

Educational Process Model

Hristo Tujarov, Svetlana Avramova, Stefan Kalchev, Milena Stefanova

Abstract: This paper presented unified model of the educational process. It is based on 3 models examined from different point of view the educational processes and knowledge acquisition. The role and the place of each model are analyzed as well as their relationships.

Key words: educational technologies, information resources, information space, knowledge management, Knowledge Spiral, Bloom's Taxonomy.

INTRODUCTION

Different model for knowledge creation and dissemination are presented in various publications. Well-known are the Nonaka's model "knowledge spiral" [3] and the Bloom's taxonomy [2]. These models don't fully embrace processes of creation, dissemination and evaluation of knowledge.

This paper attempts to present a unified model by combining three models: information resources of the information space, Nonaka's knowledge spiral and Bloom's taxonomy.

Generalized Educational Process Model

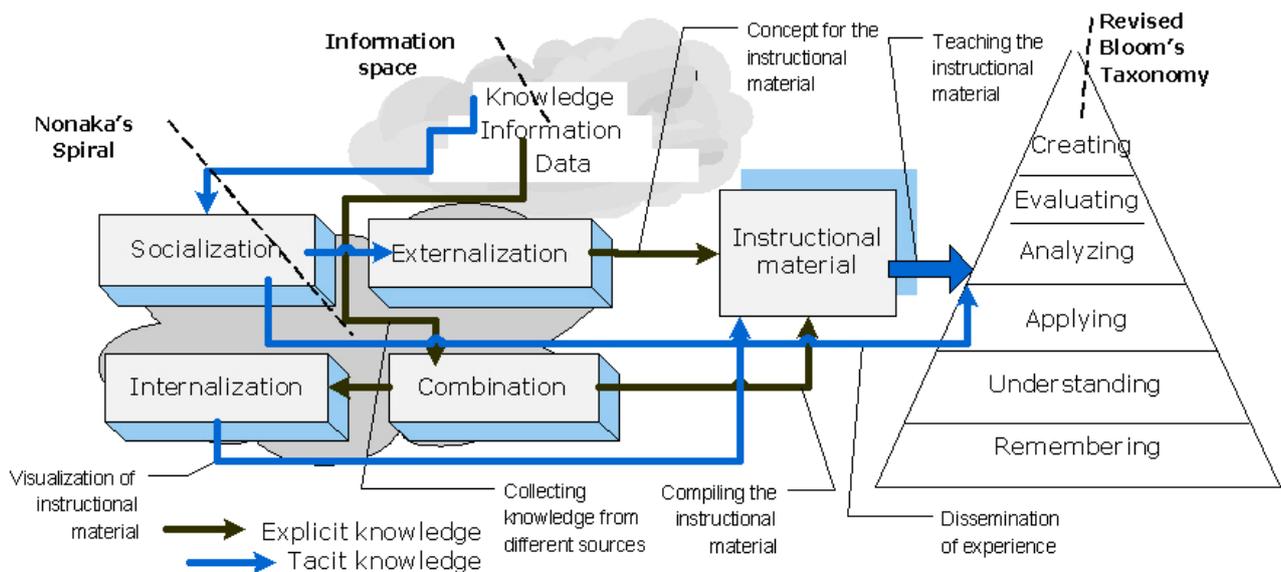


Figure 1. Generalized Educational Process Model

The authors of educational materials usually obtain needed knowledge from information space – Internet resources, books, publication etc. They transform input data, information and knowledge into educational materials by different approaches and means (Nonaka model). The effectiveness of education (educational materials) and experience (socialization) are interrelated to Bloom's taxonomy.

A model of the information space

From information area the authors obtain data, information and explicit knowledge and worked it up to get tacit knowledge:

- Data – by gathering and structuring;
- Information by analysis and synthesis;
- Knowledge – analysis, synthesis, developing concepts for solving different problems.

The terms data, information and knowledge are still arguable. The definitions bellow are used from the authors for clear explanation of their thesis.

Data – structured records, reports obtained from measuring, observations, analysis and other research processes, presented in the form that allows storing.

The data are result of accumulation and structuring of some reports.

Information – data processed intentionally and decreased entropy in particular situation.

Information is the result of processing of data.

