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MODELING AS METHOD OF EDUCATIONAL REALITY ABSTRACTION

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The article presents modeling as a research method in current science, the advantages and possibilities of modeling techniques relating to curriculum development. The opportunity of models to reveal the structure and characteristics and behavior of real object is also carried out. The aim of the article is to analyze modelling and its opportunities in the research process; to characterize models, which go to make up curriculum planning; and the interrelation of curriculum models basic elements. Some approaches to curriculum development proposed by educators are described as well. The article covers the views of Ukrainian educators on the opportunities of modeling in the area of structuring; reflectionofobjectives.

It is noted that modeling is used in science in a number of use, in education in particular, as a method of defining new facts about the real object, which is studied. The paper provides an overview of the curriculum development process presented by some European scientists. It is defined that the purpose of curriculum modeling is to provide a structure for examining its key components, which go to make up curriculum planning and how these components work.

Special attention has been paid to curriculum models by R. Tyler, D. Wheeler, J. Kerr and E. Wragg who considered principle components of models of curriculum development (aims, subject matter, learning experience, evaluation) in their interaction. Wragg's model is characterized as a new look to many-sided nature of curriculum. The three dimensions of the model are subject; cross-curricular themes and issues; and set of teaching and learning strategies and methods. It should best ressed that with the help of the model, the process of content structuring can be observed on the basis of three didactic principles of learning: continuity, sequence, knowledge integration.

Examples of curriculum models are used to illustrate the procedures in terms of curriculum structuring. It is revealed that the primary content modeling is considered as theoretical reflection of the process of selection, structuring, passing and evaluating of the level of its assimilation by pupils according to the objectives defined.

Key words: *modeling, curriculum, curriculum models, components, structuring.*

У статті описано моделювання як метод дослідження в сучасній науці, переваги та можливості технологій моделювання, що стосуються розробки навчальних планів. Висвітлено здатність моделей показувати структуру, особливості і поведінку реального об'єкта. Мета статті полягає в тому, щоб проаналізувати моделювання і його можливості в процесі дослідження; дати характеристику моделям, які використовуються для укладання навчального плану і показати взаємозв'язок основних елементів моделей навчального плану. Розглянуто підходи до розробки навчальних планів, що запропоновані педагогами. Стаття висвітлює погляди українських педагогів на можливості моделювання в області структурування, відображення цілей.

Відзначено, що моделювання використовується в науці для різних цілей, в освіті, зокрема, як метод визначення нових фактів про реальний об'єкт, який вивчається. У даній статті міститься огляд процесу укладання навчального плану, представленого деякими європейськими вченими. Установлено, що мета моделювання навчального плану полягає в тому, щоб представити структуру для дослідження її ключових компонентів, які використовуються для того, щоб укласти навчальний план і з'ясувати, як ці комплектуючі працюють.

Особлива увага приділялася моделям навчального плану Р. Тайлера, Д. Уілера, Дж. Керра і Е. Врэгг, які розглядали основні компоненти моделей розробки навчальних планів (цілі, предмет вивчення, навчальний досвід, аналіз) у їх взаємодії. Модель Врегга характеризується як новий погляд на багатосторонню природу навчального плану. Три напрямки моделей застосовуватися з урахуванням вимог; міжпредметних навчальних тем і проблем. Слід підкреслити, що за допомогою моделі процес структурування змісту може спостерігатися на основі трьох дидактичних принципів вивчення: безперервність, послідовність, інтеграція знань.

Приклади моделей навчального плану використовуються, щоб ілюструвати методи з точки зору структурування навчального плану. Виявлено, що основний зміст моделювання розглядається як теоретичне відображення процесу вибору, структурування, прийняття і оцінки рівня його засвоєння учнями згідно з визначеними цілями.

Ключові слова: моделювання, навчальний план, комплектуючі, моделі навчального плану, структурування

Introduction

Modelling as one of the scientific research methods is widely used in pedagogics. In general understanding modelling is a method of creating and studying models, which enable us to get new knowledge, new information about the object studied, to identify differences and describe the process of developing. [8]. Modelling of educational system is paid more attentionto in scientific and pedagogics research as its priority task is expected to identify the self-development resources, self-perfecting within educational systems [10].

