UNIVERSITY OF ZAGREB
FACULTY OF HUMANITIES AND SOCIAL SCIENCES
DEPARTMENT OF INFORMATION AND COMMUNICATION SCIENCES
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LANA KRIŠTO

MULTIMEDIA IN COMPUTER-ASSISTED LANGUAGE LEARNING

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Mentor: Dr. Sanja Kišiček

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Contents

Introduction

Technology and multimedia constitute a large portion of our everyday life. Computers and other technological devices are used for work, leisure and even education. Advantages of using computers in education have been exploited in the domain of language learning, as well.

Computers and the Internet provide learners with a great amount of material that can be used for learning foreign languages. However, not all available materials are of the same quality. In order for Computer-Assisted Language Learning (CALL) to be successful, the software and materials used in teaching have to be created following certain guidelines.

This paper will investigate the theoretical foundation behind the use of multimedia in language learning and give an overview of guidelines for creating an effective learning environment using multimedia. Examples will be given of how CALL was used for achieving different study goals, i.e. improving different aspects of language knowledge.

After defining CALL and multimedia, which are the key concepts in this paper, related cognitive theories will be presented. These cognitive theories provide the basis for multimedia learning, which is the usual type of learning with the aid of a computer. Furthermore, phases of CALL will be presented in order to show how the field developed over time.

Since multimedia materials have a crucial role in CALL, guidelines will be given for the successful implementation of multimedia into material for learning languages. The process of learning a language with multimedia will also be explained. Apart from that, the role of animation in CALL will be researched.

Features of CALL will be discussed. However, the paper will focus on vocabulary acquisition with the aid of computer. Lastly, the concept of e-learning in relation with language learning will be researched in addition to giving an overview of other uses for computers in language learning.

1. Terminology – CALL and Multimedia

Beatty defines CALL (Computer-Assisted Language Learning) as "any process in which a learner uses a computer and, as a result, improves his or her language" (cited in Hubbard, 2009, p. 1). What can get improved is: learning efficiency, learning effectiveness, access, convenience, motivation and institutional efficiency (Hubbard, 2009). CALL allows learners to obtain materials and instruction anytime regardless of their location. There is no need for a tutor's presence. Moreover, proper instructional design and multimedia, both of which will be discussed in this paper, can make language acquisition easier, more permanent and more interesting.

CALL often encompasses multimedia learning. Multimedia is "the presentation of material using both words and pictures" (Mayer, 2001, p. 2). Material described as multimedia can, therefore, consist of written or spoken text and any kind of pictorial material (e.g. illustrations, photos, graphs, animations, videos). Multimedia learning, therefore, refers to learning from material presented both in verbal and pictorial form (Mayer, 2001).

2. Cognitive Theories

2.1 Working Memory

Baddeley and Hitch developed the working memory model. Sorden states that "their model for working memory was a system with subcomponents that not only held temporary information, but processed it so that several pieces of verbal or visual information could be stored and integrated" (2005, p. 265).

Badeley proposed that a component, the central executive, controlled two subcomponents or slave systems: the visuo-spatial sketchpad and the phonological loop. Badeley later added a third subsystem– the episodic buffer (Sorden, 2005). The model is presented in Figure 1.

According to Baddeley (2009), the phonological loop is responsible for temporary storage of acoustic material. The visuo-spatial sketchpad holds visual or spatial material. The central executive is "an attentionally limited system that selects and manipulates material in the subsystems, serving as a controller that runs the whole show" (Baddeley, 2009, p. 44).

The phonological subsystem allows the acquisition of language, while the visuo-spatial sketchpad is used for visual and spatial information. The episodic buffer is a storage system which links the subsystems of working memory and connects them with input from long-term memory and perception (Baddeley, 2009).

