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REALIZATION OF FRAME-BASED TECHNOLOGIES IN THE CONTEXT OF EDUCATION INFORMATIZATION

KULGILDINOVA T.A.[1], UAISSOVA G.I.[2]

[1]Kazakh Ablai Khan University of International Relations and World Languages, Almaty, Kazakhstan
[2]Abai Kazakh National Pedagogical University, Almaty, Kazakhstan
Email: [1]tkulgildinova@mail.ru, [2]gulnar.uaisova@mail.ru

ABSTRACT

The present paper focuses on the problem of using a frame-based theory in the context of education informatization. The purpose of this research is to define the role of frame technologies in the educational process and to describe their characteristics. The importance of this paper is determined by the age of information technologies, in particular, by the necessity to 'compress' the teaching material in order to facilitate the interpretation of information by learners. With the introduction of information technologies in education, there is an opportunity to create most advanced learning techniques which improve the assimilation of learning material and allow teachers to pay more attention to the individual and personal growth of students and to direct their creative development. Frames underlie the structure of e-books, tablet PCs and smartphones, and they are necessary for self-education and the development of the ability to work independently. It was found that the frame-based technique used by the teacher skillfully directs students to text reproduction, text formation and text perception, i.e. teaches to analyze the received educational information. Frames allow to manipulate both declarative and procedural knowledge.

Key words: *Computerization, Informatization, Information Technologies, Frame, Slot*

1. INTRODUCTION

The current stage of society development is characterized by computerization and informatization of education. In the rapidly changing world, the content of higher education is being updated in accordance with the objectives of continuous training of specialists and their readiness for implementation of professional activity in the conditions of its changing, complexity and perfection. This is due to the difficulty in finding the optimum ratio of the technique of implementation of training programs that combine general and professional personal development. In the new environment, training should be focused not only on the fundamental nature, scope and completeness of specific knowledge, but also on the formation of skills to replenish knowledge, identify and solve new problems, comprehend and propose alternative solutions. Computerization is a steady trend of the development of society and education at the present stage [1].

Computerization of education is determined by the following factors:

- The requirement to improve the quality of training of highly qualified specialists who are able to solve complex scientific and technical issues related to the manufacture, operation, maintenance of computer hardware and software development;
- The need to address the problem of formation of computer literacy, as well as the specific qualities of the user, a variety of information technologies and computer equipment of all students, regardless of the level and profile of education.

Therefore, the relevance of this work is determined by increasing demands on education of students capable of professional growth and mobility in terms of the development of new technologies. The implementation of these requirements involves a high level of professional communicative culture along with a combination of intellectual and business abilities.

In this connection, it is necessary to find and implement effective teaching techniques that contribute to the improvement of communicative competence. Of particular importance is the search for the means optimizing the understanding (interpretation), formation and creation of statements (reading, writing) by actualizing a variety of means, including frames.

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The frame-based technology underlies the structure of e-books, tablet PCs and smartphones, and they are necessary for self-education and the development of the ability to work independently. The frame is a generalized and universal system of the representation of different types of information. A frame in didactics is considered to be a repetitive way of organizing the teaching material (frame as a concept) and training hours (frame as a scenario) in the study of the information, creating universal framework structures. The frame theory reflects the stereotypical nature of the approach to the study of the material, knowledge organization and problem solving [2]. The process of understanding is always accompanied by summarization and entered into the memory in a summarized form - in the form of tables, charts, graphs or frames. This is the basic meaning of the framing organization of knowledge.

Studying ways of knowledge representation with the help of cognitive models (frames, schemes, scenarios etc.) becomes a perspective direction in the methodology of teaching language as the formation of language competence occurs more often on the text basis. Such an approach from the point of view of solving the problem about the ways of information organization and storage in human consciousness is connected with the frame method of the analysis which, owing to the university, can apply for efficiency of its use in the didactic system. The concept or the way of organization of the teaching material is developed by the teacher in the form of schemes, tables, algorithms, structures etc., i.e. in that form which is more convenient for students' figurative perception [3].

