smart home". When studying the basics of "cooking", they should get acquainted with modern technological equipment, training equipment for cooking. Knowledge of chemistry can be deepened and used in the process of cooking and storing food. It is important to be aware with biotechnology, modern food processing, introduction of nanotechnology in cooking, etc.

In the process of studying the module "Technology of interior design" high school students can try themselves in the role of interior designer. However, there is no need to make a shelf, stool or other. While watching videos, students can learn about industrial design, digital modeling and manufacturing technologies. When choosing the topic of their individual creative project and the object to be made, high school students must make the necessary calculations, justify the choice of material. If plastic is chosen for the designed product, the parts can be printed on a 3D printer; if a tree is selected, it is necessary to set parameters for a machine with numerical program control. Of course, such lessons should be conducted on the basis of colleges, lyceums, children's technology parks, centers of innovative creativity today.

It is possible to accustom pupils to non-standard mastering of scientific inventions by involving them in participation in various scientific societies, modern centers of science for youth. For example, "Science Picnics in Ukraine" — interactive experiments in parks, squares, where visitors are introduced to inventors and show that science can be interesting; there they don't present a theory, but reveal the secrets of research in various fields by entertaining.

2. Methodological bases of use of innovations in the course of professional training of future technology teachers

Pupils integrate scientific, technical and artistic activities that have significant potential for the harmonious development of personality in the process of designing and manufacturing products in technology lessons. It is important to get acquainted with modern materials for the manufacturing of products, the peculiarities of their processing, the study of special equipment for practical work, the use of the basics of design and decoration of products with different techniques. Speaking about the informatized society, it is necessary to organize the educational process using the information and communication technologies to teach young people at the appropriate level.

The future teacher must be able to create a database with a variety of projects, he has to work with technical documentation on a computer, be able to make drawings and calculations using computer programs. In addition, it is difficult to imagine modern learning without multimedia technologies by such means: text usage, graphics, video and animation in an interactive mode. These technologies expand the scope of the computer in the educational process. During the practical work, this information will help every pupil to do their individual creative task more successfully.

Social networks have been actively developed, because of the shift of the vector of communication of young people to the Internet sources. The direction and structure, interests and forms of information exchange are their characteristic features. Therefore, it is advisable to use modern domains to form the interest of students. One of the fastest growing social networks is Pinterest, a progressive platform for finding ideas. It is based on the creation of thematic boards. The main tool is the images collected in the tape. Pinterest is world-famous, according to the

statistics: the software environment ranks second place in the number of users among the world's social networks; conversion and CTR in the social network is higher than in FB. The most popular topics — interior, decor, hobbies, cooking. As this software product has gained the trust of millions of users in a quite short time and continues to grow in popularity due to the constant improvement of its capabilities. Its potential features can be used in the educational process of future technology professionals. It's not just about passive use of service ideas, but also creating your own pins and boards.

It is appropriate to highlight the main recommendations that will help to form a cognitive strategy for learning activities particularly at the lessons of technology and generally decorative and applied arts, using the capabilities of Pinterest:

- 1) the use of qualitative content;
- 2) making pupils interested in several boards (experts recommend to use at least 10 boards with 4 pins in each);
- 3) liking the ideas that evoke interest (to like others);
- 4) using of hashtags;
- 5) branding content;
- 6) the work with videos (the usage of video content from YouTube, Dailymotion, TED, Vimeo is allowed);
- 7) captions to pictures have to be left (the qualitative description will accompany a picture after its "stratification").

In the process of studying different modules, such as "Technology of artificial flowers", "Technology of manufacturing gift packaging with textile decor", "Technology of making postcards", "Technology of interior design" in the classes of labor training and technology there are significant resources for improving technical and technological knowledge, practical activities of creative direction using modern domains, platforms for finding ideas.

In the process of studying the module "Technology of making artificial flowers" the basics of creating artificial flowers can be mastered by students of different age, because the process of making them involves the design of simpler and more complex elements. High school pupils can discover the magical world of floral compositions. However, there are no school textbooks and manuals; there is no necessary theoretical information, didactic materials and recommendations. These materials could be used by teachers to prepare and conduct classes. In addition, it is important to involve young people to the design of products using modern materials. Mentioned above indicates the need of updating the content of vocational education, intensification of scientific and pedagogical initiative and creativity, which are aimed to find new reserves of quality training and their competence.

