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Interactive digital board and memory strengthening

Pregledni znanstveni članek

UDK 371.333

DESKRIPTORJI: učenje tujega jezika, nove tehnologije, spominski kanali, motivacija, pozornost, jezik v razredu, komunikacija, komunikacija med poukom tujega jezika

POVZETEK – Članek opisuje metodološko osnovo in učno učinkovitost računalniške programske opreme Action Manager. Novo učno orodje je namenjeno interakciji med poukom angleščine. Glavne sestavine programa so krepitev spomina, visoka motivacija in pozornost. V poskusu, ki je bil izpeljan na ravni osnovne šole, so učenci pokazali optimalen priklic v okviru dveh spominskih testov tako na ravni delovnega kot tudi dolgoročnega spomina.

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DESCRIPTORS: foreign language learning, new technologies, memory channels, motivation, attention, classroom language, communication in the foreign language classroom

ABSTRACT – This article describes the methodological bases and learning efficacy of the computer application software Action Manager[1]. This pioneer teaching tool has been specifically designed for students' interaction in the English foreign language class. Memory strengthening, high motivation and attention are main elements in the program. In an experiment carried out in a primary education level context, students showed an optimal memory recall of the learning concepts in two memory tests for both working and long term memory.

1. Introduction

New technologies for learning a foreign language are being applied in many educational contexts. Among the different instruments available, the digital board[2] can be one of the most complete and innovative resources for teaching. With a computer, projector and some other peripherals, different tasks can be carried out within the framework of foreign language teaching, such as giving explanations supported by slides, showing web sites, watching films or documentaries, performing karaoke, using word processors for writing, etc. The use of this tool offers opportunities for new methodological approaches and may facilitate faster learning and at the same time raise students' interest and motivation.

1 Action Manager can be freely downloaded at http://www.uhu.es/fernando_rubio.

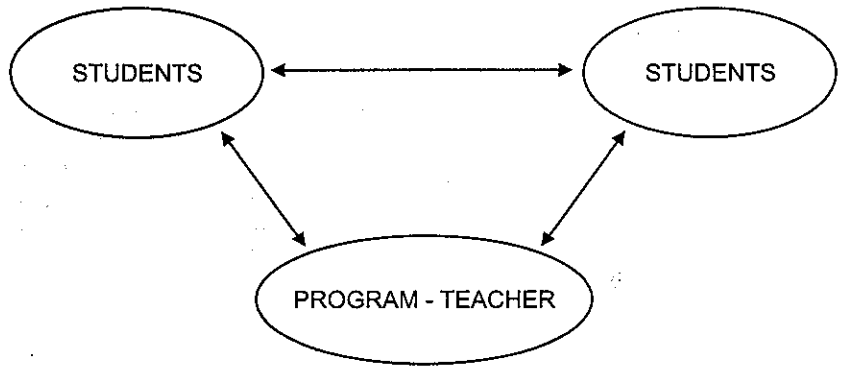
2 With the term "digital board" we refer to a multimedia projection, and not necessarily

However, the fast arrival of these new resources can put us in a "pseudo" state of learning. There is, for instance, a study carried out by the USA government in which no significant differences were noted in tests of mathematical and social knowledge between the groups using the Internet as a methodological base and those using other traditional methods (Bourge, 2002). Next to this, there is the learning process which is very complex, the use of technologies which is new, and several other aspects which should all be borne in mind before some instruments are to be used. There are also teachers, who may never have had any training in the use of computers for language learning and may not be prepared to follow the right procedures when using them, let alone use a digital board.

Broadly speaking, using a digital board has some evident advantages. With this method, the students' visual stimulus is enriched and their level of attention is raised. Also, with appropriate speakers auditory perception can be boosted. On the other hand, students' interaction can be hindered, that is, students can become passive receivers of visual and auditory stimuli. There are always a large number of kinaesthetic students in a classroom (they are able to learn better when they receive information coming from movement and emotion) and the use of the digital board which is a strong visual and auditory support would not help fostering their learning process.