The relevance of this approach is connected with the fact that working with the text gives the chance to generate students' communicative competence: it develops the abilities of students to express their own opinion within the limits of the given theme or a dialogue situation. The text as a communicative unit realizes almost all language functions and, first of all, the function of transferring and getting information, assuming not only a certain registration of an informative fragment from the creator of the text, but also an adequate understanding of the corresponding text from the addressee [4].

Purpose and objectives of this research

Thus, the purpose of this research is to define the role of frame technologies in the process of learning and to describe their characteristics.

The objectives of this study are as follows:

- to explore and describe a frame structure based on previously selected primary conceptual characteristics;
- to analyze a common concept of use of the frame approach to learning, which is the basis for the development of the concept in all areas of knowledge, taking into account its specificity.

2. METHODS

The methodological basis for the research of the framing representation of knowledge in the educational process is formed by the theories and concepts of domestic and foreign scholars:

– a general philosophical theory of knowledge, the concept of social and creative essence of the personality and the dialectical laws of its development;

– a theory of systems and a general methodological principle of a systemic approach;

– modeling as a general scientific method of investigation and modeling of the learning process;

– a cultural approach to the concept of student-centered learning and education;

– a competence-based approach in teaching;

– theoretical-methodological and psycho-pedagogical bases of visualization of the educational material.

3. RESULTS AND DISCUSSION

3.1. The Frame-Based System

The main advantage of framing as a knowledge representation model is that it reflects the conceptual framework of human memory organization as well as its flexibility and visibility. Most brightly the advantages of frame-based systems of knowledge representation are manifested when generic connections are changing infrequently and the subject area has a few exceptions. The values of slots are represented in the system in a single copy, because they are included in only one frame, which describes most of the concept of all those that contain a slot with the given name. This property of the frame systems provides an economical storage of the knowledge base in computer memory. Another advantage of frames is that the value of any slot can be calculated using the appropriate procedures or defined by heuristic methods, i.e. frames allow to manipulate both declarative and procedural knowledge.

Graphically, it looks similar to the semantic net, but the fundamental difference is that each

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node in the frame-based system has a generalized structure similar to that shown in Figure 1 [5].

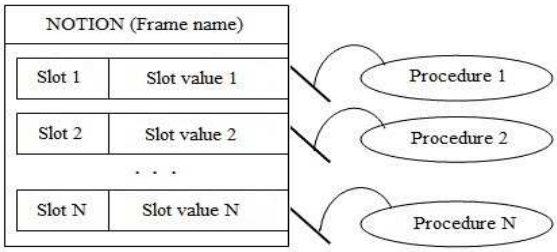

Figure 1: Generalized Structure of the Frame by S. Khabarov

3.2. Terms "Frame" And "Technology"

The feature of the frame-based model of knowledge representation is that all the concepts described in each of the model nodes are defined by a set of attributes and their values, which are contained in the slots of the frame.

Monakhov showed that the terms "frame" and "technology" are compatible. Since the frame can be prepared in the form of graphics, charts, algorithms, etc., the frame-based technology presumably may provide additional clarity, capacitance, imagery, compact size. And the thing which is subject to schematization (summarization, concentration) refers to the learning material, which is the very essence of what may have varying degrees of fragmentation and connectivity (generalization). The learning material is understood as the special, properly structured (generalized) and ordered information that is supposed to be conveyed to students. Also, it can be assumed that in the process of summarization of the educational material there will be enough time for productive activities of students. Therefore, didactic conditions and teaching opportunities of the framing technology were considered in two ways:

1. frame as the degree of ordering (generalization, connectivity) of the learning material (structural and substantive aspects);
2. frame as the scenario of the educational process (time aspect) [6].

