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## MODELLING OF PROFESSIONAL KNOWLEDGE AS AN EDUCATIONAL TECHNOLOGIES METHOD

The paper suggests modelling of professional knowledge as an educational technologies method. The influence of these and other factors, in presence of educational standards, results in difficulties in planning and organizing of educational processes, and, on the whole, in decrease in the effectiveness of educational processes and training of students according to particular specialities. The goal of this article consists in development of an innovation technology based on the simulation cognitive modelling method. Taking into account the modern trend of auditorium study reduction and independent students' activity increase, there emerges a didactic problem of students' knowledge and competences formation effectiveness provision under time shortage, instruction process poor structurization, teaching goal setting high vagueness conditions. Students, on the basis of teaching material given to them for the study, as well as using additional information found in Internet and in other sources of information, will form individual discipline models, the assemblies of which for the whole period of the study, for example baccalaureate, should construct an atlas of professional knowledge models. For filling the discipline models platform up, it is proposed to create a test-and-experimental students' knowledge modelling virtual students' studio on the chair web pages. The potential of modern information technologies and their applied use in educational systems requires careful, deep and thorough experimental research. That is why the creation of the professional knowledge modelling test-and-experimental virtual students' studio is a topical question.

**Keywords:** speciality knowledge model; higher educational institution; teaching and methodical provision; knowledge modelling students' studio; knowledge model platform.

### Introduction

At present, the educational system of Ukraine is under the influence of a great number of factors, both objective and subjective ones, which, in their interconnection, result in a decrease in the effectiveness of education and training, including the higher school as well.

The main factors that have an influence on the higher education system, are [1–4]:

- high dynamics of the world knowledge renewal in many spheres of human activity;
- high development tempo of informational and communicative methods and means of information transfer and processing;
- high degree of conservatism in the processes that take place in the higher school of Ukraine;
- the higher school pedagogics methodology development tempo remains behind that one of the computer and informational science methodology;
- wide range of professional skills of the research and educational specialists.

The influence of these and other factors, in presence of educational standards, results in difficulties in planning and organizing of educational processes, and, on the whole, in decrease in the effectiveness of educational processes and training of students according to particular specialities [5–7].

**The goal of this article** consists in development of an innovation technology based on the simulation cognitive modelling method.

### 1. Speciality Knowledge Model

By the simulation cognitive modelling we shall understand the construction of models of objects, processes and phenomena of the object domain in

question, which can be represented discretely as modules, meaningful modules, lectures, school-book sections and subsections, disciplines as a whole, as well as assembly of disciplines that correspond to the study curricula.

In the process of the professional knowledge acquisition, the students are proposed to study a number of disciplines that should be interconnected logically and semantically, which, unfortunately, cannot be always achieved in practice.

One of the basic principles of the higher school didactics consists in the thesis that any school discipline studied at a higher education institution, has scientific basis, i. e. the assembly of:

- methods,
- manners,
- postulates,
- theorems,
- procedures,
- approaches etc.

That is why it is very important, in our opinion, to develop teaching aids designed not for a separate discipline but for the speciality on the whole, in order the knowledge of students be systematized by particular specialities.

Let us designate such teaching aids as universal ones.

Obviously, their names should begin with “Scientific basics of ... speciality” words.

The content of such teaching aids should correspond with the teaching material of the most of the curriculum disciplines; have the teaching and reference properties useful at different stages of the education, both for students and for the teachers. In addition, the teaching aid structure should correspond with linguistically didactic principles and possibilities of text

information representation as certain models – text bodies [1].

The aforesaid can be illustrated with a diagram in the Fig. 1, where it is shown that the function of such

universal teaching aid for the speciality consists in supporting of the traditional teaching process, in order to systematize the students’ knowledge according to the particular speciality.