For this reason, the digital board should not only be seen as a visual and auditory support but also as interdirectional support, as shown in Figure 1, where the teacher can interact with the students, students with the teacher, students with students, and all of them according to the software used. In this way, the didactic function is extended and the resource exploitation maximized.

Figure 1: Three-directional diagram of the digital board interactive use.



This interaction model does not only foster different kinds of learning percep-

thus able to recall the learning contents more efficiently with this type of interaction, which is due to the fact that processing occurs along all five memory channels (semantic, procedural, emotional, episodic and automatic; Jensen, 1998; Sprenger, 1998). In fact, an accepted principle in the field of brain-based learning focuses on the process of codification[3], and it holds that the more elaborated the process, the better the memories are stored (Baddeley, 1999).

Studies on cognitive processing and the use of new technologies in the context of learning are scarce so that this new area of research would need to be delved into in more detail. In some contexts, the use of new technologies has become a snobbish attraction or just an instrument to raise motivation. This article tries to show that the interactive digital board not only motivates and gains students' attention but also makes learning more efficient.

The paper tries to explain the methodological basis and functioning of the Action Manager[4] software (AM in the continuation), which has been the pioneer program of the interactive use of a digital board in the field of learning foreign languages[5] (Rubio, 2002). To investigate the learning efficiency of the program, a study was carried out during the school year 2002-03. The purpose of the study was to ascertain to what extent students were able to recall words of the program from their short and long term memory. After four memory tests, the results showed that the use of the interactive digital board with the AM program left a deep mark in both memory processes.

2. Action manager and the interactive digital board

2.1. Description

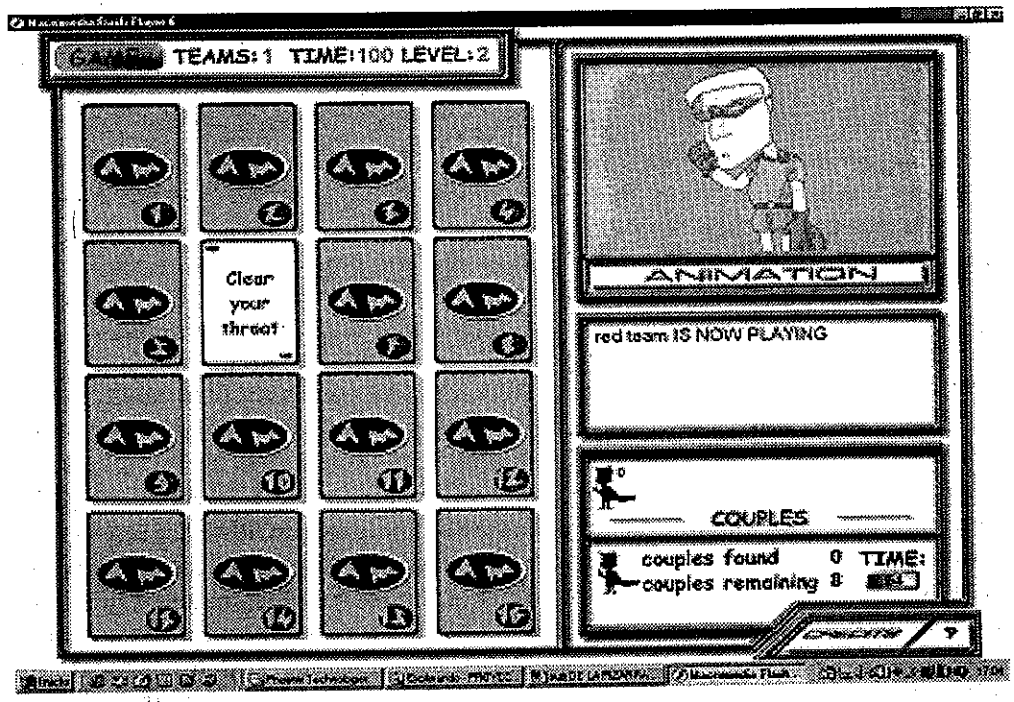
AM is a software program designed in FLASH where the players or students have to achieve the highest mark (see Figure 2 for a layout example). It is a typical card game where pairs of cards must be found. A student or a team flips over two cards in turn until finding a pair. Once the students find a pair they have to perform the same action as the one shown on the cards and repeat the word with the right pronunciation and intonation, otherwise the cards will be turned back over again. Students keep playing with the same dynamics until they collect a total of eight

[3] Schacter (1999, p. 69) defines the concept of codification as "the processing of turning into memories what people see, hear, think or feel".