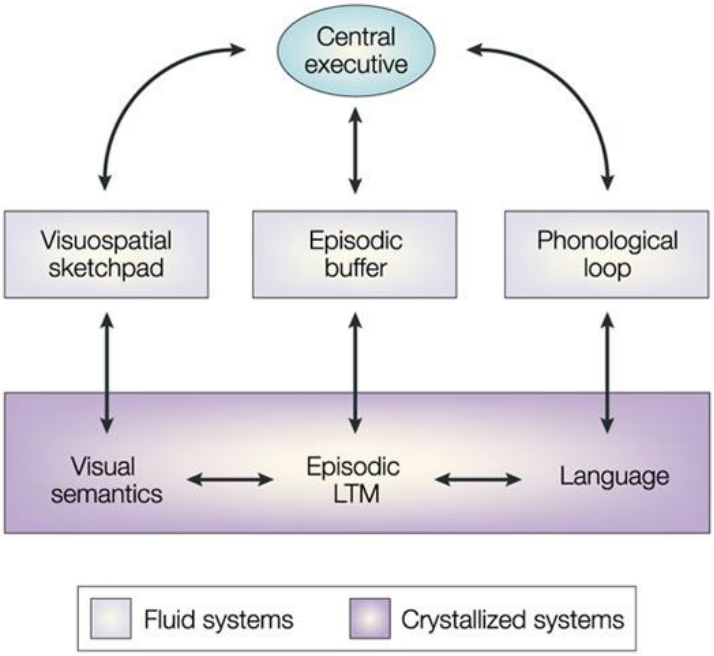

Figure 1. The Working Memory Model. (Source: Baddeley, 2009)

2.2 Dual Coding Theory

Benefits of multimedia learning in general, and of using multimedia in CALL, are based on the Dual Coding Theory (DCT). Paivio defines dual coding theory as follows: "Cognition according to DCT involves the activity of two distinct subsystems, a verbal system specialized for dealing directly with language and a nonverbal (imagery) system specialized for dealing with nonlinguistic objects and events" (2006, p. 3).

Paivio (2006) enumerates several important features of DCT with regard to memory. Firstly, memory performs better with objects and concrete words, than with abstract words. Furthermore, verbal and nonverbal codes can have additive effects on recall. However, the nonverbal code is mnemonically stronger. In addition to that, using concrete stimuli during recall is more beneficial than eliciting a concrete response.

2.3 Cognitive Theory of Multimedia Learning

Cognitive theory of multimedia learning as presented in Figure 1 is based on DCT, and it is described by Mayer (2001). One channel processes words, while the other processes pictures. It is important to note that written words, as opposed to spoken, will be processed by the same channel as pictures. In other words, one channel deals with visual, and the other with auditory material. Knowledge is actively manipulated in the working memory, in which two models, a verbal and a pictorial, are constructed and then, together with prior knowledge stored in long-term memory, integrated.

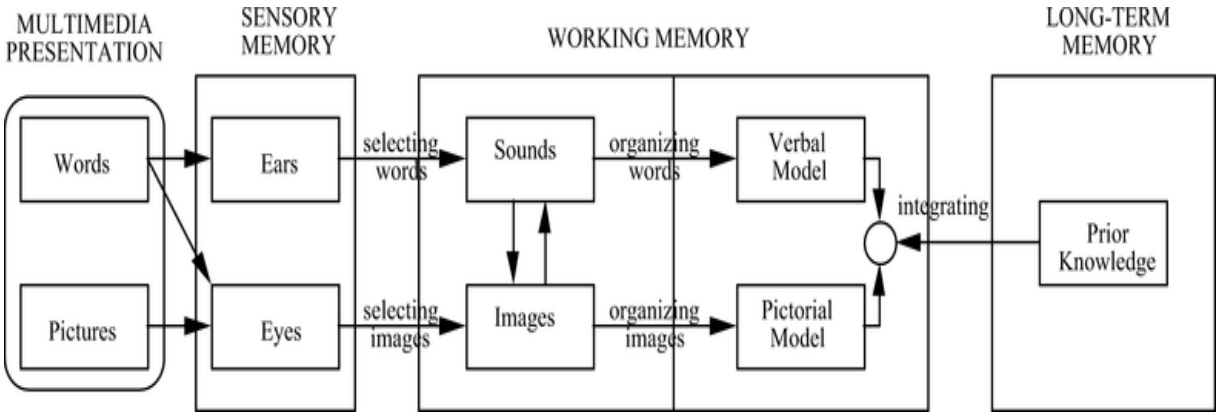

Figure 2. Model of Cognitive Theory of Multimedia Learning. (Source: Mayer 2001)

According to Mayer (2001), five cognitive processes lead to meaningful multimedia learning:

1. selecting relevant words
2. selecting relevant images
3. organizing selected words into a verbal model
4. organizing selected image into a pictorial model
5. integrating word-based and image-based representations

2.4. Cognitive Load Theory

Cognitive load is directly connected to learning difficulty. Proper instructional design can partly reduce cognitive load, which can aid learning in some cases. According to Sweller (1994), there are two basic learning mechanisms: schema acquisition and automation of learning processes.