Making artificial flowers is one of the types of decorative and applied arts. Products, made by combining flora objects from different materials, can serve as separate accessories, decoration elements, decorations, souvenirs, etc. The process of their creation is not only interesting, but also is very important for the development of artistic and design abilities and creative potential of the individual.

According to the curricula of bachelor, master degrees, future teachers of technology of engineering and pedagogical faculties study disciplines "Applied creativity", "Workshop on service types of work", "Design of textile products". We believe that the study of material on the design and

manufacture of artificial flowers is possible to be added to the content of one of these disciplines and provide for this approximately 6-8 hours.

To ensure the logic of the presentation of this educational material, students should get acquainted with historical information, the basics of technology of artificial flowers, their place and importance in modern decorative and applied arts, as well as the latest trends in design and floristics.

In order to increase the level of cognitive activity of future teachers of technology, it is advisable to offer an individual research task: to prepare information on materials by using literary and Internet sources. For its successful solution, the teacher can provide indicative topics for abstracts or short reports on the manufacture of flowers of fabric, ribbons, leather, foam; making thematic bouquets, Ukrainian souvenir-wreath, compositions of artificial flowers for interior decoration; women's jewelry and clothing accessories made of artificial flowers, etc.

Thus, it is necessary to take into consideration many factors that develop the personality in order to be involved in creativity. The specialist has not only adapt to the new conditions, but also be able to change it by changing and developing himself. It is important to keep in mind the interests of young people, their personal qualities, inclinations, learning opportunities.

As a result of processing information sources, it is advisable to encourage future teachers of technology to create a common bank of ideas. We provide the example for studying the topic "Design and manufacture of artificial flowers". Depending on the content of the collected materials, it is possible to analyze the information and systematize it: the image of separate colors; samples of the developed instruction cards, technological sequences of manufacturing of separate elements of products; samples of compositions, bouquets, bouquets for clothes, wreaths on the head and wreaths-decorations for rooms, etc.

The future technology teachers, after analyzing the features of similar products for the manufacturing, offer to develop their individual project. It is important to predict the degree of complexity of creating products in accordance to the educational opportunities of each student. In case of necessity, their choice can be adjusted. However, the best result will be in case of correcting this by developing a sketch together.

Depending on their own tastes and wishes, students choose different materials for the design of artificial flowers. Accordingly to this choice, created product designs will be differentiated by the technological complexity of individual operations. The technological sequence of manufacturing products usually includes the following stages:

- making templates for making artificial flowers;
- fabrics and materials preparation;
- cutting of details;
- connection of a flower or composition;
- final processing of the product.

Depending on the materials, selected for the work, it is necessary to justify the control of quality of the product.

The future teacher of technology must be able to help students draw up a plan for the project while organizing and carrying out work on the project. They should discuss the objects of design (individual flowers, compositions of them or complex products with a combination of different techniques for making artificial flowers) . The teacher should be able to adjust the sketches, design and the technology of manufacturing the product depending on the material that is intended. In

order to help students in designing products, the future teacher must have knowledge of design and modeling, technical design, drawing, color, the laws of composition, have an artistic taste to combine individually made elements or colors in harmonious products. Considerable attention should be paid to the study of advanced modern technologies for processing various materials (e.g. foamiran).

Students must know traditional and non-traditional teaching methods in further professional activities and constantly apply them in the learning process. They have to be able to implement a differentiated approach to students, organize work in pairs, in small groups, apply the method of fantasy, the method of creating an ideal object. Students should objectify a method of solving problem situations using the methods of "brainstorming", "focal objects", etc. However, modern education of a young person is inconceivable without the use of information and communication technologies. For example, it is expedient to master CAD (computer-aided design systems) at classes of technological workshop in a higher educational institution of simple designing of furniture. CAD Woody 1.5, developed by the Ukrainian manufacturer Intear, is intended for designing case furniture from a chipboard, DVP, glass. This system can be used not only in production, but also in individual aims. The design of parts is carried out on an orthogonal spatial axial grid, and the final manufacturing of the product is usually performed in axonometric projection. At the same time, the program provides ready-made templates for rapid development of new product models, a database in MS Access format for accounting of basic materials, accessories and other parts. In general, the duration of design depends on the complexity of the design of product parts, as well as the professional skills of the designer. In the end, you can automatically check the correct design of the product.