3.3. The Frame-Based Technology

The framing educational technology is the study of the learning material (concept) structured in a certain way in a specially organized periodic time sequence (scenario). The main feature of the technology is to increase the volume of the studied knowledge without increasing training hours.

The frame-based technology is the opposite of the traditional (classical) form of education, and we cannot say that this opposition is expressed by incompatibility. It can be assumed that a reasonable alternation of the framing technology and traditional forms of training (different methods solve different problems) will yield positive results.

The framing educational technology can solve a number of interrelated problems:

1. The problem of intensification of the educational process;
2. The problem of activation of students' cognitive processes.

It is within this problem that the research was conducted. The framing technology, in our opinion, allows to solve the problem by the intensification of the educational process. Accordingly, intensification occurs in two directions:

1. by the systematization (schematization) and expansion of the learning material;
2. by the search for new active means, techniques and forms of training.

This pedagogical technology allows to solve the problem of the formation and activation of students' cognitive processes. As noted by Kurbatov, "human cognition is the multi-level and multi-layered process. Sensory cognition is the basis of knowledge". Sensory cognition, in his opinion, has the following structure:

1. feeling (the formation of a subjective image of the objective reality);
2. perception (permanent solution of cognitive tasks on object recognition);
3. representation (the formation of the image of the earlier perceived subject or the image created by the productive imagination) [7].

The ability to solve these problems with the help of the framing educational technology makes it necessary and important to understand the practical application of the technology and the content of this experience by the holistic theoretical content.

The frame-based way to organize and display the educational information is based on the identification of significant and stereotypical relationships between the elements of knowledge and the creation of a sufficiently "hard" and universal structure that is used to arrange the learning content. In the course of a complex analytic-synthetic activity of both a teacher and a learner performed the verbal information is summarized in short, succinct verbal texts, translation of verbal information in nonverbal (figurative), synthesized in a holistic system of knowledge elements [8, 9].

In didactic purposes the use of the text for developing students' speech will be the most effective if the teacher considers two inseparably linked aspects in its characteristics; 1) a set of

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linguistic signs, properties and qualities of the text (a set of language means-connectivity, integrity, completeness, communicativeness); 2) a set of extra linguistic characteristics (intention of the author, i.e. motives, the purposes of the text creation, personal qualities of the author, character of addressing the text). The language teacher, considering the text as didactic unit, should know approaches to the text from psycholinguistic positions when the text is understood as a speech product which possesses thematic, structural and communicative unity. G.V. Kolshansky says "within the text all communicative plans are realized, therefore the text represents a category not purely language, but pragmatic-psychological speech [4]". The scientist, considering the text as communications unit, takes away to it (text) one of the main places in a science, and considers that only the text allows to examine in more details process of communication in human society.

N.S. Bolotnova's interpretation of the text as "the speech product conceptually caused (i.e. having concept, idea) and the communicatively-focused within the certain sphere of communication having informatively-semantic and pragmatical essence" has something in common with G.V.Kolshansky's point of view [10].

We will stop on methodic of teaching Russian language and realization of such text category, as text information.

I.R. Galperin [11] underlines that the category of information is inherent only to the text and is a basic sign of it, as without intention.

3.4. Types Of Information

One of the communicative people the dialogue process can't take place. The scientist allocates three types of information in the text: content-factual, content-implied sense, content-conceptual.

Content-factual information (CFI) contains messages about the facts, events, and processes; in such information the events on a subject of speech, comparison of the facts, their characteristics, any assumption, and possible decisions of the put questions can be supplied.

Content-factual information is always expressed verbally when it is possible to confirm with the citation from the text, that is an element of the frame scenario it is possible to isolate (plan) easily. Language units in CFI are usually used in their direct lines, in detail-logic dictionary meanings fixed to these units by socially caused experience.