The aim of this article is to analyse modelling as a research method; models which go to make up curriculum planning; and how the elements of curriculum models interrelate.

Modelling method is defined as reflecting of the basic characteristics of the original system being transformed in the object designed for analyses (model). Constructed model is somewhere simpler in comparison with the original one and allow finding out the components which are hidden in the original, probably because of obscurity in essence of this phenomena [15]. Most researchers state that any model as a formalized structure is going to operate only in condition of its content filling. For example, Ukrainian researcher S. Goncharenko considers the modelling essence as defining similarity of phenomena (analogies), adequacy of one object to another one in certain relationships and on this basis transformation of the simpler in terms of structure and content object into more difficult model [5]. The model by S. Goncharenko on scientific research is characterized by additional means which can give new information about main object to be studied in the process of its research. According to international dictionary of education, modelling is stated as a means of process transferring from the moment that corresponds to its actualization to the moment of its detailed study [11].

Ukrainian educator T. Humaniuk defines the term «model» as an imagine, landmark or material picture of reality: reflection of objectives and phenomenon in the form descriptions, theories, schemes, drawings and diagrams [6]. Models in curriculum planning are considered more as algorithms as they reflect step-by-step procedures. Defining the main functions of the model, American scholar John K. Gilbert refers to the model as a bridge that connects scientific theory and reality [1]. Some educators divide the notions «model» and «algorithms», stressing that «model» refers mainly to knowledge and information conceptualizations while «algorithms» refers mainly to building or designing procedures [9].

Transferring of model designing to curriculum area embodies a format for its design, developed to meet society needs, contexts, and objectives. In order to address these goals, curriculum developers design simplified representations of reality which are often showed in diagram forms. The purpose of curriculum modelling is to provide a structure for examining its key components, which go to make up curriculum planning and the way in which these components work [1].

There is a growing number of curriculum models developed over years varying from common to complicated. Listing the curriculum models, it is worth mentioning R. Tyler's (1949) classical model, D. Wheeler's (1967) and J. Kerr's (1968) models for curriculum design.

One of the best known curriculum models is the Tyler classical model introduced by R. Tyler in his book «Basic Principles of Curriculum and Instruction». The key components in Tyler's model are objectives, selection of learning experience, organization of learning experience and evaluation. The author defines the objectives as basis for the selection and organization of learning experiences, for assessment the curriculum. To Tyler, learners, their needs and contemporary life influence the objectives to be defined. Evaluation in this model is considered as a final stage of learning, by which curriculum expectations are correlated with outcomes [2].

The idea about connection between all components (aims, learning experience, content, experience organization and integration, evaluation) in curriculum design was offered by D. Wheeler. He developed and extended the ideas forwarded by R. Tyler. His model refers to cyclical types of curriculum models which represents curriculum as a cycle responding to the changes within education. According to Wheeler's model, aims should refer to final product of learning, which in its turn

have impact on aims defining. In the process of curriculum planning, aims are formulated under the principle from general to specific and content is determined from learning experience. It is important to note that Wheeler's idea for expected learning outcomes was innovative for that time and it was subjected to discussions (Figure 1).