[4] This research was facilitated by a Fellowship from the Action of Projects of Educational Innovation for the Improvement of Teaching Practice at the University of Huelva (2001-02). Please, see Rubio and Fonseca (2003) for an extended version of this paper.

pairs of cards. Students can follow the score they have achieved. The AM application allows up to six teams of students to participate.

Figure 2: Example of an Action Manager screen.



Six out of the nine screens consist of animations carried out by a nice antihero character and three screens include people via video and picture format.

Although the program offers three different game levels depending on the knowledge of the player (elementary, intermediate and advanced), it is intended for all learners because it deals with isolated words. Due to the informal character of the program, it may be appropriate for use with children or with adult groups in an atmosphere of confidence and security.

The linguistic elements to be learned belong to classroom language. The program uses the vocabulary for actions, sounds, gestures, positions, orders, objects and feelings which can be used to stimulate real and more frequent communication in class: "*Use as much of the target language as possible*" Cameron (2001, p. 209). The AM application has 72 words, out of which 56 words are verbs, 8 nouns and 8 adjectives:

Screen 1: yawn, stretch, hiccup, snore, sigh, scream, clap your hands, hiss. Screen 2:

teacher, stick out your tongue. Screen 3: scratch your head, blow a kiss, wave your hand, lick your lips, shiver, pick your nose, caress your hair, fidget. Screen 4: sneeze, cough, snap your finger, wink an eye, laugh, put up your hand, be silent, wait. Screen 5: throw it in the bin, take out your dictionary, sharpen your pencil, go to the bathroom, turn on the lights, lend your ruler, turn around, speak louder. Screen 6: dangle your legs, fold your arms, stand up and sway back and forth, stand on tiptoe, pinch your cheek, shake hands with your partner, cross your legs, recline on your chair. Screen 7: stand up, sit down, look at your teacher, open your mouth, close your eyes, touch your head, read your book, take a pencil. Screen 8: rubber, stapler, scissors, notebook, board, ruler, glue, ball pen. Screen 9: happy, sleepy, scared, surprised, angry, crazy, in love, thoughtful.

3. The interactive digital board and memory channels

Sprenger (1998) explains that people remember what they have learned by using five memory channels that store information in different parts of the brain with different cognitive processes. These are the semantic, episodic, procedural, automatic and emotional channels.

As Sylwester points out (1995), the *semantic memory* is processed in the hippocampus in the form of a catalogue for semantic categories[6]. Therefore, the vocabulary acquisition is ideal when the student has the option to relate a word to other words of the same semantic field. For this reason, the linguistic elements presented in AM belong to a related semantic field: gestures, sounds, positions, actions, orders and objects that normally occur in a class context. Since these are common actions, the possibility of repeating the vocabulary is guaranteed, and memory recall is reinforced[7]. However, not any type of reception reinforces memories; as Baddeley explains (1999, p. 129) "the pure automatic repetition is not the best way to assimilate new information". The type of repetition that best fits the acquisition of a word in the memory is the one where the person has to elaborate connections of meaning between the semantic category and the previous knowledge of the concept. Therefore, the semantic memory depends basically on the processing levels (or codification), and not on structures or stores (Craick and Lockhart, 1972). This means that when codification of an item is elaborated, memory is empowered. Aparicio summarizes this process as follows (1993, p. 226):

Codification can include simple activities of sensory character or others, every time more complex, until it achieves the activities that need all our available interpretative resources. The main prediction of the theory is that the marks out of the "deeper" complex semantic analysis are memorized better.

[6] This explains that vocabulary learning is more effective when it is organized within the same topic lessons or semantic categories.

