

Projecting and Implementation of Future Managers' Integrated Practical Activity

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ABSTRACT

The paper is aimed at identifying the conditions for future production managers' effective professional training. The authors determined the specificity of future technical specialists' modern economic training content. The necessity of future production managers' complex practical activity is shown, which contributes to the formation of their readiness to solve business problems, to manage the work process, and to organize productive interaction among the working collective members. The structure and composition of students' complex practical activities in the framework of teaching practice and independent work, the technique and conditions for its implementation (initiating conditions, external conditions, and internal conditions) are determined.

Keywords: higher education, production manager, integration, integrated practical activity, pedagogical technologies

INTRODUCTION

The economic processes taking place in modern society make serious adjustments to the education process. The leadership of modern science-intensive industries makes high demands on the workers training. In modern production, the manager of the middle level is required to possess a wide range of knowledge, not only technological, but also pedagogical, psychological, economic and other orientation.

This is clearly visible from corporate models of specialists' competence in various industries [1, 2, 3, 4]. For example, the United Aircraft Corporation (UAC) in its specialist's corporate model notes the following professionally important competencies: to have business thinking, to be able to determine the production economic efficiency, economic support of technological processes within the structural subdivision, to monitor production processes, to be able to organize their own work and work of other employees, etc. That is, the employer operates with respect to the specialists readiness with the notion "competence/ competency". Thanks to the paradigm change (from knowledge to competency based), educational organizations can provide specialists better training, which is more in line with the needs of the labor market [5, 6, 7, 8].

But, despite the fact that the employer wants to see in the arsenal of the technical profession graduate, not only professional competences of technical orientation, but also economic and managerial orientation (be able to calculate technical and economic indicators of the station, establish professional communications, etc.), not many employers in practice allow students to be at workplaces that would contribute to future professional activity schemes' and algorithms' formation, theoretical knowledge application and skills and abilities training. This

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happens for various reasons: for example, students are fully involved in the production technological process (6 hours a day), as a result of which the student simply cannot leave the workplace to study other directions; Department heads are overly burdened with work, and cannot organize a sufficient number of lecture halls for trainees; the mentoring system is not worked out at the enterprise; insufficient integration of the "university-enterprise" system and so on.

A superficial understanding of future professional activity, without full immersion in the professional environment, significantly complicates the process of organizational and economic orientation professional competencies forming [9, 10, 11, 12].

This negative aspect obviously needs to be changed. We believe that not only organizational changes and substantial restructuring of the "university-enterprise" interaction are needed, but also content's and didactic transformations of students' practical classes in the university, increasing their readiness for future professional activity. Then, when immersed in a professional environment, the student will fully understand the activity economic and technological side and be able to apply the theoretical knowledge and skills obtained in the production practice.

METHODOLOGY

The competencies formation task in the sphere of production organization and management instead of the educational programs' and its practical activities' results mastering leads us to the need to transform the technique for practical classes' The formation of such qualities cannot be "torn off" from the most professional activity, and obviously it should be carried out in conditions as close to real professional activity as possible under the pedagogical control in order to guide the students, deepen and form their necessary personal qualities organization in economic disciplines.

We considered:

- didactic theories of problem learning [13, 14, 15] and the competence approach in teaching [16, 17,18];
- the concept of integrating education and production [19, 20]
- theory of technical and economic training [21].

The final knowledge obtained from the activity organization's theory and practice analysis is the totality of interdisciplinary, integrated requirements for the result of the educational process. A competency based approach means that the educational goals are tied to the situation of applicability in the world of labor. Therefore, competencies cover the ability, willingness to cognition and attitudes (behaviors images) that are necessary to carry out activities. Then the organization of the educational process in competence-oriented education is to create such conditions under which the new information will not only be formally learned but personally interpreted, reworked and will become part of the student's personal and professional internal resource [22, 23, 24].

The employer is guided not only by qualification characteristics when selecting personnel. Analyzing the questionnaires on the personnel recruitment from various enterprises, according to the issues list that are included in them, we can say that the employer is interested in such indicators as the applicant psychological readiness to perform professional activities (motivation for work), the ability to work in team (stress-resistance, communicability, non-conflict), ability to make decisions and willingness to bear responsibility for them (predisposition to managerial activity), etc..

We consider that the comprehensive practical work, realized within the framework of university students' educational and practical activities, can serve as a basis for forming the necessary competences. Comprehensive practical works are practical exercises where a set of training tasks is solved: the prior knowledge of technical and technological knowledge is mastered by applying them in the labor assignments performance, a set of labor skills is formed (starting from the orientation in the work assignments, ending with the final control of the work results); new work methods are being acquired and skills of performing professional actions are being acquired.