Modern scientific research, improvement of equipment and technology should be brought to practice in secondary schools classes. Accordingly, future teachers should be able to motivate students and encourage them to learn about inventions and, if possible, master them. For example, the labor training program provides the design of souvenirs, talismans, accessories, etc. A doll, made in the folk style, is one of the most typical examples. However, young people are not always fond of creating a traditional Ukrainian "doll-motanka". Students can be interested in designing a modern designer's doll. The Ball Jointed Doll (BJD) is a doll, to make which hinged hinges and an elastic cord to connect are used. Such "non-standard products" are usually obtained with the help of the 3D printer. You can use the program "RML 3D FACEMAKER", which is offered for non-commercial use. It is freely available and requires only a single web player and browser to run. This program provides a list of facial features that students can manipulate with a slider that can be scrolled with a computer mouse or touchpad. The selected settings must be sent to RML and the face of the nylon doll will be printed on a 3D printer. RML allows you to model a face, print it as a three-dimensional, and then you need just to paint it and assemble it with body parts. Pupils can even design and print flexible plastic clothing for their dolls. But they can sew and decorate it by their own. Thus, students master the latest design technologies along with traditional technologies of sewing and decorating products and in such lessons.

Future technology teachers carry out individual creative projects in various disciplines. However, if necessary, they can combine their activities into a collective interaction. Cloud services are the convenient tool for organizing and implementing collective design.

The various design stages can be performed from any computer that has access to the Internet nowadays. Sending files in small volumes by mail takes time and are inconvenient in order

to exchange information. To solve the problem, it is recommended to synchronize and save files such as Dropbox, Google Drive, OneDrive using cloud services. It is convenient to store project documentation, photos, video clips, etc in cloud sources. In addition, you can set up simultaneous commenting, editing, asking questions to each other and all participants have the opportunity to observe the changes that are made during the implementation of the project stages.

Applying the teaching methods, mentioned above, and introducing information and communication technologies, the teacher will help to increase students' interest to the subject, develop their creative abilities, cognitive activity. An individual approach to the future teacher of technology during the development of their own project forms a number of qualities that will ultimately have positive effect on the formation of the student's character, his attitude to learning and further professional activity.

3. Research aspect.

In accordance to the purpose, set in the article, the study was conducted. It was conducted in the conditions of implementation of the usual educational process in the secondary school and during the training of future teachers of technology.

As a result of an organized conversation with pupils of 10-11 grades, it was found that 92% of them have positive attitude to learning the programs of variable modules in technology lessons.

It should be admitted that all interviewees were interested in the story of modern materials for the manufacturing of products and technology of their processing.

The proposal of high school students to implement homework to collect the necessary information using information and communication technologies for the development of creative projects became unexpected and pleasant.

Besides the survey, analyzed above, there were selected questions for the survey of teachers of labor education and technology and the following results were obtained. 91% of teachers agree with the need of constantly improving the level of knowledge, skills and abilities of artistic and aesthetic orientation for successful professional activity. Almost all respondents (98%) are interested in mastering modern techniques and technologies of manufacturing products. 87% of interviewees thought about the need of practical experience in creating harmony in design and decoration of products with a combination of different materials. Teachers believe that in the classes of labor training and technology it is necessary to combine methods of designing decorative and applied arts and products from modern materials (83%). 31% of teachers of this specialty consider themselves insufficiently competent in the design of products from different construction materials, although they are interested in independent creative search for information from various sources and are constantly improving their professional skills. 91% of respondents want to acquire and apply knowledge and practical skills of aesthetic orientation in the process of creating and decorating products with students. It turned out that high school students like to design and make products of different construction materials, but they understand that they own only certain technique, so 31% of them need constant support and help from the teacher.