In spite of this, the user has to be aware that the semantic codification which is processed with the use of AM is limited. This is due to the fact that although the vocabulary is learned meaningfully, the literature in this field indicates that a stage of transfer is necessary for foreign language learning to occur. Also, "only a certain type of semantic codification provokes a deep activation in the memory" (Schacter, 1999, p. 71). This means that AM concepts should be incorporated into other tasks[8] that integrate all the skills in different learning situations. Doing this and using the AM actions that take place naturally within communication, semantic codification has more possibilities to be elaborated.

AM simply offers an introduction of concepts and an ideal predisposition for acquisition supported by other random activities in the classroom. An example of orientation tasks applied to the AM application would be to carry out an activity where the student has to answer questions such as: "*What would you rather do in class? Stretch, sigh, yawn, scream...*" Then, the student has to establish semantic connections between concepts and his personal schemata. Another possible activity would be: "*Order these words according to loudness: sneeze, scream, sigh, whistle, whisper...*" On this occasion, the student would have to know the meaning of the concept and establish comparisons according to personal values, which means he is establishing connections between his new and previous knowledge. As Schacter (1999, p. 71) explains:

If we wish to increase the probability to remember an incident or to learn a piece of information, we have to be sure of making elaborated codification thinking about the information and connect it with other things that we already know.

Playing AM, the semantic channel is activated when the student has to induce the meaning of the vocabulary by watching the actions and listening to the sound of the word with its characteristic intonation (words are not translated). In every pair of cards, one has the word written on it, and the other one just the animation; the sound is the same for the matching pair.

The *episodic memory* is also present in the AM learning process. This type is responsible for those memories which are based on experienced images or episodes, so the brain evokes the memory as a picture or film. A way to foster this type of memory is to carry out an activity where the student does something different to what he usually does, so different that his brain records it as significant within his experience. For this reason, the digital board with its enlarged screen projection, and together with sound and animation, creates new visual and auditory experiences. In order to create a deeper effect in the episodic memory processing with AM, the students can see some actions carried out by an attractive colour animation. The literature that deals with the episodic memory points out the lack of

precision of this type of memory[9]. This happens because a person constructs images and facts in a subjective way, being able to change the created image from the original one. For this reason, the episodic memory activation should go along with other memory activations, as it happens with the semantic memory.

The third memory channel is activated to remember things related to movement sequences, that is why it is called the *procedural memory*[10]. This memory is reinforced by the repetition of successions of movement, which is fixed once it has become a routine. In AM, there are 72 concepts to learn, 56 are actions that make students imitate movements and produce a dramatized sound. For instance, when students get the "stretch" pair, they have to stretch, produce the right sound (onomatopoeia) and then utter the word.

The *automatic memory*[11], as the concepts itself shows, is activated when memories are instantly evoked by a stimulus (image, music, gesture, etc.). The AM target is that students have to produce the learned concepts freely or automatically, that is, a student who is about to yawn instantly thinks of the "yawn" term. The more the concepts are repeated, the better the neuron connections take place and the deeper evocation of the automatic memory is processed.

The fifth and the last type of memory mentioned by Sprenger (ibid.) is the *emotional memory*. According to LeDoux (1996), it is the strongest memory lane of all types of memories. The emotional memory is activated when students in class are involved in entertaining activities or enjoy a relaxing and safe atmosphere. AM has been designed to provide this with a dynamic and amusing methodology. However, if the competition between the teams is too strong, they may have a stressing experience. It is the teacher's task to create an appropriate atmosphere which is neither too competitive nor too relaxed, because a moderate level of anxiety helps in performing the tasks (Rubio, 2004). The AM application offers teachers the chance to have from one up to six teams in the class. If they want to avoid competition just one team can play against the teacher.

The emotional memory, as well as the other four types of memory, has its own channel to process information, and the capacity for this kind of memory is deeply influenced by the way the information is presented. Thus, Sprenger (1998) explains that the students may fail to answer correctly in an exam if the required channels are not those used by the students during the learning process. For instance, a written exam may evoke the memory from different

[9] See Damasio (1994) who points out that the episodic memory builds images from substratum or memory parts, that is, not as a whole picture otherwise there would not be enough room to store episodic memories.