This formulation of the question requires teachers to design practical activities based on the following methodological principles:

1) the principle of integration, characterizing:

- production and education integration, both in order to form a single set of requirements for the results of professional training in the university, so to create new opportunities for organizing educational and professional activities;
- integration of types of activities (educational, practical, research and professional) to achieve the set didactic goals;
- interdisciplinary integration of training content, aimed at forming a complex of professional competencies.

2) *the principle of modularity*, which determines the approach to learning, reflected in the content, methods and organizational forms. In accordance with this principle, training is built on separate functional parts - modules designed to achieve specific didactic goals.

In our case, modular technologies, due to the competent selection of modular units, allow: 1) to create the optimal number of variants of the training material layout; 2) coordinate the quality and quantity of educational information; 3) to simulate the final result, describing the "model of a specialist (graduate)" depending on the needs and capabilities of the student, educational organization, labor market, through the organization of feedback at all stages of training.

3) *the principle of problem-solving*, which determines the students inclusion in the solution of the problem, in the search for new knowledge.

Specific dependence is established in the training practice: if students are faced with the need to solve educational problems, then in their decision process, they develop many qualities that characterize them as individuality and creative personality (the high level of development of intellectual, motivational, and other spheres, initiative, independence, criticality, etc.).

4) *the principle of optimization*, which allows reducing the time spent on mastering knowledge without losing the quality of instruction due to: 1) the use of an optimal model of knowledge layout in theoretical material presentation; 2) application of differentiated tasks for testing knowledge, taking into account the individual characteristics of students.

5) *the principle of creativity*, which involves the activation of students creative abilities through independent thought activity, with the choice of the degree of study assignments complexity in the learning process, and the choice of educational information obtaining method.

The implementation of comprehensive practical work assumes the need to take into account three groups of organizational and pedagogical conditions:

1. Initiating organizational and pedagogical conditions: stipulating the planning, design and implementation of organizational and managerial training into the professional training of future production engineers;
2. External pedagogical conditions: presence of the debugged mechanism of interaction "the enterprise - the educational organization" on the basis of social partnership;
3. Internal pedagogical conditions: the formation of an innovative educational space based on the integration of modern forms, methods and means of teaching; the availability of a diagnostic system for organizational and managerial competencies formation, which allows differentiating the levels of students.

The implementation of initiating organizational and pedagogical conditions is carried out through the development of normative and methodological documentation, namely the work program based on the specialty work curriculum, on the basis of the specialty (profession) standard, taking into account the requirements of enterprises - social partners (basic enterprises of the educational organization). The technology of the organizational and management module development consists of several stages - preparatory, organizational, procedural, the resultant one; their stages - certain successive steps, on each of which concrete actions are carried out.

The implementation of external organizational and pedagogical conditions is carried out on the basis of social partnership; it is directly related to the organization of the close "education-production" connection necessary for organizing a practice-oriented educational process on the basis of a competence approach. To implement the students' organizational and managerial training, it is necessary to have a well-functioning mechanism for interaction, enterprises specialists active involvement in the educational process (involving them as experts when reviewing educational and methodical documentation as consultants in the professional modules formation, as lecturers in the educational process organization, as course and diploma projects reviewers). Close contact of students with the enterprise specialists is necessary for professionally significant competencies formation, including organizational and managerial ones.

Realization of internal organizational and pedagogical conditions is based on the formation of an innovative educational space on the basis of the teaching modern forms', methods' and means' integration; is connected with the development of content and procedural components of organizational and managerial training. In the most general form, the structure of comprehensive practical work can be represented in the form of a scheme (**Figure 1**):