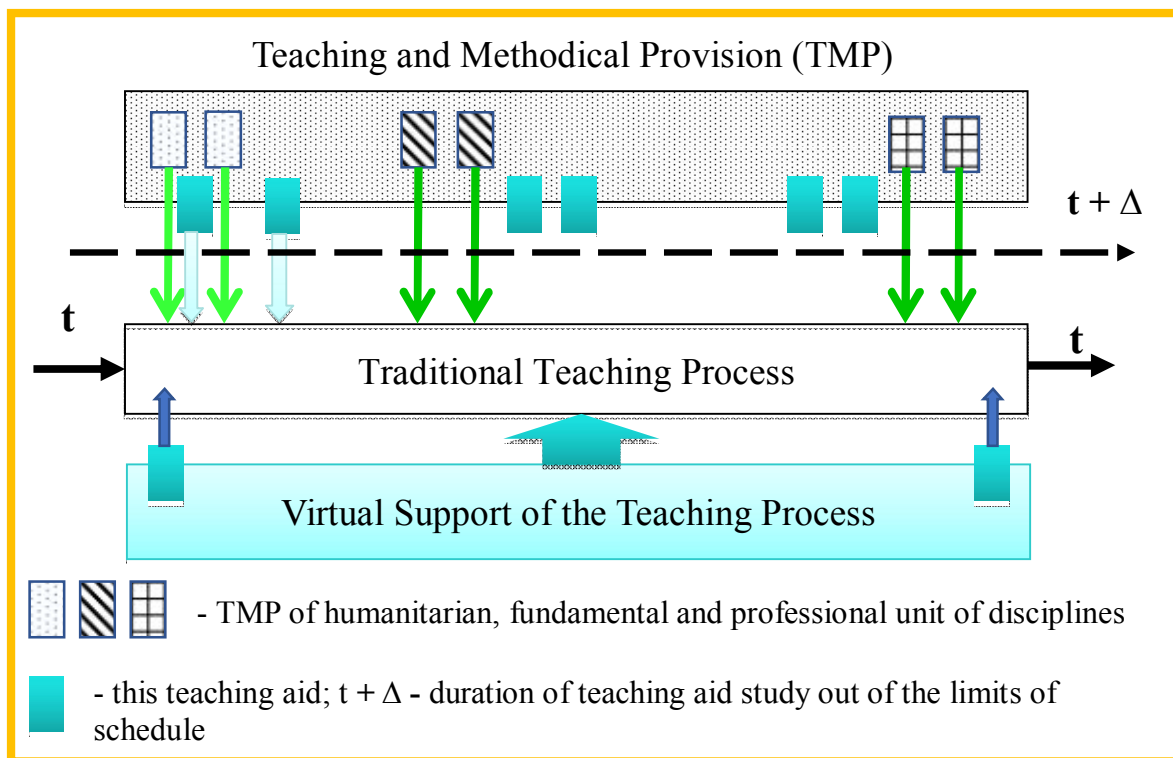


Fig. 1. Diagram of students’ knowledge by speciality owing to the construction and application of the universal teaching aid by the speciality

Besides, in the diagram of the Fig. 1 it is shown that the traditional teaching process is connected with the virtual support of the teaching process.

Let us expose its essence.

Let us mention that the basis of teaching material [2] visual presentation principle is formed by the models developed by the teachers as

- lecture summaries,
- tutorials,
- school-books,
- electronic instruction means as separate presentations etc.

In the theory of artificial intelligence construction, such presentation is called the presentation of knowledge by declarative methods. Although various methodical instructions on execution of laboratory work and exercises, solvers with the specific problem solution examples etc. are of declarative nature, they form the procedural knowledge and skills [3, 4] in the students.

Taking into account the modern trend of auditorium study reduction and independent students’ activity increase, there emerges a didactic problem of students’ knowledge and competences formation effectiveness provision under time shortage, instruction process poor structurization, teaching goal setting high vagueness conditions. In other words, under condition of the above-listed factors effect. To explain the essence of the virtual support of the

instruction process (see Fig. 1), let us represent the instruction of students as an outline diagram of the simulation cognitive modelling (see Fig. 2).

In the Fig. 2 it is shown that the research and educational specialists construct discipline models and bring their essence (teaching material) to the students’ attention using both traditional methods and those based on the virtual representation.

Students, on the basis of teaching material given to them for the study, as well as using additional information found in Internet and in other sources of information, will form individual discipline models, the assemblies of which for the whole period of the study, for example baccalaureate, should construct an atlas of professional knowledge models (see Fig. 2).