The interviewees claimed that they always enjoy the students' prosperous activities in the classroom. Their ideas were clearly defined project ideas and their perfect implementation - the manufacturing of original products that meet the design and technological requirements, the requirements of harmony and beauty.

In addition, there was questioning among the students of the Faculty of Engineering and Pedagogy at Ternopil Volodymyr Hnatiuk National Pedagogical University. These students did

pedagogical practice and gained the experience as technology teachers in 10-11 grades. Future teachers showed interest and desire to teach high school pupils in the programs of variable modules. Some of them (35%) submitted their proposals for the selection of certain modules, improving the content and structure of these modules.

91% of them consider mastering with students "Technology of interior design", "Technology of making gift wrap with textile decor", "Technology of making applications from textile materials and accessories" to be appropriate. They believe that the getting knowledge, skills and abilities in a result of mastering the material of these modules is not only interesting, but can be appropriate for using in everyday life. 87% of bachelors said that they would like to study material that, in terms of its content, involves the design of products by using not only traditional folk crafts. They prefer modern design methods, technologies, inventions of modern materials, art and design. Taking into account, future teachers would like to design products of stylish materials, to study unknown techniques and ways of manufacturing products.

Students submitted propositions for improving classes in the disciplines of "Applied Creativity", "Workshop on service types of work" after the pedagogical practice. 72% of them suggested to search the necessary information from Internet sources additionally to make theoretical or practical part of laboratory works. It will help to prepare abstracts-messages, multimedia presentations, to select videos of carrying out master classes. The learning of something new and unique was the main aim for this group of respondents. 82% of bachelors agreed with the addition of an individual approach to learning in the educational process; development of creative projects of different levels of complexity in accordance with the knowledge and learning abilities of students. For 87% of respondents, it is important to choose an object for the manufacturing: its design, the possibility of choosing different decorations, the use of modern materials and techniques for decorating products.

As a result of the qualitative analysis of the study it is concluded that in the process of developing theoretical foundations or practical work it is necessary to educate future teachers of labor training and technology such features as: perseverance, ability to implement their ideas to the end, improving skills, mastering modern techniques and methods of manufacturing products. Students should be coordinated both to successful cooperative work in the team and individual solution of problems and difficulties to achieve great results.

Conclusions.

As a result of the study, it was concluded that due to the lack of clearly defined innovative creative training of student, the overall result of their training in higher education and the level of activity of teachers decreases. This indicates the need to make changes in the content of professional training of future teachers of technology for the education students of secondary school in modern information and educational conditions and the development of appropriate methodological frameworks.

The introduction theoretical and practical innovations are indicators of reformation of technological education. It will help to develop and adapt future teachers of technology to modern socio-economic realities, make them be able to meet the needs and demands of society.

The innovations, proposed in the article, are given as an example of improving the technological training of young people. Their content is sequent to the requirements of the Ukrainian State Standard of basic and complete secondary education, the content of programs of the discipline.

Qualitative analysis of the study confirmed the feasibility of introducing methodological foundations for the training of future teachers of technology. Taking into account the conditions of the information and educational spheres it allows us to formulate the following advantages of its implantation in the educational process:

– forming and development of design and technological competence of the individual, which is manifested in the process of mastering knowledge about materials of different origins, their production, types, properties, methods of processing and features of working with them. This forming also is presented in the ability to think creatively, make calculations, develop graphic images, improve practical skills of work in the process of technology of manufacturing of products of modern constructional materials with observance of technical conditions and application of the basic methods of work by using modern techniques and ways of manufacturing of products;

– development of informational and communicational competences in the process of creative self-realization of the individual.

All things considered, the preparation of future teachers of technology for the organization of students' learning activities in the modern information and educational conditions should be a purposeful, methodically prepared process. The main aim is to form a creative personality, well-adapted to modern requirements. Its efficiency and effectiveness is provided by all logics of construction of the maintenance of educational process, style of training, the corresponding organizational forms and receptions. The level of professionalism and creative development of the future specialist depend on how they will be considered by teacher and student.

We claim that for further research it is advisable to justify the ways of individual approach to students in the process of studying professional disciplines. Also the need of improving the methodological foundations of technological training should be taken into account.

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