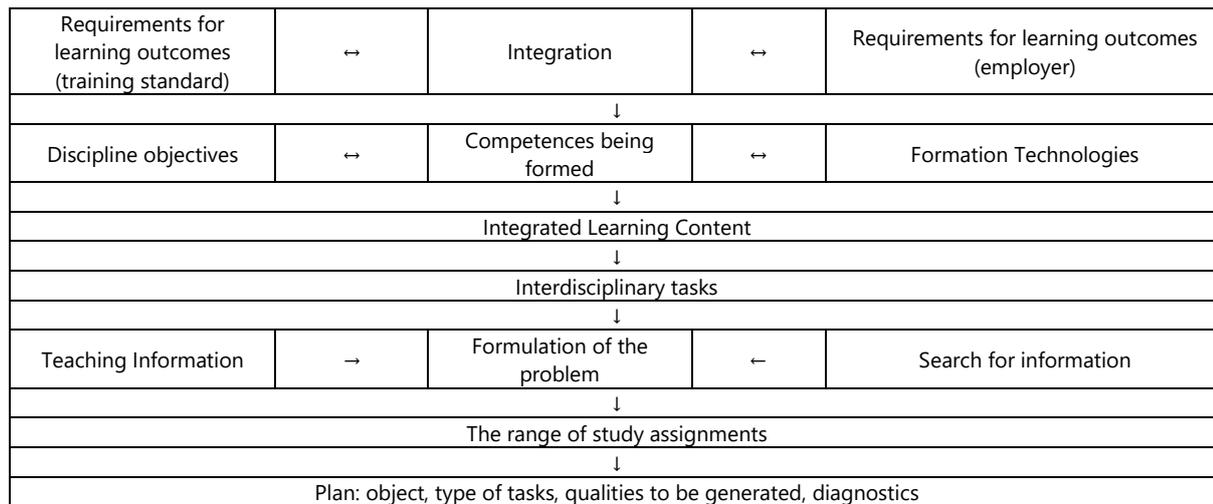


Figure 1. The structure of comprehensive practical work

RESULTS

The purpose of the comprehensive practical work is: instructing practical skills during the discipline “Economics and production management”, consolidating and systematizing theoretical knowledge, monitoring the mastery of theoretical material, the degree of mastering them by the student. As a result of the practical work on discipline, students will have a clear understanding of the role and place of the industry economy in the field of economy and technology, mastered general and professional competences in the field of production management.

When designing such comprehensive practical work, the whole amount of work is divided into stages that the student can perform consistently, but in such a way that one cannot skip over the stage, or perform them in an arbitrary sequence. In the course of the transition from stage to stage, the work becomes more complicated. Each stage is evaluated on a five-score system. The assessment system is cumulative. For all practical work, an average score is set out in stages.

As an example, the comprehensive practical work “Calculation of the main economic indicators of the production station activity” in the discipline “Economics and production management” is presented.

This practical work includes the following practical works, which are its stages:

The 1st stage - “Indicators calculation of fixed assets use”;

The 2nd stage - “Calculation of the number, wages and salary funds of various categories of workers”;

The 3rd stage is “Calculation of labor productivity and output per worker”;

The 4th stage - “Compilation of product costing, cost estimates”;

The 5th stage - “Determination of the goods price and the enterprise price policy”;

The 6th stage - “Calculation of profits, profitability of certain types of goods”;

The 7th stage - “Calculation of the main technical and economic indicators of the station”.

The goal of the comprehensive work is not only to consolidate and systematize knowledge on certain topics of Discipline under study, but also to demonstrate the interrelation of these topics among themselves, as well as their significance in the design of technological processes (depending on the training direction, the range of the production station products is chosen). The practical work result is the creative project “Calculation of the main economic indicators of the station”, which includes: compiling a production plan for the station (workshop) (*fragment*); staff schedule of the station (workshop) (*fragment*); calculation of labor productivity and output per worker; calculation of profit, profitability, prices, production costs with conclusions and proposals for improving the economic performance of the station (workshop).

Rules for the work performance.

The work has a cross-cutting task for all 7 stages of comprehensive work (from the second to the 10th practical work). These tasks are given at the beginning of the work (six options) in the initial data section. Works are carried out consistently, with a gradual complication of tasks. The 8th stage is generalizing one and brings together the all stages’ data. The implementation of comprehensive practical work is completed by public protection of the creative project

Table 1. Criterion differentiation for organizational-managerial professional competencies formation

Criteria	1st level fact-finding <i>(competence is not formed, the degree of its formation is 10-30%)</i>	2nd level reproductive <i>(competence is formed partly by 40-60%)</i>	3rd level productive <i>(competence has been formed)</i>	
	<i>The score "2" is not satisfactory</i>	<i>the score "3" is satisfactory</i>	<i>by 70-80%</i> <i>the score «4» is good</i>	<i>by 90-100%</i> <i>the score «5» is excellent</i>
Learning criteria	He is characterized by the un-formed theoretical knowledge in the production planning and organization, occupational safety and health, industrial sanitation, the quality of manufactured products and calculation of production economic efficiency, there is no possession of professional terminology, absence of ability to work independently and work in a team.	He is characterized by a low degree of theoretical knowledge in the field of production planning and organization, occupational safety and health, industrial sanitation, the quality of manufactured products and calculation of production economic efficiency, low level of proficiency in professional terminology, inability to work independently	Sufficient formation of theoretical knowledge in the field of production planning and organization, occupational safety and health, industrial sanitation, the quality of manufactured products and calculation of the production economic efficiency for independent work according to a given algorithm, owns professional terminology at a level sufficient to explain the processes and draw conclusions.	He is characterized by a high degree of independence in the search for knowledge. A high degree of theoretical knowledge in the field of production planning and organization, occupational safety and health, industrial sanitation, the quality of manufactured products and calculation of production economic efficiency, free possession of professional terminology, the ability to independent search and analysis work.
Criteria of activity (learning and labor)	The ability to use sources (educational, reference, periodical literature and the Internet) and to extract information for solving professional tasks in the field of production planning and organization, occupational safety and health, industrial sanitation, production and calculation of economic efficiency of production have not been formed, is not able to transfer the received theoretical knowledge to the field of practical activity. The student is completely unprepared and unable to carry out his professional activities.	Ability to use sources (educational, reference, periodical literature and the Internet) and extract information for solving professional problems in the production planning and organization, occupational safety and health, industrial sanitation, the quality of produced products and calculation of the production economic efficiency are very poorly developed. The student is not able to transfer the received theoretical knowledge to the field of practical activity. A student to a smaller extent is ready to perform professional duties, under the strict guidance of a mentor.	He is characterized by a sufficient level of skills to use independently information sources to solve problems in the production planning and organization, occupational safety and health, industrial sanitation, the quality of manufactured products and calculation of the production economic efficiency, is capable of transferring and interpreting theoretical knowledge into practical skills. The student is able and ready to perform independently professional duties, but not in full.	He is able to use information sources independently, process received empirical material, correctly present the state of the problem under study, use professional terms, formulate conclusions and proposals in the field of production planning and organization, occupational safety and health, industrial sanitation, the quality of manufactured products. He is able to a holistic view of the problem. A student is able and willing to perform independently professional duties in full.