Research and educational specialists will control and advise students in the process of discipline individual models construction and can introduce corrections into the substantial part of the school discipline model according to the ‘Partnership’ teaching technology procedures described in [5].

The discipline models processed in that way, will be placed in the knowledge models platform according to the speciality.

An example of the knowledge models platform with a teaching aid (discipline model) [5] placed in, is cited in the land administration and geoinformation systems chair web site [6]. The discipline models platform is named ‘Speciality navigator’ there.

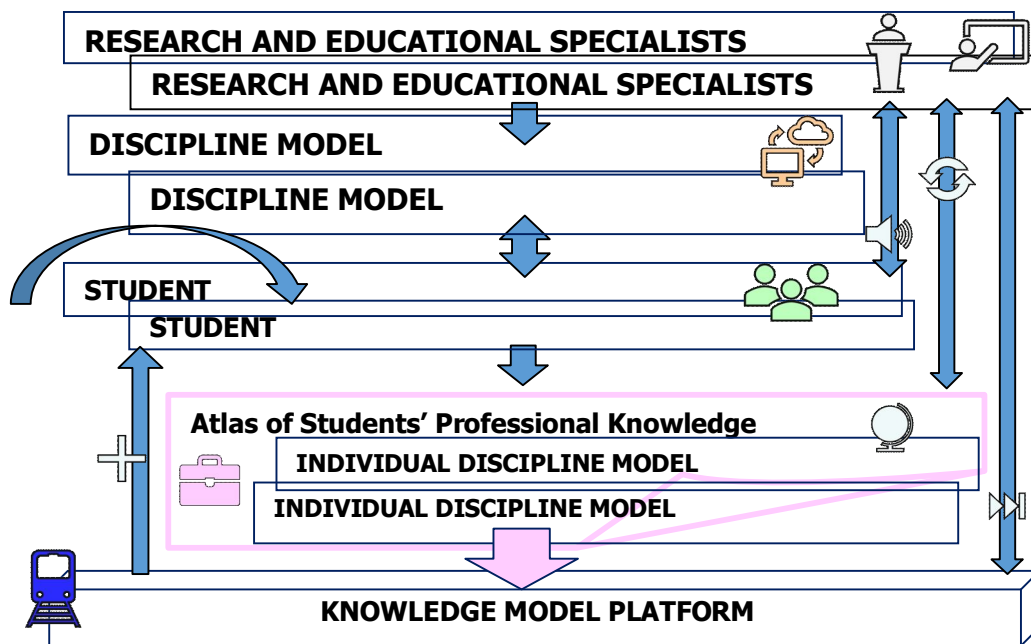


Fig. 2. Outline diagram of teaching technology based on the simulation cognitive modelling method

## 2. Knowledge modelling students' studio

For filling the discipline models platform up, it is proposed to create a test-and-experimental students' knowledge modelling virtual students' studio on the chair web pages.

The necessity of the knowledge modelling students' studio can be justified by the fact that in its territory (pages in the chair web site) the teachers have opportunity to control, correct and validate the individual models of students' knowledge by the disciplines studied. In addition, within the framework of the modelling studio, the students 'assemble' the atlas of their professional knowledge by the speciality.

The experimental research carried out with 2-year and 4-year students on creation of the professional knowledge atlases, have shown a vast diversity of the software tools used in the modelling process. At the construction of their knowledge atlases, some students have used software tools forced to be studied independently out of the limits of the instruction schedule. Examples of title-pages of some professional knowledge atlases of the students, as well as knowledge (school discipline) model three-level platform screen shots, are published in the chair web site [6].

Thus, a creation of an innovation training technology which does not comply with out-of-date anthropocentrism principles of the time of A. S. Makarenko and V. A. Sukhomlinsky, is proposed. Unfortunately, these and other prominent pedagogues of the 20th century did not know in their pedagogic activity the influence of informational and communicative revolution factors. The potential of modern information technologies and their applied use

in educational systems [7–12] requires careful, deep and thorough experimental research.

That is why the creation of the professional knowledge modelling test-and-experimental virtual students' studio is a topical question.

## Conclusion

So, the organization and attraction of the students to the activity in the studio, as well as the teachers, will allow to solve a number of important problems.

