

THE STUDENT EDUCATION PORTFOLIO IN THE DIDACTICS OF CHEMISTRY

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Abstract: One of the modern scientifically based methodologies for training of the future teachers, which stimulates formation of independence, self-assessment and development of the professional competences, is the education methodology "portfolio". The education portfolio is successfully used in our country and abroad in the education of students from different majors. The effectiveness of its usage as methodology of evaluation, reflecting the aims and values of the education system, is proven. In education the portfolio can be viewed as one of the interactive teaching methods used in the modern didactic technologies.

Making students' education portfolio by our assessment is also especially topical by other reason connected with the career development of the future expert. The portfolio attached to a Diploma of Higher Education gives the employer information about the real achievements, skills and accumulated experience of the young expert. Unlike the traditional summary, it gives chance for the social, personal and professional competences, achieved by the students in the process of education, to be presented and evaluated much better, students' development and aspiration to self-improvement to be examined. This instigates the idea of using the portfolio as a tool for evaluation of the study results and the professional and pedagogical competences formed when executing the individual work by the students. Its introduction has an aim to increase the interest and responsibility of the students, when executing the assigned tasks for individual work and to motivate them for more active participation in the study process.

The goal of this paper is to present our experience in using the possibilities, offered by the portfolio educational technology, for evaluation of professional-pedagogical competence students formed while studying the subjects of the methodical cycle. The requirements for the portfolio and the criteria for its evaluation are described.

At the same time, the proposed portfolio model is also focused on self-assessment to the active and conscious attitude of the student himself towards the process and learning outcomes. The materials presented in the portfolio indicate the future teacher's readiness for a successful implementation.

Keywords: portfolio, professional-pedagogical competence

INTRODUCTION

In terms of changes in our educational system the professional requirements for teachers are changing too. The focus is on the development and improvement of their professional competencies, which should reflect the current goals and objectives of education. Only a creative thinking and competitive teacher, who is predicting the results of his pedagogical work and modelling the educational process, is able to realize these goals. It is necessary for teachers to continually enrich their knowledge and skills, to be involved in research work and to improve their qualifications.

One of the modern scientifically based methodologies for training of the future teachers which stimulates formation of independence, self-assessment and development of the professional competences is the education methodology "portfolio". The education portfolio is successfully used in our country and abroad in the education of students from different majors. The effectiveness of its usage as methodology of evaluation reflecting the aims and values of the education system is proven. [1, 3, 7, 8] This instigates the idea of using the portfolio as a tool for evaluation of the study results and the professional and pedagogical competences formed when executing the individual work by the students from the major "Pedagogy of Chemistry and Environmental Protection Education", "Pedagogy of Biology and Chemistry Education", and Medicinal Chemistry - pedagogical qualification, when studying the methodology disciplines. Its introduction has an aim to increase the interest and responsibility of the students when executing the assigned tasks for individual work and to motivate them for more active participation in the study process.

THEORETICAL FORMULATION

In French the term "portfolio" means "to expose", "to formulate", "to bring", and also "sheet", "paper", or "file", and in Italian it means "a folder with documents" or "the expert's folder"[2] The notion "portfolio" originated in Western Europe in XV-XVI century, during the Renaissance when painters and architects presented

their works in a folder called “portfolio”. In the field of education the portfolio may be examined as one of the interactive methods of education used within the modern didactic methodologies. The idea of using it in this field was born in the middle of the 80-s of the XX century in the USA.

The educational portfolio was created with different aim, that is why there is no one and the same definition of it in the literature. The authors define it as: collection of materials which illustrates the efforts and achievements in a definite field, a tool for self-estimation of the student; a method for fixation, accumulation and evaluation of the individual achievements; personal folder; set of documents; work folder; systematic, specially organized set of evidence used for knowledge monitoring, the skills and relationships of the students, etc. [4, 5, 6] According to P. Petrov and M. Atanasova it is a modern educational technology which reflects the link between the theory, the scientific knowledge and pedagogic practice. The portfolio characterizes the processing, acting, organizing and functional side of the pedagogical activity including the goals, motives, the study content, the methods and means, and also the assessment of the obtained results.