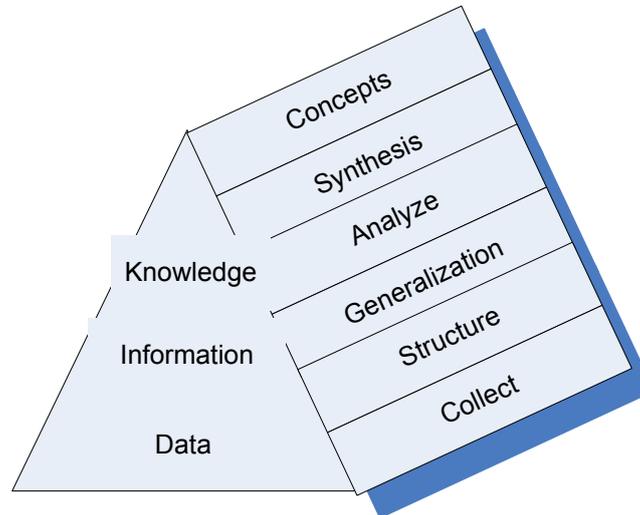


Figure 2. Informational Space Model

Knowledge – experience, subject to reflection and conceptualization. Individual knowledge can take the form of competence. The facts that don't transform into competence are either information without practical application or experience used unwittingly.

The knowledge is an outcome of analysis and synthesis of information realized in particular conceptions.

Nonaka's Spiral

According to Nonaka, the tacit and explicit knowledge are not totally separate but mutually complementary entities [1].

Nonaka and Takeuchi assumed that knowledge is created by conversion of the tacit knowledge into explicit knowledge and vice versa. They interact with each other in the creative activities of human beings. Nonaka calls the interaction of these two forms of knowledge, the "knowledge conversion" process.

This conversion process is composed of four steps: socialization, externalization, combination, and internalization [4].

– Socialization

Socialization involves the sharing of tacit knowledge between individuals. The key factor here is experience (physical or mental). The transfer of tacit knowledge is realized by observation, imitation, practice and formation of mental models.

Examples:

- The author gains tacit knowledge by using information materials in combination with observation, imitation and practice;
- The student gets the knowledge from their teacher by observation, iteration and practice;
- The employee in a company gets new information and discipline direct from work.

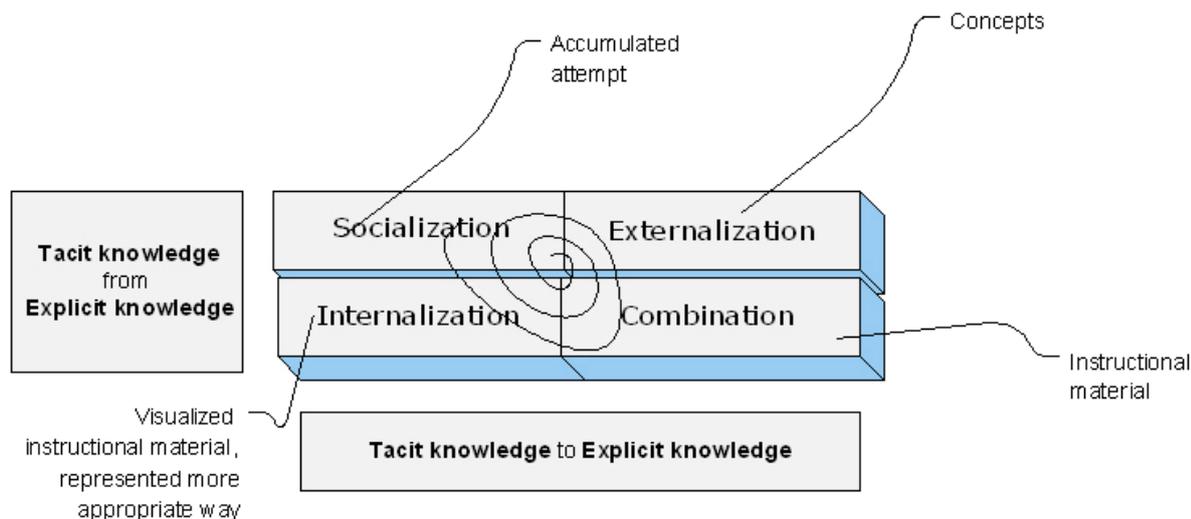


Figure 3. SECI knowledge model

– **Externalization**

Externalization of the tacit knowledge is a process of creation of explicit knowledge. Most often it is used when conception for new product is created (although externalization can take place in every kind of activity).

Examples:

- The tacit knowledge of the authors takes form of educational materials by means of models, analogies and metaphors.
- The employee reached to the idea of optimization of their working activities.

– **Combination**

This is a process of new knowledge creation by gathering tacit knowledge from different sources. Conception structuring is accomplished by applying categories, arrange, combining conceptions, exchange of explicit knowledge, communication.

Examples:

- The author transforms (codify) tacit knowledge through creation of educational materials by arrangement, appending, combination and categorization.
- The employee writes proposal for optimization of their working activities to the management.

– **Internalization**

This is the process of knowledge transfer through verbalization and visualization. New knowledge is generated by “learning by doing” and new mental models.

Examples:

- Explicit knowledge from educational materials is transferred to learners in educational process.
- The employee’s proposal is approved and instruction is distributed to all employees.