Schemas are basic units of knowledge that help us process large amounts of input. They are general concepts that stand in for specific varieties. Sweller states: “Schemas effectively

increase the amount of information that can be held in working memory by chunking individual elements into a single element" (1994, p. 299). By implication, schema acquisition helps us process large amounts of information faster, since working memory can hold more items when they are in the form of schemas. Clark notes: "The virtual capacity of working memory for any given content is much greater for individuals with prior experience with that content" (2005, p. 597).

Automation, as well, reduces working memory load. The process refers to automatic processing of well-learned material. Such processing takes up less working memory capacity (Sweller, 1994). Automation pertains to use of well-known schemata that are held in long-term memory (Sweller, 2005).

Cognitive load can be intrinsic or extraneous. Intrinsic cognitive load refers to inherent complexity of learning material and is caused by element interactivity. According to Sweller "elements interact if they are related in a manner that requires them to be assimilated simultaneously" (1994, p. 304). Extraneous cognitive load, on the other hand, can be manipulated by instructional design. However, the need for the reduction of extraneous cognitive load is not always present. If the intrinsic cognitive load is low itself, extraneous cognitive load makes little difference and it does not need to be reduced (Sweller, 1994).

There is also germane cognitive load whose increase is likely to result in schema construction and automation (Sweller, 2005). In other words, germane cognitive load is caused by effective learning. The three cognitive loads (intrinsic, extraneous and germane) are additive. Instruction will be productive when either intrinsic or extraneous cognitive load is not too high.

Chandler and Sweller state that "by eliminating redundancy, intelligibility may be increased rather than decreased" (1991, p. 331). Therefore, the self-explanatory source of information should be located and redundant sources of information should be eliminated or isolated to be used as a mnemonic device. Where several sources of information are needed for the materials to be fully comprehensible, instruction should be presented in an integrated format (Chandler and Sweller, 1991).

2.4.1 Cognitive Load Theory and Language Learning

Not all aspects of language learning present the same kind of challenge for cognition. Second language vocabulary acquisition is an example of low intrinsic cognitive load, since the

element interactivity is low. However, syntax and semantics present a greater challenge due to higher element interactivity (Sweller, 1994).

Sweller (1994) points out that second language vocabulary acquisition resembles learning lists of associate pairs and involves dealing with elements only. On the other hand, when those elements are used in tasks for learning syntax and semantics, they take on the role of schemas. The function of learning itself is acquiring schemas to be stored in long-term memory and their automation.

2.4.2 Instructional Design Techniques for Reducing Cognitive Load

Working memory limitations need to be considered when it comes to instructional design. More precisely, the number of items it can hold and its duration should be taken into account. Sweller states: "All instruction requiring learners to deal with novel information must be processed by a structure that is minute in capacity and that retains the new information for no more than a few seconds" (2005, p. 22).

Sorden believes "that the layout should be visually appealing and intuitive, but that activities should remain focused on the concept to be learned, rather than trying too much to entertain" (2005, p. 265). There are several instructional design techniques proposed by Sweller, Van Merrienboer, and Paas: the goal-free effect, worked example effect, completion problem effect, split-attention effect, modality effects, redundancy effect, and the variability effect (Sorden, 2005). Techniques that are most applicable to CALL will be briefly discussed below.

Sorden (2005) explains that in order to avoid split-attention effect, learners' attention should not be divided between two tasks, which happens when they have to integrate multiple sources of information. Instead they should be presented with one source of information at a time.

Modality effects are especially applicable to multimedia instruction. Using auditory and visual information which can't be understood in isolation, but has to be integrated, can increase effective working memory capacity. Moreover, according to the redundancy effect, loading the learner's both channels (visual and auditory) with information that can be completely understood by itself can be counter-productive, and it can even cause a form of split-attention (Sorden 2005).