There are different classifications of the educational portfolio in the literature depending on the aim by which it is created. According to D. Pavlov it can be classified by the following three classification indications. [4]

- According to the person who makes it: the developed portfolio by the students for themselves; developed by the teachers for their own job development; formation and development of their own students; work on a concrete project (topic)

- According to its aims: procedural, including a concrete period of time and reporting the changes that have happened during that period; resource and specific analysis of the resources (intellectual, financial, material, personnel) in a definite field; demonstration – it contains a purposefully selected, systematized, structured information destined to persuade, to make others take a positive decision for something (assignment, contract signing, a project sponsorship and others).

- According to the way the information is stored: information printed or written on paper; developed with electronic type of information (on data storing devices).

The portfolio, object of the current work is a procedural as it includes a definite period of time – three semesters in which the methodological disciplines are studied. When creating it the students purposefully observe, analyze, project, solve pedagogical problems, start to form in themselves professional competences – object, psychological and pedagogical, methodological, innovative. In this context, the portfolio has educational, motivational, diagnostic, elaborating and rating function. For the time being all presented variations of portfolio are on paper but we can also add materials on magnetic devices to them - multimedia presentations, videos of lesson parts of chemical experiments, virtual laboratory experiments, etc.

RESULTS AND DISCUSSION

The work on creating and enrichment of the student's portfolio passed through several stages. At the first stage, under the form of pedagogical training conducted during the seminar classes we accomplished: introduction to the portfolio significance for the professional development of the modern teacher; discussing the goals and the different approaches for working with portfolio; defining of the obligatory materials which must contain the portfolio and the terms for their completion; examination of the possible formats for organizing the materials in the portfolio folders; defining the criteria and the way of evaluation as the portfolio is used for evaluation of the individual work of the students according to the grade and rating systems and the results from this evaluation together with the results from the examinations define the individual rating of everyone of them.

As a positive result from the executed education we report increased motivation in a big part of the students who gradually become aware of the portfolio significance for their direct study activity and also for their future professional realization.

The second stage covers the period of studying the methodological disciplines (6th and 7th semester). In the period of the both semesters the students implement the forms of individual work and current control and complete the materials in the portfolio folders. In the end of every semester the lecturer evaluates the turned-in works by using the grade and rating systems by including the results in a final evaluation in the relevant subject.

The third stage is executed in the period of teaching internship before the graduation when the portfolio starts to fulfill functions of “intern portfolio”.

Regarding the set goals – evaluation of the individual work of the students and the formed professional competences within the methodological education, the main sections of the portfolio include all methodological disciplines: a course of lectures in the methodology of chemistry teaching, the three stages of pedagogical practice, the methodological optional course and the exercises in methodology and approaches of the school chemistry experiment. In each of them, except the obligatory forms of individual work in every discipline, we can include tests, materials for seminar classes, multimedia products, references, etc.

In every section, the materials are organized in the following way:

- obligatory materials which include the provided forms of individual work according to the curriculum, the tests and the results from the current control;

- additional materials – where the students can include materials which they have prepared for participation in the seminar classes, materials which they have prepared for participation in observation and CPP conferences, works which are not assigned to them directly but are used in the education or in their internship in school, etc.
- information materials – the references which have been used in the preparation of papers and course works, the protocols from the observed lessons in the mentor teacher classes (during the time of the observation) and with the students from the group (during the time of CPP), Chemistry and Environmental Protection, etc.

Sample structure of the student portfolio in methodological disciplines approbated in the process of education.

Title page – formed according to the views of the student

I section: Personal Information

II section: Chemistry Education Methodology.