[10] Due to the dynamic and corporal character of this type of memory it is also called muscular memory (Jensen, 1998).

channels. The semantic memory can be stimulated by activities with gaps to be filled in or by joining words in columns; the procedural memory can be evoked by writing down the steps to follow in a certain action such as loading a car at a patrol station. It is important to bear in mind that undergoing a situation similar to a learning situation helps remembering it better. Regarding the emotional memory, Baddeley (1999, p. 335) points out that:

> *...everything experienced in a particular state of mind will tend to be remembered easier when that state of mind is restored, regardless of the stimulus material being pleasant, unpleasant or neutral.*

Therefore, if we intend to check whether the students have learned the AM linguistic elements, the traditional written exam would not be appropriate because the stimuli and the processing of the memory channels are different.

Apart from the above mentioned five types of memory, other forms of memory functioning have been studied, such as the auditory and visual memory. In this connection, Baddeley (1999, p. 34) states that "the underlying auditory memory system has been developed to detect and use rhythmical and prosodic aspects in the spoken language". In order to ensure better conditions for auditory memory with AM, students listen to sounds and voices played in animations characterized by a rhythmical and prosodic variety. Thus, these sounds and voices are semantically related to the right action. For instance, the word "scream" starts with a scream and then screaming is pronounced. This happens in every animation.

In the first step of AM, the auditory memory starts in the *working memory*[12] through the *phonological loop*[13]. If we make AM a recurrent activity where linguistic elements can be repeated several times, the codification processes are repeated therefore the elements are learned better.

If, as Miller and others (1993, p. 26-27) suggest, learning is carried out within several processes such as "sensation, perception, integration with previous memories, memory storage, taking decisions and creating answers", the interactive digital board with the AM application can become a useful tool for fostering foreign language learning.

4. Attention

Memory and attention are linked because they both need a quantity of cognitive energy to happen (Kahneman, 1973). Therefore, both processes work in a linear way: the more attention, the more chances to retain the learning concepts. To get

[12] The work memory is a short term memory, though it is an old-fashion term.

[13]

the students' attention is one of the main goals of AM. This is easily accomplished with the use of the digital board. Attention is a mechanism of observation, the persistence of which depends on external and internal components (Roselló i Mir, 1998). The former, those extrinsic to the person, can be defined by size, position, colour, movement, novelty, repetition, intensity and complexity. These are characteristic of AM, especially colour, movement and novelty. The internal or intrinsic motivations are our expectations and intentions. Roselló i Mir (1998, p. 33) explains that both components have to be present:

We do not have to be ingenious to believe that this dichotomy between extrinsic and intrinsic stimulus represents two isolated and independent categories. The prosexigen value of the external stimulus qualities can be modelled by cognitive and motivation elements, and at the same time these will be modelled by the former, becoming therefore the connection between them, a kind of a feedback dialectical loop.

Eysenck (1982) explains that motivational states can have a great influence on attention processes. Here emotion is the ignition switch for attention and motivation to be raised:

If we realize that motivation and emotion are at least closely connected, and we have just studied that motivation and attention determine each other, then by an easy deductive process we can guess that an important link may exist between emotion and attention. (Roselló i Mir, 1998, p. 15).

Bearing in mind the characteristics of AM, we can see that intrinsic elements are present in the process, which strengthen students' attention during the activity.

5. Motivation

Motivation is a key element that is strengthened by the use of AM. The fact that new technologies are used in the classroom makes learning less monotonous and more stimulating. In addition, the competitive element of the game raises motivation even more so that it lasts until the end of the game[14]. Motivation is a cognition and emotion drive. After many years of controversy about which is the most influencing element in learning, most researchers have adopted an eclectic position where emotion is considered to be essential for cognition to take place (Arnold, 2000). Christison (2000, p. 2) explains it as follows:

Students' feelings and attitudes about language learning play a vital role in how successful they will ultimately be. Because it is not possible to separate emotions

[14] As we have mentioned before, competition may become a negative element in the game by creating high levels of anxiety and other negative emotions when facing excessive rivalry and

and cognition, teachers must be concerned with what students learn as well as with how and under what circumstances the learning takes place.

