E-AMS BASED ON VISUAL STRUCTURES FOR SMART LEARNING METHOD

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Abstract- The proposed e-AMS provides the formation of the speech zone of the acquired language in the mind of the learner due to a sharp increase in the effectiveness of exercises by transforming grammatical information from verbal to graphic form. In addition, continuous assessment of the level of competence of the student leads to the formation of a logarithmic dependence of the learning curve and compensates for the prerequisites for its degradation, providing a synergistic effect in the learning process. As the core of the system, it is planned to use the Structural-Visual method to create non-Verbal means of teaching foreign languages based on modern technologies, teaching new labor skills and new social interaction. The main result to date can be considered a conceptual solution to the problem of simultaneous interaction of the language system and ICT tools that ensure the sustainable formation of foreign language thinking of adults in the process of developing professional and language skills, presented at the system level.

Keywords: Information systems; Electronic acquiring management system (E-AMS); Learning curve; Structural-visual method, Structure Visual Method (SVM);

I. INTRODUCTION

There are a huge number of offers on the market to solve the problem of learning management. These are Learning Management Systems (LMS) of a General type, programs and applications for learning languages, both for individual aspects of the language and the entire language as a system. In the process, a large number of such programs, applications and services were studied and tested. Let's focus only on the General features of entire classes of programs and services, mentioning only the most typical examples.

LMS of General type, such as Moodle, Docebo, Edmodo, Schoology and many others, are created mainly for the organization of the educational process in the framework of the classical way of obtaining knowledge. They are designed to facilitate and simplify the activities of the teacher, methodologist, management of the educational institution and contain a large number of properties, functions and tools. They are difficult to set up and learn and are designed for use within large organizations (schools, universities, large companies). They perform their functions well, but to adapt them to manage the individual process of obtaining a particular skill is extremely problematic.

Specialized programs due to the low methodological competence of programmers in most cases are created for the study of words. The use of interval repetition methods in such programs and services as Memrise, Mnemosyne, Anki, Supermemo, etc., allow you to quickly memorize poorly structured information, which provokes users to spend a lot of time on a rather unproductive activity of memorizing the translation of words outside the context and structure. This also applies to most services and social networks for language classes, such as Duolingo, Busuu, LinguaLeo, etc.

The closest prototype is a program for complex language learning such as Rosetta Stone, Tell Me More, Babbel, etc. they offer tools for the development of most language skills and are designed more for independent language learning. These programs do a good job with their functions, because they are based on a direct, non-translational way. But they have their limitations and drawbacks that slow down progress and force people to drop out. The main one is the same direct method, which reduces the exercises to repeated repetition without understanding the logic of the language.

As already mentioned, conscious training is much more effective, and the imbalance towards practice without understanding the theory is just as unproductive as learning the theory without applying it in practice. In addition, programs do not know how to adapt to the individual characteristics of the student, his native language and, accordingly, the way of thinking. Therefore, the pace of learning offered by the program will rarely coincide with the abilities and capabilities of the student, leading either to boredom or excessive stress, and the conclusions made by the student on the basis of a limited number of examples about the structure of grammar can be very original and very far from the real situation.

The situation is aggravated by the complexity and congestion of the interface, non-obvious methods of training and a fairly high cost of such programs. Such programs are created by programmers for people who are good at computers, and are poorly adapted for use by ordinary people who are not familiar with computer technology. In addition, the presence or absence of a native language in the interface and content of the program does not guarantee the absence of translation, thinking and thinking of the material in the native language, especially for people who have already had many years of experience in translation training.

To achieve direct understanding and completely non-translational thinking is possible only by perfectly balancing the complexity and pace of training with the abilities and capabilities of the student by controlling his learning curve, which is one of the most important tasks of the controlled formation of language skills.

As shown by the study of existing prototypes, at the moment there are no programs that allow you to block thinking in your native language and guarantee the rapid acquisition of direct thinking skills in another. This goal is not only not realized, but is not even set. Even five years ago, the creation of such a system was impossible, but now both methodological and technological prerequisites are ripe for this.