Obligatory materials:

Course work. The course works are on concrete topics from the study content which are not examined in the lecture course. When working on them the students must examine the chemical, the pedagogical and the methodological literature on the set topic and apply the acquired theoretical knowledge and skills for planning, analysis and methodological interpretation of the educational content. The course work must include: introduction in which the aim of the project is motivated; main part, in which the theoretical formulations on the set problem are explained and the individual creative work done by the student is described; conclusion, in which the possibilities for applying the discussed problem in the pedagogical practice is pointed out; reference list.

Course project – elaboration and defense of innovative methods by samples. The students individually examine literature proposed by the teacher, diploma works made in the section of Chemistry Education Methodology, materials from the national conferences in chemistry and articles and magazines in which the experience of teachers is presented. As a result of the executed examination they prepare and present innovative sample methodology to the course. When they include it in the portfolio it must be based regarding the aims, position in the structure of the lesson and expected results from its application.

Results from current control – the solved tests checked and evaluated by the teacher are attached.

III section : Observation

Analysis of a video lesson. The student presents written analysis of a watched video lesson. In addition they suggest their versions of methodological solutions.

Developing a model of pedagogical activity in a set situation. In the portfolio the student presents own model of definite fragment from the pedagogical process (set individually by the teacher) by grounding its purposefulness and effectiveness on the basis of their knowledge in pedagogy, psychology and methodology of the education.

Written methodological elaboration of a lesson in Chemistry and Environmental Protection. When we elaborate the lesson we need a very good knowledge of the study content manifested in revealing of inner subject connections when outputting and forming the notions; acquired notion device; using precise chemistry language, individual, original output of the topic; using modern pedagogical methods.

IV section. Current pedagogical practice

Obligatory materials

Methodological elaborations of lessons in Chemistry and Environmental Protection in secondary and high classes delivered to the student group and at school.

Elaborated lesson fragment by using interactive or information and communication technologies. In the course of the preparation of the concrete lesson the student elaborates interactive didactic methods – case studies, incident, role game, debate, virtual experiment and so on. When evaluating it we report how successful this methodology fits the concrete methodical unit.

V section: Methodology and approaches of the school chemistry experiment

Obligatory materials:

Course work. The course work can be realized as a project for experimental studying of a chosen topic from the study content in Chemistry and Environmental Protection; elaborating systems from laboratory and demonstration experiments with the respective appliances; reagents and manuals; preparation of a system with videos of experiments which are difficult to be executed in school, elaborating of a virtual experiment. The obligatory condition when forming the course work is for the references to be given.

Preparation of protocols for the executed exercises. The protocols include description of the executed experiments with a scheme of the appliances and given chemical equations of the ongoing processes.

Solved problems for individual preparation

Results from current control – the solved tests executed at the end of the both cycles of exercises are attached, checked and evaluated by the teacher.

VI section: Optional methodological course

As the forms of an obligatory individual work are dependent on the topic of the course the materials which are collected in the portfolio are different and they depend on the chosen course. They can be references, papers, course projects, methodological elaborations of lesson units, samples for diagnostic examination of the students' achievements, set of tools for diagnostic examination, etc.

VII section: Internship

Obligatory materials:

Methodological elaborations of the delivered lessons by the students;

List of the students in the classes where the student has taught with the set goals and their grounding;

Script of extracurricular activity organized during the internship;

Methodological elaborations of the observed lessons of the students from the group in school.

VIII section: Opinions and evaluations:

In this section we include:

The opinions and the evaluations of the teacher in the relevant discipline about the presented individual works – papers, course works, methodological elaborations;

Opinion about the head of the pedagogical internship and the mentor teacher about the pedagogical skills of the student seen in the course of the internship;

Opinion about the entire methodological preparation of the student and the acquired competences by them.

CONCLUSION

From the gathered several year experience in the work with students' portfolio we can conclude that they really estimate the level of their theoretical and practical preparation and they are aware of the necessity of more serious and responsible attitude to it. The research of their opinion conducted in the end of their internship shows increased self-confidence regarding their own abilities and motivations for further individual preparation.

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