USE OF COGNITIVE MAPS TO DEVELOP SKILLS OF ALGORITHMIC THINKING AND PROCESSING FOREIGN LANGUAGE INFORMATION

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Development of algorithmic thinking by means of cognitive maps in foreign language training is considered in the article. Special attention is paid to multi-level analysis and exposure of the text intrinsic logic in cognitive maps. At this the importance of learners' creative skills development is underlined.

Keywords: IT technologies, cognitive maps, perception level, type of thinking, "clip thinking", emphasis, key-points, association, definition, algorithm, semantic paradigm

ИСПОЛЬЗОВАНИЕ КОГНИТИВНЫХ КАРТ ДЛЯ РАЗВИТИЯ НАВЫКОВ АЛГОРИТМИЧЕСКОГО МЫШЛЕНИЯ И ОБРАБОТКИ ИНФОРМАЦИИ НА ИНОСТРАННОМ ЯЗЫКЕ

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В данной статье рассматривается развитие алгоритмического мышления с помощью когнитивных карт при обучении иностранному языку. Особое внимание уделяется многоуровневому анализу и раскрытию внутренней логики в когнитивных картах. При этом подчеркивается важность развития творческих способностей обучаемых.

Ключевые слова: информационные технологии, когнитивные карты, уровень восприятия, тип мышления, "клиповое мышление", эмфаза, ключевые понятия, ассоциация, определение, алгоритм, семантическая парадигма

Modern level of society development faces the challenge of new educational approaches in all fields of training, IT being at the forefront and subjects of humanitarian cycles too often remaining in the hinterland. University lecturers and students experience it every day entering classrooms. Interactive boards, local computer networks, Internet, hi-fi, notebooks, tablets and iphones as teaching technical aids became a reality in Russia but new methods of teaching in the field of foreign language training in many respects did not. The gap between them is to be overcome in the nearest time, provided that the advanced pedagogical technologies will find their way and get introduced in academic curricula.

Replying the addicts of traditional pedagogy one should pay the tribute to the old grammar-translation method used to train millions of foreign language learners successfully.

It was perfect for its time. But the reality has changed and the type of thinking too. All social processes have speeded up enormously and the present day task is to catch up and develop in line with them. The feature of modern type of thinking and its utter difference in comparison with the way people used to think, say, some fifteen or twenty years ago is the so-called "clip-thinking", the term introduced by Larry Rosen and used by such researchers as D.S. Bartosh and E.G. Doroshenko [1]. The "clip thinking" is developed due to broad invasion of video clip art technologies on TV and Internet, in the sphere of advertising, music, cinema, keeping in mind special technologies broadly used in mass media of today. Under its influence the traditional way of perception and thinking processes underwent thorough transformation in favor of thinking. People of today very often perceive information in fragments, changing one another with such speed that one simply does not have time to process the content or notice logics or incoherence in the video material presented. People are forgetting about books, new generation not knowing the pleasure of paper books reading which allowed you thinking it over and considering, answering the set of questions arising in the reading process. Speedy kind of modern information flux with no time allowance to think it over reduces analytic abilities, memory volume and degrades the level of perception and comprehension in general. With the aim to withstand the thinking degradation process and develop creative abilities of their children some IT guru of the Silicon Valley [2] who better than others realize the danger of "clip thinking" do not allow their children to use computerized gadgets at home or limit their use to one hour a day. But banning was never a successful way to cope with a problem.

A university lecturer should study the prospect ways of using IT technologies and innovations in any field of science and technologies turning them into powerful tools of creative thinking. Maria Dolinova [3] from the National Research University of Moscow Higher School of Economics does a project on mental maps as means of brain and cognitive abilities development resulting in optimal time management [5] and giving recommendations on their use in the form of video lectures [3]. The inspiring examples of mind-mapping by Tony Buzan [7], the Six Hats lateral thinking system by Edward de Bono [6], the Fish Bone mapping by Kaoro Ishikawi [4], Mikhail Rubin's TRIZ [8] and others offer the tools for re-profiling the very system of knowledge presentation for introduction a brand new educational paradigm. Though we consider the term 'cognitive map' more appropriate for research purposes, when describing the use of different types of maps and thinking systems, such as Tony Buzan or Edward de Bono, for example, we shall use the terminology of the authors.

Mind-mapping principles by Tony Buzan and Edward de Bono lateral thinking system were chosen in April 2015 as the first attempts to introduce the elements of this new pedagogical paradigm in SibSAU academic process for training students learning technical English in rocketry. The experiment was continued in 2016 and as a whole lasted for a year. It showed both pedagogical technologies as effective, interesting and time-saving which is of utmost importance under conditions of insufficient time given to foreign language training in a technical university. For this period about 300 students were offered to make up cognitive maps based on the texts of volume from 0,5 to 4 pages depending on the course and level of training. Mind maps were made up as class-room assignments, parts of skill-tests and at the advanced stage as home assignments, essays, a means of oral topic or news presentation, i.e. the assignments were carried out both in written and oral forms, the latter always having a written basis for retelling. The first 2-3 maps were made under the instruction of the English language lecturer. The students were demonstrated first the lecturer-made mind map on the blackboard, then the best examples of successful student's mind-maps were shown to a specific group and in other groups. They were also given a brief oral instruction on escaping possible errors in the formal part. Mind maps with errors were never shown to prevent automatic remembering. The errors were always corrected individually with due short explanations and hints to the right way. The process of mastering the mind-mapping

technique took from half a month to a month in general in every group of students. After that mind maps became a customary type of work and subject of individual competition among the students.