Content-conceptual information (CCI) represents a system of author's thoughts on life and its plan. Such information represents creative reconsideration of the specified relations, factors, events, the processes occurring in the society and presented by the writer in the imagined created world. The objective validity in its real embodiment of CCI isn't always expressed with sufficient clearness, it occurs owing to presence of different interpretation of the same information.

To teach students to define content-factual and content-implied sense sides of the information in the chosen texts as a didactic material it is necessary to suggest such text for analyzing that in it, the information didn't contradict one another, and acted as parallel two streams of the message-one, expressed by language signs, another, created by these signs as senses.

Taking into account thesis of speech activity theory it is possible to assert that the semantic structure of language units, representing author's senses, is actualized in recipients' thinking as a system of its personal senses.

It is necessary for student to define types of information in the text, i.e. to make text activity. Text activity is considered as the information united and systematized in the form of the frame [12] which is understood as a cognitive structure based on probable knowledge about typical situations [13]. The frame can be described as the typical structure intended for regulating, a material structure and the information.

The information is considered as factual, there is an answer to a question: what happens and represents a dynamic structure of the frame.

The frame scheme: the arranged situation; problem imitation; asking help; the help is rendered; the situation is corrected in favor of the needing. Such structure allows to systematize great volume of the information, leaving it as much as possible convenient for perception. Structurization of the educational information by the frame method is characterized by comparison process-process, in which the correctness of a choice the type of information is checked. Let's consider Table 1, in which the text activity of students is reflected.

Working with such category of the text as informativity assumes the use of Minsky's framing theory. On the basis of the knowledge mechanism of a new situation allocated with it, at which the child takes the necessary information in a special way imposed on the new information on things known to it from the memory, allows to leave on a denotation principle of N.I. Zhinkina. The principle denotation is understood as correlation of the

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subject world to semantics of a language using lexical schematic visuals. Learning N.I. Zhinkina [14] and A.I. Novikova [15] works, which allocate in the statement subject denotative plan in which understand the structure of the validity objects and their communications reflected in person consciousness. R.T. Kasymova [16] makes a conclusion that we should form denotative perception of a language sign through the subject pictures and drawings at elementary school.

Table 1: Types of Information in the Text

Factual (plot)	**Conceptual (concept)**	**Implied sense (implied sense)**
Facts, events, place and time actions (plot). It is transferred by text retelling.	The system of author's reference on life, its outlook (concept, idea, the main thought). Different readers have different information.	The latent sense, which is transferred by means of a word order, intonation of language means (implied sense).
What is the factual information ? What is happening?	What is the theme and the main idea of the text?	What is the implied sense?

3.5. Frame' Levels

Minsky distinguished the following levels of scenic structure [13]:

I. A superficial syntactic frame (usually the structure of the form "verb + name").

A model or a structure of the sentence scheme (its graphic image) can serve as an example of such a frame. So, the simplest model, which reflects the order of the words in an English sentence, is as follows [17]:

Subject + verb + object + adverbials;
/ | \
How? Where? When?

II. A superficial semantic frame (word meaning, connected to action).

Speaking about the semantic frame, one can appeal to such a concept as a denotation. Denotation – some language units – is a set of objects of reality (things, properties, conditions, processes, attitudes), which may be referred to this unit (by virtue of its linguistic meaning).

A semantic frame is built on the denotation. For example, when teaching vocabulary to develop speech the following frame-based chains are often used: plants - wild plants (trees, shrubs) and garden plants (flowers, bushes), etc. Similar semantic frames are an excellent way to develop logical thinking and vocabulary replenishment.

III. Thematic frames are scenarios that are related with activities, portraits, environment. For example, the frame of "to cry" presupposes the existence of certain emotions (sadness, grief, etc.), which has a specific reason (resentment, fear, etc.), on the one hand, and certain external characteristics on the other (tears, the characteristic tone of voice, etc.). Thematic frames organize our understanding of the world as a whole and everyday behavior.