Lastly, according to the variability effect, variability in practice should aid learners to develop multiple schemas, which will prove helpful under different conditions, as well (Sorden 2005).

3. Phases of CALL

Warschauer (1996) makes distinction between three phases of CALL:

1. *behaviouristic CALL*
2. *communicative CALL*
3. *integrative CALL*

Behaviouristic CALL (1950s-1970s) was based on *drill and practice*, and the computers were used for supplying the student with instructional materials. The learner could repeatedly be exposed to the material, get immediate feedback, and enjoy an individualised learning experience. This phase features Taylor's model of *computer as tutor* (Warschauer, 1996).

Ertmer and Newby (2013) state that "behaviourism equates learning with changes in either the form or frequency of observable performance" (2013, p. 48). The goal of learning is recalling a proper response to a specific stimulus. In instructional design principles of behaviourism are utilised through observable outcomes, pre-assessment, reinforcement and strengthening stimulus-response association (e.g. with cues) (Ertmer and Newby, 2013).

Communicative CALL (1970s-1980s) was oriented towards a non-drill format, and the student had more control over the practice. As it is visible from the name of the phase, the focus was on interaction. *Computer as tutor* model still remained, accompanied by Taylor and Perez's *computer as stimulus* model. The purpose of CALL shifted from the search for a right answer towards stimulating discussion and critical thinking. Apart from that, Taylor's *computer as tool*, that is Taylor and Perez's *computer as workhorse* model, emerged. Programs performing that role help the user in using and understanding language. These are, for instance, spellcheckers, word processors, concordancers (Warschauer, 1996).

Integrative CALL is based on multimedia and the Internet. Hypermedia is present, as well, meaning that multimedia materials are connected and can be navigated through according to the learner's preferences. Benefits of multimedia include a more authentic learning environment, skill integration, greater learner control, and enabling content focus without hindering learning. However, creating a quality multimedia program takes time and money,

and it requires knowledge both of programming and of designing in accordance with pedagogical principles (Warschauer 1996).

The role of the Internet in integrative CALL, according to Warschauer (1996), is making communication easier. This is called computer-mediated communication (CMC) and it will be discussed in more detail later in this paper.

4. Multimedia Design Principles

Mayer (2001) enumerates seven principles for the design of multimedia material:

1. ***Multimedia Principle:*** *Students learn better from words and pictures than from words alone.*
2. ***Spatial Congruity Principle:*** *Students learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.*
3. ***Temporal Congruity Principle:*** *Students learn better when corresponding words and pictures are presented simultaneously rather than successively.*
4. ***Coherence Principle:*** *Students learn better when extraneous words, pictures, and sounds are excluded rather than included.*
5. ***Modality Principle:*** *Students learn better from animation and narration than from animation and on-screen text.*
6. ***Redundancy Principle:*** *Students learn better from animation and narration than from animation, narration, and on-screen text.*
7. ***Individual Differences Principle:*** *Design effects are stronger for low-knowledge learners than for high-knowledge learners and for high-spatial learners than for low-spatial learners.*

It is evident that the underlying implication of these design principles highlights the benefits of using multimedia materials in learning. However, all the items used should be relevant and the designer's aim should be to engage both the user's eyes and ears so as not to overload one sensory channel.

Plass and Jones (2005) state that some principles are not fully applicable to language learning. The coherence principle is at odds with second-language acquisition (SLA), because "any meaningful linguistic input has potential value for the acquisition of the language" (Plass and Jones, 2005, p. 480). Moreover, the redundancy principle and the modality principle are not

applicable to SLA because successful language learning needs to develop both reading and listening.

The following principles were also presented by Mayer (Sorden, 2005):

a) ***Personalization Principle*** – A conversational, rather than a formal, style of narration aids learning.
b) ***Pre-training Principle*** – Training on separate components should precede a narrated animation in order to avoid overloading working memory. This way, low level schemas are created first, which enables the learner to combine them into more complicated schemas about a concept.
c) ***Signalling Principle*** – Signals help learners organise auditory material, which reduces the associated cognitive load.
d) ***Pacing Principle*** – Learner should be able to control the pace of presentation themselves in order to properly process the material.