First, to create working digital models of disciplines that ensure constant access to the knowledge by one or another speciality.

Second, to ensure operative correction of school disciplines material.

Third, to propose an alternative variant of students' knowledge evaluation on the basis of the models constructed by them.

Fourth, to develop students' competences in generalizing the instruction material and its systematization in the process of professional knowledge atlases creation.

Fifth, to develop technology based on consulting procedures. Instead of traditional teaching methods – presentation of the theoretic material as lectures, and practical activity working-through – to use knowledge models or their combinations.

Sixth, in the process of the rating expert evaluation of the students' professional knowledge models, to solve the problem of the expert (teacher) opinions coordination improvement by means of the experts classification and calculation of Kendall's concordance coefficient [9] which will show the coordination of expert evaluations.

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### Моделювання професійних знань як метод освітніх технологій

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В роботі запропоновано моделювання професійних знань як метод освітніх технологій. Вплив різного роду факторів за наявності освітніх стандартів призводить до виникнення труднощів у плануванні та організації навчальних процесів і в цілому до зниження ефективності процесів навчання і освіти студентів за конкретними спеціальностями. **Метою** цієї статті є розробка інноваційної технології, в основу якої покладено метод імітаційного когнітивного моделювання. З огляду на сучасну тенденцію скорочення аудиторних занять і збільшення годин, що виділяються на самостійну роботу студентів, виникає дидактична задача забезпечення ефективності формування знань та компетенцій у студентів в умовах дефіциту часу, слабкої структуризації навчального процесу, високої невизначеності при постановці завдань навчання. Студенти на основі навчального матеріалу, поданого ним для вивчення, а також на основі додаткової інформації, знайденої в Інтернеті та інших джерелах інформації, формують індивідуальні моделі дисциплін. Їх сукупності за весь період навчання, наприклад, бакалаврату, повинні скласти атлас професійних моделей знань. Для заповнення платформи моделей дисциплін пропонується на сторінках сайту кафедри створити дослідно-експериментальну віртуальну студентську студію моделювання знань студентів. Можливості сучасних ІТ-технологій і їх прикладне використання в освітніх системах вимагає ретельних, глибоких і всебічних експериментальних досліджень. Тому створення віртуальної студентської дослідно-експериментальної студії моделювання професійних знань є актуальним завданням.

**Ключові слова:** модель знань за фахом; заклад вищої освіти; навчально-методичне забезпечення; студентська студія моделювання знань; платформа моделей знань.

### Моделирование профессиональных знаний как метод образовательных технологий

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В работе предложено моделирование профессиональных знаний как метод образовательных технологий. Влияние разного рода факторов при наличии образовательных стандартов приводит к возникновению трудностей в планировании и организации учебных процессов и в целом к снижению эффективности процессов обучения и образования студентов по конкретным специальностям. Целью настоящей статьи является разработка инновационной технологии, в основу которой положен метод имитационного когнитивного моделирования. Учитывая современную тенденцию сокращения аудиторных занятий и увеличение часов, выделяемых на самостоятельную работу студентов, возникает дидактическая задача обеспечения эффективности формирования знаний и компетенций у студентов в условиях дефицита времени, слабой структуризации учебного процесса, высокой неопределенности при постановке задач обучения. Студенты на основе учебного материала, представленного им для изучения, а также на основе дополнительной информации, найденной в Интернете и других источниках информации, формируют индивидуальные модели дисциплин. Их совокупности за весь период обучения, например, бакалаврата, должны составить атлас профессиональных моделей знаний. Для заполнения платформы моделей дисциплин предлагается на страницах сайта кафедры создать опытно-экспериментальную виртуальную студенческую студию моделирования знаний студентов. Возможности современных ИТ-технологий и их прикладное использование в образовательных системах требует тщательных, глубоких и всесторонних экспериментальных исследований. Поэтому создание виртуальной студенческой опытно-экспериментальной студии моделирования профессиональных знаний является актуальной задачей.

**Ключевые слова:** модель знаний по специальности; учреждение высшего образования; учебно-методическое обеспечение; студенческая студия моделирования знаний; платформа моделей знаний.