IV. Frame narration is a framing form of the typical stories, explanations and evidence, allowing the listener to construct a complete thematic frame. This frame contains the information about how the focus of attention can be changed, about main characters, plot forms, action development, etc.

Therefore, speaking about the processing of the information by a stream of consciousness, it is necessary to use the concept of the frame. Whenever any sign is being selected, the interpreter automatically attracts a wide context or a frame, against which the selected linguistic expression get its interpretation.

Text activity is directed on formation of the text competence which includes a complex of knowledge and the abilities connected with perception, understanding, interpretation, creation and pronouncing texts which are carrying out function of a tutorial and education, and also a didactic material in the process of solving certain pedagogical problems. I.V.Salosina [18] makes the concept the competence of perception which is connected with psychological meaning of perception as a process of creation complete individual images of subjects or the phenomena. It is an initial stage of informative activity and is connected with mechanisms of memory, attention, and thinking. The effective perception creates preconditions of formation the understanding competence (CU). The given competence for the teacher is based on knowledge of semiotics and text stylistics. CU in a context of professional pedagogical preparation- is not only the knowledge of decoding mechanisms, but also ability to estimate the information from its availability and to synthesize in forms convenient for understanding as the understanding is a basis of mastering subject material. The text competence includes readiness of the student to integrate the information that means

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ability to interpret and represent the information, to make generalization, comparison and opposition of the information. To organize this activity correctly, the teacher should know own text competence.

The text competence of the teacher is connected with a complex of knowledge and the abilities interfaced to modeling certain knowledge of the world, with teaching students to ways of storage of the information and its adequate perception. The teacher should be able to make a system of exercises in which ideas of a modern cognitive-communicative methodic of teaching Russian language at elementary school are put.

3.6. Educational Process In The Context Of Informatization

Therefore, the main conceptual positions that represent the core of the concept and define the requirements for a frame-based approach in the educational process in the context of informatization are as follows:

1. Mechanisms of realization of the educational process should include technologies, methods and means of intensive training, which is associated with the need to qualitatively assimilate the communicative knowledge, skills and competence in a short time.
2. The frame-based approach allows to intensify the educational process, as it enables students to master a set of communicative knowledge, skills and competence in a limited timeframe.
3. The use of the frame-based approach to language learning allows to form a basic vocabulary in a limited timeframe.
4. The frame-based approach ensures the formation of specific communicative knowledge, skills, competence, experience of the correct use of expressions, mastery of language standards in all kinds of speech activity.
5. Training with the help of the frame-based approach forms the idea of language as a system of interconnected elements at different levels (phonetic, lexical, grammatical).
6. The frame-based approach enhances the effectiveness of teaching, as it stimulates the motivation of students and support their interest.

4. CONCLUSIONS

The present research highlights the problem of using a frame-based theory in the context of education informatization.

The frame-based technique used by the teacher skillfully directs students to text reproduction, text formation and text perception, i.e. teaches to analyze the received educational information. The frame scenario of the teaching material is completely included into students' consciousness and will be applied by them automatically without efforts.

With the emergence of information technologies it became possible to create highly effective training techniques enabling, on the one hand, students to enhance the efficiency of assimilation of the learning material and, on the other hand, teachers to pay more attention to the individual and personal growth of students and to direct their creative development.

Students' productive activity will completely force out the reproductive type, and they will be capable to synthesize the information: to combine, to think out, to make and to create it. The frame representation of the knowledge provides the ordering and integrity of the teaching material that finds out the link of the frame with a verbal toolkit of language and cognitive consciousness area in which through language structures the schematized image-representation of skilled knowledge of the person becomes more active.

The frame-based representation of knowledge increases the integrity and systematization of the teaching material that facilitates its assimilation (reducing the number of teaching units). The frame-based organization allows for saving training hours by means of its algorithmic nature.

In general, the frame educational technology increases the efficiency (richness, density, concentration) of the educational process. Frame-based training as a pedagogical technology is one of the intensive training methods.

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