In short, AM has its own motivational elements so that teachers do not need to seek any other strategy to motivate the students during the game. Sometimes they *encourage* the students to learn, memorize or be motivated, but what it really influences the learning process is not the intention but the form of the cognitive process: "It is the codification operation and not the intuition to learn which determines the execution in the memory" (Aparicio, 1993, p. 228).

In short, AM raises students' motivation through several elements: the use of new technologies, impressive or attractive images and sounds, dynamicity, competitive spirit, team activity and targets to achieve (to get as many pairs of cards as possible).

6. Experiment

To prove whether the methodological framework of AM leads to optimal learning, we carried out a study in which working and long term memory tests were applied. Other issues, such as students' beliefs about their motivation and the level of attention were also measured.

6.1. Objectives

- To check if the instructions and procedures to be followed during the game were appropriate.
- To analyse motivation, attention and memory fixation in short and long term memory.

6.2. Subjects, data collection and procedures

17 students from the sixth level (with nearly the same number of boys and girls) of a primary school in Huelva, Spain, participated in the study. In a 60-minute session, the first 10 minutes were used to show eight actions to be learned. Then the class was divided into two teams which played the game for 15 minutes. During the rest of the session, a questionnaire (about students' attention and motivation) and two memory tests (one with written support and another for free recall) were administered. 45 days later the memory tests were repeated following identical procedures, and the new results were compared with the previous ones in order to see the effect of the use of AM with respect to long-term memory recall.

6.3. Results

Regarding the motivational aspects of AM, 95% of the students said they liked and enjoyed the game, they understood the actions to be learned (note that meanings have to be guessed because they are only in English) and paid attention during the game.

Figure 4: First and second memory test with visual support.

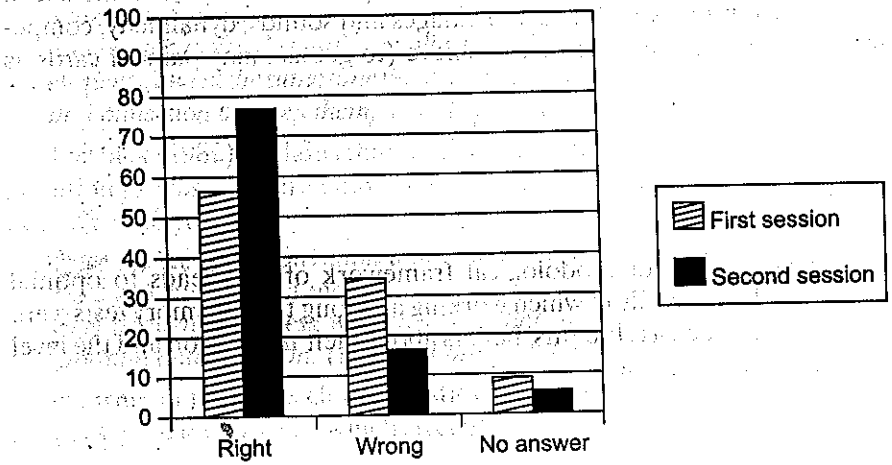
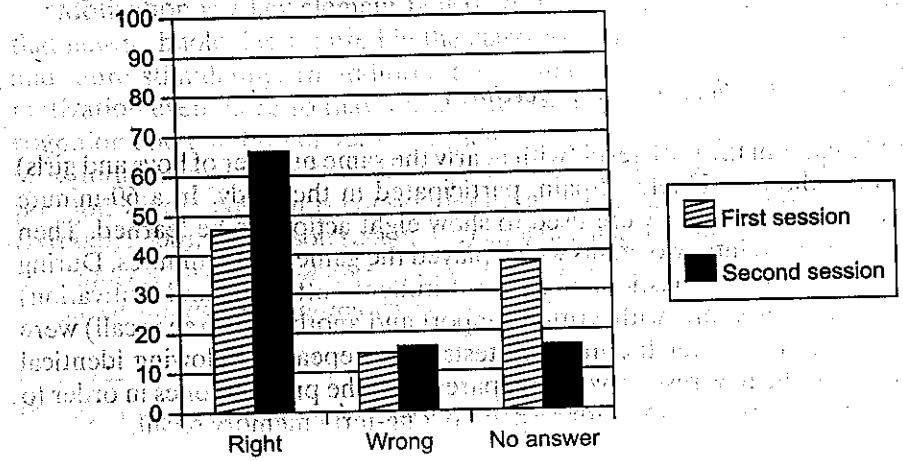


Figure 5: First and second memory test without visual or auditory support.