Evaluation of the creative project (the quality of practical work implementation) is carried out according to the system set-off or not based on the developed indicators: the identified indicators of the technical process; determination of expenses and cost of the product; economic benefit; opportunities to improve economic efficiency; the criteria for planning and performing work: timelines, the data provision, their completeness, the availability of the necessary knowledge and skills; quality of speech and presentation.

Diagnosis of training criteria and performance criteria is based on the following diagnostic toolkit (**Table 1**).

This variant of comprehensive practical work was implemented at the Kazan National Research Technical University (the training direction "Optoelectronic Devices and Systems", experimental groups: EG1, EG3, EG5) and at the Kazan National Research Technological University (training direction "Technology and Processing of Polymers", groups: EG2, EG4, EG6) since 2014 "within the discipline "Economics and production management" in the third year of undergraduate education. As a result, the indicators of qualitative and quantitative academic performance have grown (**Table 2**).

Table 2. Summary indicator of students' qualitative and quantitative progress in comprehensive practical work

	Number of students	5		4		3		2		Average Score
		Number	%	Number	%	Number	%	Number	%	
2014-2015 academic year.										
EG1	14	4	28.5	3	21.4	7	50.1	0	0	3.7
EG 2	30	8	26.6	10	33.3	12	40.1	0	0	3.8
2015-2016 academic year.										
EG 3	24	9	37.5	5	20.8	10	41.7	0	0	3.9
EG 4	22	8	36.3	7	31.8	7	31.9	0	0	4
2016-2017 academic year.										
EG 5	23	10	43.4	8	34.78	5	21.73	0	0	4.22
EG 6	24	11	45.83	9	37.5	4	16.6	0	0	4.29

These indicators are higher than the average score for higher education institutions in this discipline by 0.4-0.6 points. This indicator is fairly stable and tends to increase, which is associated with didactic and educational and methodical improvement of the learning process in the discipline "Economics and Production Management".

So, the comprehensive practical work allows us to assess not only the student's knowledge and skills (criteria of training) but also competences (performance criteria), by immersing students in an artificially created professional environment and performing interrelated elements of professional activity that are formed in a comprehensive calculation and analysis project, fully imitating the professional activities of a technologist in such areas of professional activity as: participating in the development of technically justified norms of time and determining the economic efficiency of planned technological processes; evaluating the economic efficiency of production activities; introduction and accompanying technological processes.

DISCUSSION AND CONCLUSION

The regional labor market presents new requirements to the modern specialists, which are not sufficiently taken into account in training programs. The new requirements are not of a subject nature, they do not belong to a specific discipline, and their formation requires changes in the content and procedural components. Some authors call such requirements basic skills [25], others - overprofessional, basic qualifications or key competencies [26].

In such conditions, education taking into account the needs of enterprises becomes necessary [27, 28]. Organizational and managerial training in the pedagogy of vocational education should be viewed as a managed process that functions and improves taking into account the needs of professional activity, as well as the need for students high-level readiness to perform professional functions. Its cumulative criterion is the degree of the correspondence of higher educational institutions graduates' training results to the requirements of professional activity, in which organizational and managerial activity plays an important role. Thus, the present study has solved the problems of determining the theoretical grounds for designing and implementing comprehensive practical work within the organizational and managerial training of the bachelor technical specialties students - production's future engineers.

The study results have a wide range of usage for the design and implementation of comprehensive practical work for students not only of technical, but also other profile, including in the system of corporate and post-professional education.

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