II. Aspects of Effective Methods of Teaching Foreign Languages

The mechanism of speaking any language is set genetically, and it cannot just change. As the outstanding Russian scientist academician L. Shcherba said: "We can banish the native language from textbooks and classes, but we can't banish it from the student's head" [1]. Figure 2 shows areas that determine the speech behavior of a person in the process of communication [2]. Wernicke's area helps a person to learn from audible speech completed the phrase, and then from these sentences to provide the meaning. The understanding of the sounding speech in the human mind is automatic and no logical thinking is necessary here. A person hears a speech, and he understands its meaning. The second brain structure is the Broca's area. It is responsible for speech reproduction. When a person speaks, it is enough for him to think, and the reproduction of thought occurs through Broca's area, which forms meaningful speaking.

These brain structures have no conscious control, and a person cannot spontaneously speak a foreign language. A person can realize that he is speaking a new language if he hears a speech, immediately understand it (Wernicke's area works), and if he does not need to strain to Express the thought (Broca's area works). Thus, the minimum element for understanding the language is dialogue, and highly qualified language teachers combine all this with one phrase: "You know the language if you think in it."

Unfortunately, the obvious things for psychologists do not find their embodiment in the traditional practice of teaching foreign languages, and only the most trained specialists who possess special techniques are able to significantly reduce the duration of training, not only without compromising the quality of training, but on the contrary, to guarantee it. This most significant method, which has passed many years of testing, the methods of which are embodied in their own school, is the Callan method [3]. The Callan method can teach English in a quarter of the time taken by any other method on the market (figure 1). Instead of the usual 350 hours necessary to get the average student to the level of the Cambridge Preliminary English Test (PET), the Callan method can take as little as 80 hours, and only 160 hours for the Cambridge First Certificate in English (FCE).

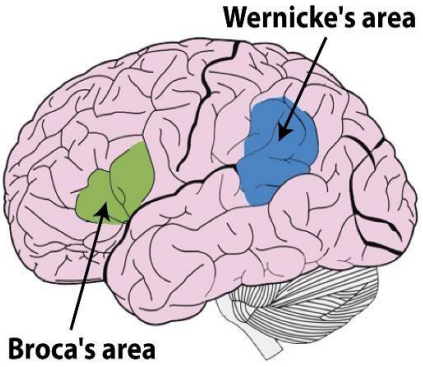

Figure 1. Zones of speech behavior.

III. Dynamic Grammar

For most people, instead of a speech mechanism, a translation mechanism works, introduced by the school approach to language learning, which is physiologically a different process, the opposite of language. To start the speech mechanism, you need to create a database of sound images, speech-motor images and direct connections of these images with meanings.

The translation mechanism prevents the creation of such links and leads to the formation of links between the signs of one and another language. Therefore, after school experience, even in nontranslation courses on the communicative method or when using programs like “Rosetta stone", most students choose their usual translation strategy. At the same time, acts of thinking and understanding are performed in the native language, and externally language actions (listening, speaking, and communication) – in the target language.

Teachers do not yet have the tools to determine, measure, and change the type of mental process, and to find out what process is actually happening. And it is almost impossible to explain these nuances to the student in order to obtain self-assessment, especially since these processes are unconscious and do not lend themselves to conscious regulation. The relations between processes in reality, sensory and motor processes in the psyche and language are extremely difficult to explain, understand, and have long been the subject of disputes and disagreements between various Sciences and scientific directions. Therefore, consciously explaining to the student what, how and why he needs to do is not the solution to the problem. As a result, the habit of the student, developed earlier in the course of a long experience of studying at school or other institutions, still takes over.

Psycholinguistic studies have shown that the use of grammatical rules for planning and controlling utterance inhibits speech activity [4, 5], since the same areas of the brain and mental processes that are necessary for understanding or producing speech are involved in operating with the rules. Indeed, it is physiologically very difficult to simultaneously speak a foreign language and reflect on the grammatical rule necessary to construct a sentence:

if a student does not know how to construct an English phrase correctly, he will not be able to do it; if he knows the rules of how to do it, thinking about them will create obstacles to speaking.