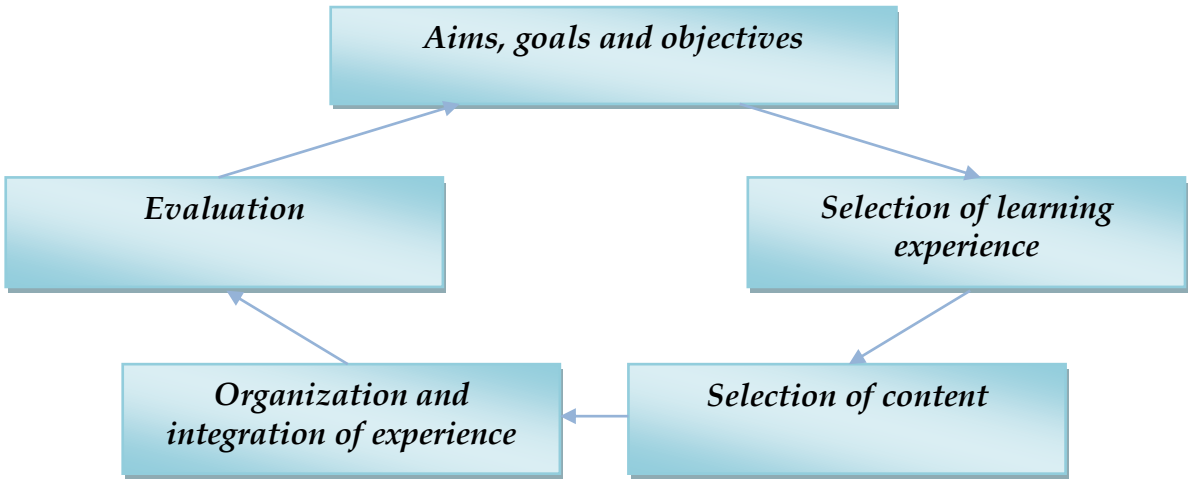

Figure 1. D. Wheeler's Model

British educator L. Stenhouse stressed that expected learning outcomes are difficult to predict, as rather large part of knowledge and experience received by pupils are related to hidden curriculum [3]. The ideas of D. Wheeler and R. Tyler were taken up by British educator J. Kerr who distinguished the similar features. Model of curriculum design suggested by J. Kerr divided domains into areas, connected between themselves: objectives, knowledge, school learning experience and evaluation. The simplified version of Kerr's model is presented below (Figure 2) [1].

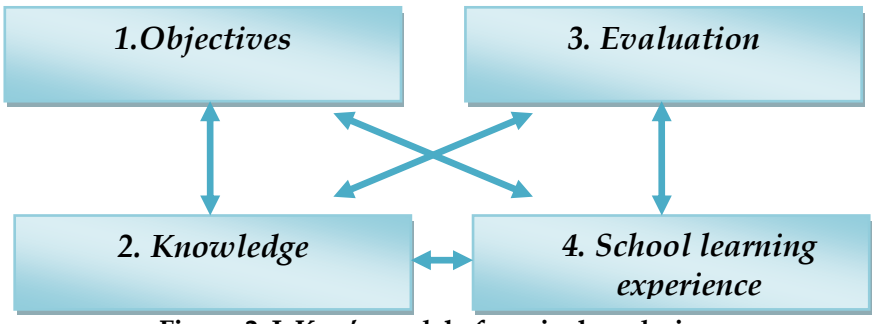

Figure 2. J. Kerr's model of curriculum design

According to J. Kerr ideas the objectives are distinguished from learning experience and knowledge, selected for transferring. The educator subdivides objectives into affective, cognitive and psychomotor ones. While characterizing knowledge, J. Kerr stresses that it should be organized, integrated, sequenced and reinforced. Evaluation in Kerr's model is considered as collection of information in terms of curriculum efficiency. It is important to note that J. Kerr's ideas in curriculum modelling dominated in the 1960-s and 1970-s in Great Britain and America.

British education expert E. C. Wragg (1997) goes further in defining school curriculum beyond the educational programme with defined goals, content, techniques and methods of its implementation. The researcher presents the curriculum as multidimensional concept, which can be considered as body of knowledge

to be transmitted, an attempt to achieve the results (products); as process and as praxis. This pedagogical phenomenon embraces not only subject knowledge, skills, but is concerned mainly with formation and development pupils' personal qualities necessary for living in the community, teaching and learning strategies that promote knowledge integration (Figure 3) [14].