A comparative analysis of two memory tests was made with the 45 days of time span between the two. According to the results of the first memory test, where the students had to choose answers from a multiple-choice activity after the teacher had performed the actions, they were able to remember most of the words. And if we compare the first test with the second test, where in the meantime the students were not exposed to the learning concepts of AM, the number of correct answers was greater in the second test, as shown in Figure 4.

Similar results were found in the second memory test, where the students wrote down the actions that they saw performed without any type of written or auditory support (except for the onomatopoeia the action might contain). Obviously, this is a very difficult task.

7. Conclusion

This article shows a connection between foreign language learning and the use of new technologies. By using the digital board, Action Manager can be a useful tool to foster motivation in the foreign language classroom, and can also help in the acquisition of the concepts to be learned in the program. In order to enhance the natural use of language within the classroom, the learning of classroom language and meaningful communication is also stimulated. Both, the methodological basis of AM which is based mainly on the activation of five memory channels and attention, as well as the study prove that the concepts to be learned are prepared for long-term memory recall. However, it would be advisable to conduct further research with a bigger number of subjects and other contexts.

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Polonca Pangrčič

Kako učitelji prve triade poučujejo glasbeno vzgojo

Pregledni znanstveni članek
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DESKRIPTORJI: razredni učitelji, glasbena vzgoja, zgodnje učenje glasbe, nadarjeni

POVZETEK – V teoretičnem delu članka predstavljamo, zakaj je tako zelo pomembno zgodnje učenje glasbene vzgoje in vlogo razrednih učiteljev pri glasbeni vzgoji. Izpostavljamo tudi problem odkrivanja glasbeno nadarjenih učencev s stališča glasbene izobraženosti učiteljev razrednega pouka. V empiričnem delu pa predstavljamo rezultate ankete, ki smo jo izvedli med učiteljicami razrednega pouka, pretežno v štajerski regiji. Raziskovali smo njihovo glasbeno predznanje – obisk pevskega zbora, glasbene šole – v času osnovnega, srednjega šolanja in v času študija. Tako smo dobili pregledno sliko o njihovi glasbeni izobrazbi. Nato smo raziskovali način obravnave nove pesmi – ali pojejo, ob tem zaigrajo na instrumente, ali učencem samo predvajajo pesem na CD-ju. Rezultati, ki smo jih dobili, so odraz problematike poučevanja glasbene vzgoje na razredni stopnji v naših šolah.

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ABSTRACT – The theoretical part of presents the reasons why early music e important and tries to define the role cl play in it. It also deals with the problem o children who are gifted in the music f namely performed by class teachers wh qualified for such a task. The empiric presents the results of a survey admini class teachers in the Štajerska region. I e music education – singing in a choir, atte school – they acquired during the time schooling (primary and secondary educa sity studies). Then I looked at how they p song to the class – do they sing it, do the their singing on an instrument, or do the them the song from a CD. The resul problems connected with music educa classes of primary school.

1. Uvod

Glasba je v vsakdanjem življenju bolj ali manj pomembna. Sprem vsakem koraku: ko sedemo v avtomobil, ko gremo v trgovino po na frizerju, pri športu v telovadnici, bazenu, celo na smučišču se razlega iz Prav tako je nepogrešljiva v televizijskih oddajah in filmih. Nikakor pozabiti na glasbo v vrtcu in šoli. Otroci jo radi poslušajo in učitelji jim jo zavrtimo, zaigramo ali zapojemo.

Učitelj razrednega pouka mora biti široko izobražen, saj nje poučevanja zajema vse predmete določenega razreda. V tem prispev osredotočila na poučevanje glasbene vzgoje in se poglobila v glasbeno izo