To get out of this contradiction allows the Structural-Visual method (SVM), replacing complex text rules with appropriate visual structures in the form of pictures, schemes and diagrams. The use of SVM in linguistics is to use graphical means to demonstrate the structure of an English sentence and how it is constructed in various forms with extensive use of color for encoding meanings. The method reveals the mechanisms of practical use of both visualizations of the first kind, which can include visual dictionaries and virtual classes, and visualizations of the second kind, which have found their embodiment in Dynamic grammar, as well as Visual Models built on its basis [6] and card tables for different levels of foreign language acquisition.

Leontiev defined the second kind of action as "the external support of internal actions" [5]. Such tools for describing the grammar of a foreign language should be found in every linguistic class, then only a thoughtful look is enough to understand the structure of the language. Subsequent training of professional skills will help to consolidate and transform consistently formed fundamental grammatical skills in solid skills of speaking a new language in the form of a conscious statement or dialogue. In its significance, Visual Models and Dynamic grammar are comparable to the periodic table of chemical elements that hangs on the wall in any classroom where chemistry classes are held.

Figure 2 shows the stages of development of elementary action on the example of the verb Do, where the black arrow indicates the direction of development of the elementary process and the flow of time. The figures below the arrow indicate what is happening in reality, and above the arrow-in the mind. Moreover, the dynamics of the development of an action can be clearly traced from the idea to its completion and is quite accessible to any adult student.

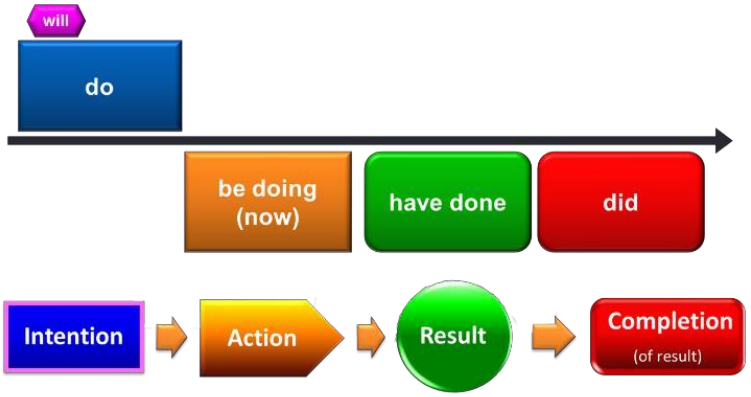

Figure 2. Dynamics of change of the verb DO.

Extended dynamics (figure 3) is created by highly qualified linguists and is difficult for students to understand in the first stages of training.

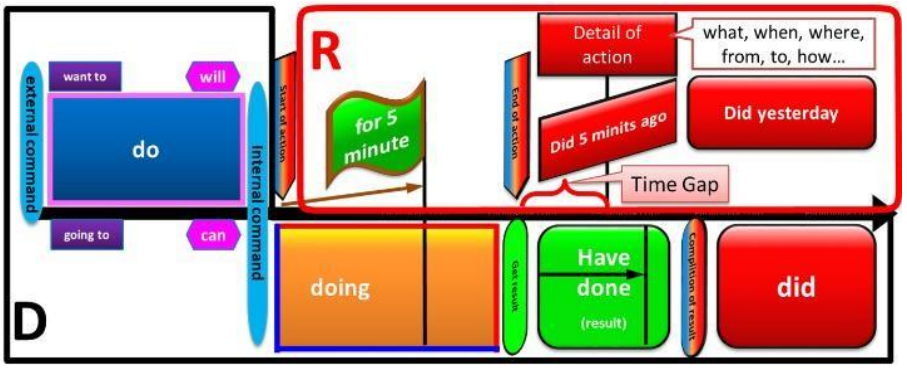

Figure 3. Extended dynamics of change of the verb DO.