At the beginning, at the first lesson, all the students were offered a one page Memo on mind-mapping with brief information about the author of the method and 10 principles to follow. The information was to be copied and kept at hand. This information minimum allowed concentration only on the practical part of the method, students introducing their own vision of the text thus receiving different versions of the same information which allowed them to have freedom of creative choice of emphasis, key-points of the text, to choose their own associations and analogues, graphical and sign ways of the given text interpretation. Nevertheless the lecturer had to attentively direct the students to follow a certain obligatory algorithm of working at the mind map and expressing the semantic paradigm of the text, never overloading the learners with specific research terminology, just asking to reflect the text content. The practice also proved the ability to combine both systems suggested by Buzan and de Bono (for big texts, presentations and essays) as well as the use of stem-mapping and timelines.

The general algorithm includes the following Multi-level English Text Analysis (META):

1st level – PRELIMINARY (written and oral)

* Translation/transcription of unknown words and terms, grammar structures
* Exercise on associations N+N /N+V/ N + ADJ, V+N
* Exercises on definitions ADJ+N, V + ADV
* Exercises on logic development (reason and consequence in case-study)

2nd level – ACTUAL INFORMATION (written)

a) Emphasis (one in the text) - N or NN
b) Key-points (by number of paragraphs or ideas)
   * Name / Place / Time - N or NN
   * Event N or NN
   * Phenomena N or NN

3d level – LOGICAL ORDER (written)

* Control N or NN
* Creativity N or NN
* Emotions N or ADJ or ADV
* Results N or NN
* Benefits N or NN

4th level – GRAPHICAL AIDS (written)

- Signs
- Numbers
- Arrows
- Pictures
- Abbreviations
- Shortenings
- Acronyms

5th level – TEXT RENDERING (orally),

where N is a noun, NN are noun + noun, V is a verb, ADV is an adverb, ADJ is an adjective.

As one may see, levels 1 - 4 mean written work, level 5 means text retelling or rendering. The advantages of mind-mapping against traditional grammar-translation method include:

1. immediate understanding of the text semantic paradigm, powerful knowledge evaluation tool
2. training of word order, use of articles, prepositions, verb forms and system of tenses
3. honing of speech skills and immediate memory use
4. visualization of information (image thinking)
5. development of system analytical thinking as any map is a system
6. development of logical thinking, establishing relations among key-points
7. development of associative thinking as a creativity element
8. lateral or parallel thinking, learning to see between the lines
9. ability of self-expression in the use of graphical means, also as creativity elements
10. transition from incoherent fragmentary perception to complete text understanding
11. ability to find out compliances and incoherence
12. upgrading the educational time management

The most difficult assignments appear to be at level 1 in exercises on logic development and levels 2 and 3 as they require not only memory training and automatic rewriting. One thing is that the word pairs here do not contain verbs, the latter should be remembered by heart. Another thing is building up the system of logic word relations and finding such casualties, which requires text analysis and development of logic search skills which can be done at preliminary stage. This reflects the idea of the so-called "concept pair" developed by D. Novak and considered in the work by I.V. Bazhenova [9].

However, the learners with low language training are able make up nice cognitive maps but experience difficulties in describing it at level 5. Here only tactful and supportive individual attitude and friendly assistance of the group lecturer can assist the learner to step up in language acquisition. On the opposite, the good knowledge of the language system eases the operation.

And here we face the necessity not only to require making up cognitive maps from students but also teach them by presentation of language system in the form of cognitive maps which is also possible and more adopted to the clip perception of the young generation. The learners with low language training will get the chance of accelerated language acquisition as they may return again and again to the theory and do practical exercises which can be made up by level of difficulty taking into account the type of it. Strong students can use cognitive language theory maps for brief revision or independent check.

It is also worth paying attention to the "portion presentation of material" suggested by D.S. Bartosh and E.G. Doroshenko in their work on the use of Flash technologies in cognitive training [1]. Their pedagogical technology and interactive computer practicum based on cognitive maps is worth paying attention to. However the adoption of such technology requires the development of a special English Language Training Algorithm (ELTA).

Speaking in favor of cognitive map training one should add that such skills received in one subject can be used in other subject as well, after the principle of it becomes the fact of one's intrinsic cognition system. Cognitive maps can be used for presentations, brain-storming, research and pilot studies in any field of knowledge as well as in engineering drawings, role-playing and military training. In general different cognitive maps in education can be divided in three big categories

a. maps for learning (subject training - ST)
b. maps for teaching (subject instruction- SI)
c. maps for science and research (case-study - CS)

The research has shown that developing cognitive maps increases thinking, memory and learning skills and has very positive impact on the academic process allowing better time management. It is also important to state that use of cognitive maps in educational process creates the situation of success, contributes to the feeling of academic process satisfaction and gives a chance to any level learner to demonstrate his or her mental abilities and the level of knowledge i.e. contributes to the process of self-realization as one of the deepest human needs.

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