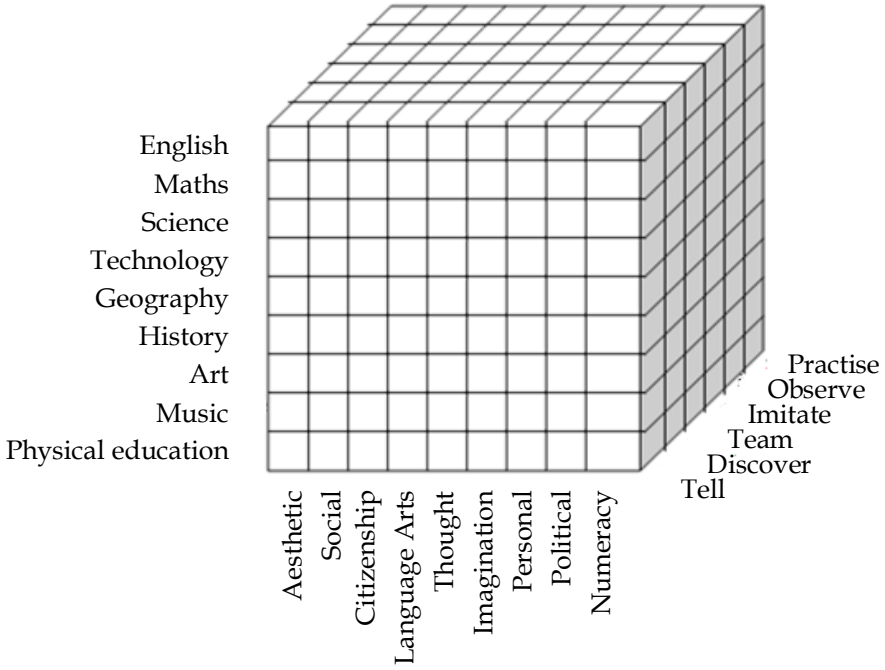

Figure 3. Cube curriculum model by E. Wragg

E. Wragg presents a view of the curriculum as a cube having three dimensions of subject matter for educational content implementation; cross-curricular themes and issues, which promote pupils' competences development; and set of teaching and learning strategies and methods, which are necessary to master for life-long learning. It should be stressed that with the help of the model, the process of content structuring can be observed on the basis of three didactic principles of learning: continuity, sequence, knowledge integration.

E. Wragg notes that the first dimension presents National curriculum of a country, as it involves the subjects from the school timetable, knowledge that has been accumulated through activities. The second dimension highlights development of personal qualities and social competences through subjects, themes, project activities and shows how they can be used in practice. The third dimension can be considered as a basis for teaching and learning cooperation, which aims at increasing pupils' motivation [4].

The model is divided into cages, which are presented as combination of three interact dimensions. According to Lithuanian educators R. Kliminskas, V. Rupainiene, cube model is possible to use for primary curriculum structuring. In addition, implementing of cube model embodies holistic approach to education, focusing on connection of life, knowledge and emotions that make learning meaningful for pupils [7].

When detailing stages of curriculum modelling, British researcher M. Galton emphasizes that in the first researches of curriculum modelling in Britain five interrelated stages were outlined. They include defining aims and objectives; the selection of learning experience to achieve the goals; the choice of knowledge to be taught in order to promote learning experience absorbing; organization and integration of

learning experience and knowledge; evaluation of these stages efficiency through attaining aims checking.

The same idea of presenting interrelated combinations of knowledge, ways of thinking, skills that determine persons' ability to perform any kind of activities can be found in the model of key competencies and abilities viewed in the book «The New Ukrainian School. Conceptual principles of secondary school reform», where the first dimension reflects 10 key life competences, and the second dimension refers to cross-disciplinary abilities, which together create the background for successful fulfilment of pupils [13].

The idea of representing primary curriculum designing as objectives and process model belong respectively to J. Kerr [1] and L. Stenhouse [12]. Kerr's objectives model is called a top-down approach under which the group of experts define the curriculum objectives, select content and select or produce learning materials that correspond to main trend of learning. Firstly, the curriculum model is tried in pilot schools after that it may be improved and sent to other schools. Stenhouse's process model, in contrast, refers to bottom-up approach according to which the curriculum therefore should be regarded as a proposal to be questioned, tested and improved in the classroom. Both approaches to curriculum development have limitations and only their combination can be successful for implementation [9].

Conclusions

Objective evidence shows that the modelling as a method of scientific research can produce much larger gains in understanding of the curriculum development process than any other methods. Taking into consideration the modelling theory one can solve any problem by creating a model or adapting the known model to the specifications of the problem.

Projection of model format on curriculum area enables to take into account society needs, which are realized in terms of the design and key components of curriculum modelling. British and American scientists interpret approaches to the curriculum structuring, as a procedure of selection of pedagogically adopted system of knowledge and skills according to the defined curriculum objectives and pupils' age, systematization and structuring of knowledge.

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