In the future, each visual grammatical construction is transformed into a Visual Model of the appropriate level with such assumptions, when the illustrative material is correlated with a specific task of mastering professional material, with specific educational actions. Then the teachers know exactly why the introduction of visibility is necessary in each particular case, and submit Visual Models in combination with card tables in the form in which they can best perform the corresponding professional task. Without basic grammatical skills, the same communicative approach turns into simple memorization of spoken phrases. Visual structures of English sentence construction allow for conscious practice, that is, independent planning of the utterance and control of its correctness. It is proposed to focus primarily on mastering the system of English tenses and automation skills, and to postpone the variety of communicative situations for subsequent practice. If you work out the basic construction on a limited number of vocabularies to full automatism, then their use in the future will not cause difficulties and will not require conscious control by the rules. Language acquisition is much faster when there are ready-made

algorithms with which the language "works" than when you try to independently derive these algorithms from the speech stream and communicative situations.

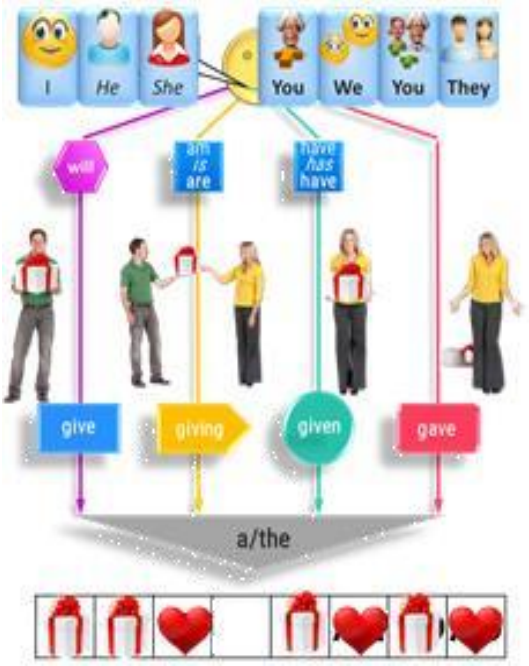

Figure 4. Lingvomap.

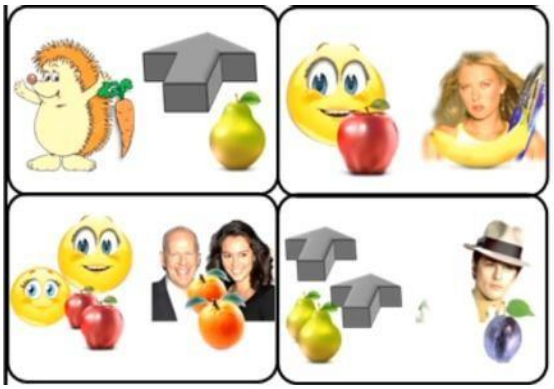

Figure 5. Fragment of a card table.

In combination with Visual Models [7, 8], lingvomaps are used (figure 4) and card tables that provide a mode of accelerated formation of grammatical skills (figure 5) will produce a new E-AMS (Mobile Application) (figure 6). According to the Krashen's input hypothesis of the understandable input material, which is in good agreement with Vygotsky's theory of the Zone of proximal development (the methodological principle of potency) [9], the development of skills occurs when performing exercises that are one step more complex than the current learned level. Increasing the current level can be achieved by increasing the speed and accuracy of the material of the same level of complexity (advanced training), or the introduction of new material (new knowledge-competence-skills).