Blooms Taxonomy

Benjamin Bloom from Chicago University proposed taxonomy of educational objectives for evaluating the effectiveness of education [2]. He developed a hierarchy of mental abilities in which the highest levels include all abilities from lowest levels.

– **Remembering (Knowledge)**

That category means remembering as well as reproducing the instructional matter from concrete evidences to entire theories. The terms, concrete evidences, methods and procedures, cardinal concepts, rules and procedures are reproduced.

– **Understanding (Comprehension)**

That category means opportunity for:

- Transformation the instructional material from one form to another;
- Interpretation to the instructional material;
- Prognoses for development of phenomena and events.

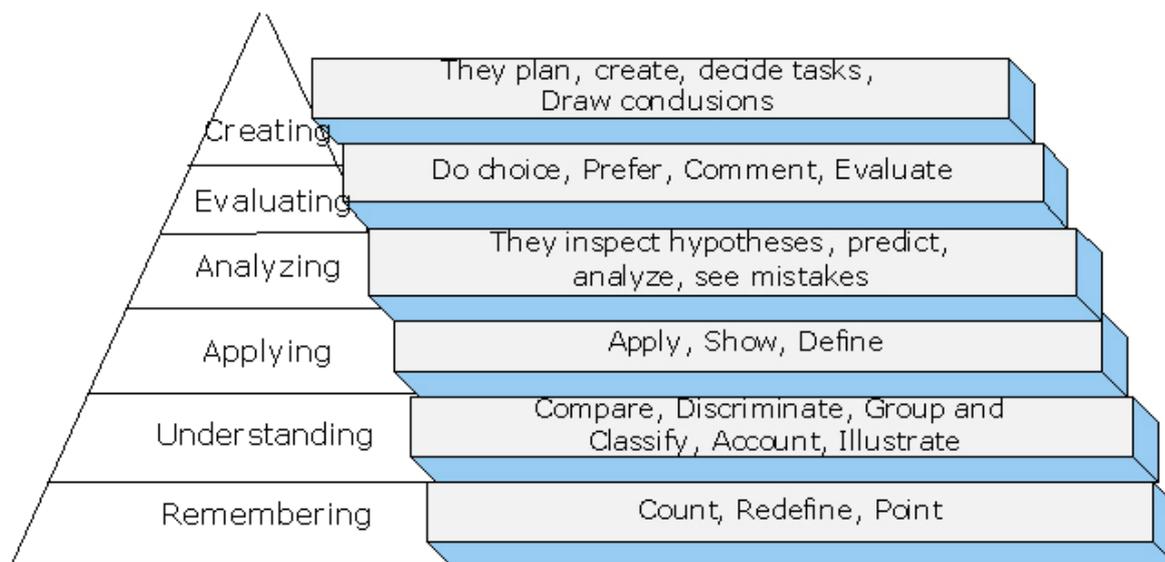


Figure 4. Revised Bloom's Taxonomy

– **Applying**

That category means opportunity for:

- Skill for using the instructional material in concrete conditions and new situations;
- Using rules, methods, concepts, laws, codes of behavior, theories in new situations;
- Showing proper applying of methods and procedures.

– **Analyzing:**

- Breaking educational material down into parts with clear structure;
- Deduction parts from the whole and define the relationships so as to:
 - Discover errors and omissions in the logic of thinking;
 - Discover the difference between causes and results;
 - Evaluate the importance of data.

– **Evaluating:**

- Ability to evaluate different entities (postulations, literary fiction, exploratory data), so the evaluation is based on:
 - Clear criteria;
 - Resemblance of the results to the available data.

– **Creating (Synthesis):**

- Ability to combine elements so that to make a whole that is more effective and optimized;
- An adequate educational outcomes presumed creative activities for developing new designs and structures including:
 - Developing a plan for implementing an experiment
 - Using knowledge from different areas for problem solving
 - Creating new products

CONCLUSION

The model presented in the report gives, from a theoretical point of view, most general basis for reasoning on the ground components of the process of education and

their interconnections. The model can be used at development of system of rules for knowledge management of instructional content.

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ABOUT THE AUTHORS

Assoc. Prof. Hristo Tujarov, PhD, Department of Computer Systems and Technologies, University of V.Tarnovo, Phone: +359 62 649 831, E-mail: htuj@abv.bg

Eng. Svetlana Avramova, Master of Information Science, Bell Canada, Manager, Information Architecture, Phone: +1 604 417 0717, E-mail: svetlana.avramova@gmail.com

Assist. Prof. Stefan Kalchev, Department of Computer Systems and Technologies, University of V.Tarnovo, Phone: +359 62 649 831, E-mail: stkalchev@go.com

Assist. Prof. Milena Stefanova, Department of Computer Systems and Technologies, University of V.Tarnovo, Phone: +359 62 649 831, E-mail: m_stefanova@abv.bg