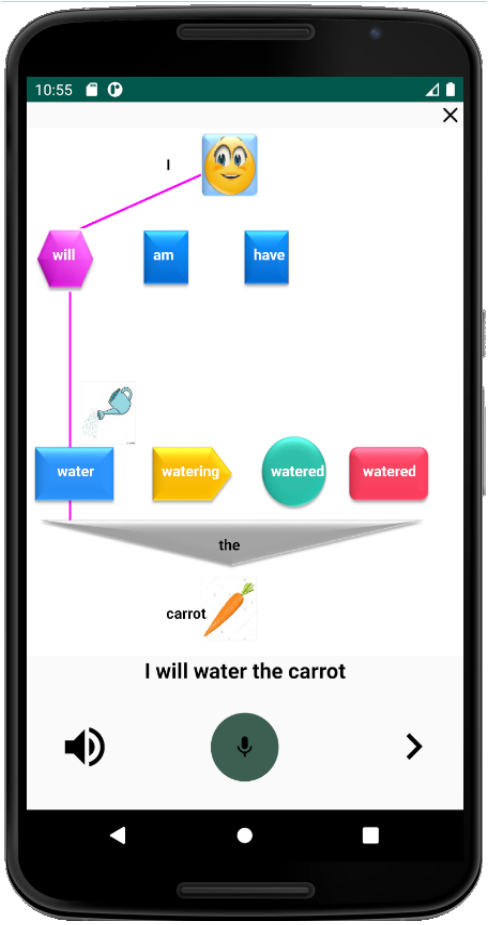

Figure 6. E-AMS (Mobile Application).

Since the learning curves (acquisition of knowledge) and learning skills (acquisition of skills) have significantly different forms and numerical parameters, unjustified transfer of methodological techniques from one field of application to other leads to unreasonably slow progress or its complete absence. The choice of the optimal mode of teaching skills in the field of grammatical skills is complicated by the lack of a mathematical description of the regularities of this process, almost complete lack of accurate data and available means of obtaining them. This is due to the extreme complexity and multilevel structure of the language, which is a fractal system with a huge number of interrelated variables, mathematically not strict and ambiguous.

It is proposed to select a very simplified model from this system, formalize it with the help of system analysis tools and obtain statistical data within this model. Such data will allow you to identify the necessary patterns and analyze them, as well as use the data to improve the effectiveness of training and expand the original model to the level required in specific cases.

Successful conscious training requires two modes: linear demonstration of patterns to implement them, and random training to fully automate the skill. The first mode shows the linear change of one parameter with fixed other variables. When using the second mode, you can combine linear and random changes to these parameters to create unpredictable situations that require real thinking using language to complete the task.

Replacing verbal rules with Visual Models allows you to make significant improvements to any teaching method. Instead of interfering with linguistic activity, SVM provides an opportunity to consciously manage professional skills training and very precisely control the process of forming language skills. This removes the contradiction of acquisition-learning and turns the grammar monitor into a grammar scaffold. Visual models allow you to quickly start the speech mechanism and provide not only a comprehensible input, but also a comprehensible output, which in Krashen's theory justly seemed ineffective.

Dynamic Grammar can be used as an independent tool that allows you to bring "correct speaking" into everyday speech activity, but its most effective seems to be to use it as part of interactive speech simulators as part of e-AMS.

IV. CONCLUSION

E-AMS is a unique science-intensive high-tech product. Its use will lead to a synergistic effect in the learning process and, as a result, the accelerated creation of a new language zone in the minds of adult learners. The system provides a process of controlled formation of professional and speech skills, which allows you to move from language learning to its improvement in the process of use. It is created on a modular basis, so each element of the system can be effectively developed and used separately. At the same time, the effect of sharing all elements of the system and integrating additional developments can significantly exceed the capabilities of existing analogues and help solve very important social problems.

The implementation of such a project is particularly important for refugees and migrants. In a relatively short time, they will be able to get not only all the necessary information about their new profession, but also to acquire stable language skills of the new homeland. Moreover, the learning process will take place remotely, without the work of a teacher directly in the classroom face-to-face with students, and the classes themselves can be held at any point where there is an Internet connection. The resulting solutions and tools will actively contribute to the efforts of state administrations to manage the integration of migrants at the national and local levels. They will also facilitate communication with migrants and their access to services such as vocational and language training, employment, education and social security in host communities.

The work is in its initial stage and is a joint project of researchers from the Lebanon, United States, Japan, Ukraine and Belarus. It should be emphasized that it does not contradict the existing system of assessment of language competencies in Europe, but rather contributes to their importance.

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