Sorden (2005) notes that in order to aid learning, multimedia design should be conducted in accordance with multimedia design principles and cognition theories. Multimedia instruction shouldn't be used as a demonstration of the instructional designer's technological prowess. What it should aim to be is helpful, effective, appealing, motivating and cost-conscious.

Clark (2005) gives two guidelines regarding multimedia design, as well:

1. *Minimize cognitive load by explaining complex visual content with audio narration*
    - The optimal way to use narration is for explaining high complex visual content that cannot stand on its own.
2. *Minimize cognitive load by omitting extraneous audio*
    - Extraneous auditory material, be it environmental sounds, background music, or explanatory narration, presents an unnecessary load for the working memory.
    - Relevant environmental sounds should, however, be included.
    - Due to the transient nature of audio segments, referential content should be presented in textual format, as well.

Multimedia enables the content to be presented in dual modalities. Optimal learning with the aid of multimedia is accomplished when related audio materials are used for explaining relevant visual material in a complex context to a novice learner (Clark, 2005).

5. Multimedia in CALL

Plass and Jones state that "second-language acquisition with multimedia is the use of words and pictures designed to support the comprehensible input that the learner is exposed to and interacts with, and to elicit and negotiate comprehensible output" (2005, p. 469).

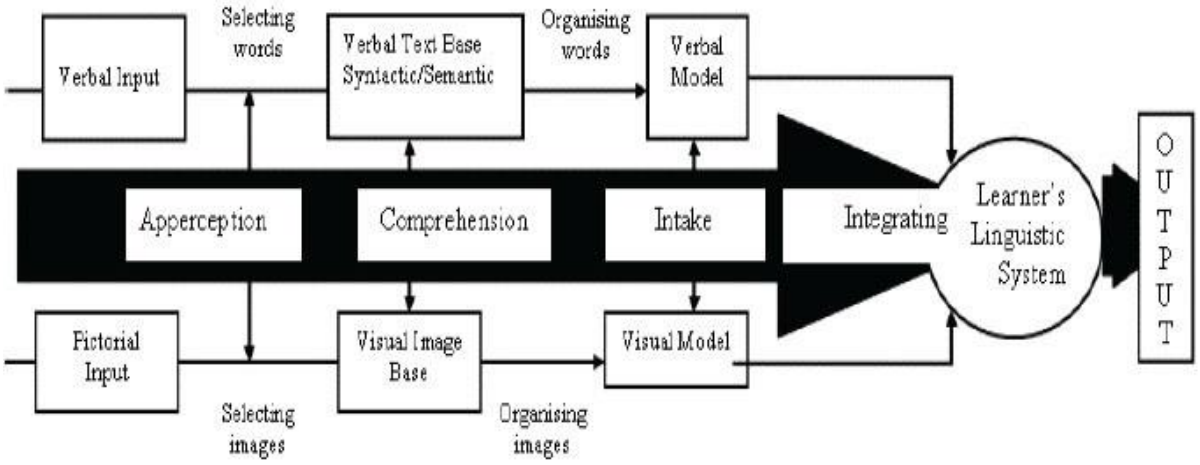

Figure 3. Integrated model of second-language acquisition with multimedia. (Source: Plass and Jones, 2005)

Figure 3 shows Plass and Jones's (2005) integrated model of second-language acquisition with multimedia. There are four major phases in the model:

1. *Comprehensible input: selecting/apperception*
    - Learners direct their attention to relevant materials and select them.
    - Selected information is represented in a text base (verbal information) and a visual image base (pictorial information). This is apperception.
    - Multimedia can be used to direct attention. An example is highlighting.
2. *Interactive processing: organising/comprehension*
    - Learners organise and connect appropriate materials into a pictorial model (includes linguistic and non-linguistic pictorial information) and a verbal model (includes semantic and syntactic information).
    - Multimedia can be used to provide annotations.
3. *Intake/integration*
    - The verbal and pictorial mental representations are integrated into a coherent mental model with the help of prior knowledge.

- Multimedia can be used to provide introductory materials, which would serve as activators of existing prior knowledge.

4. *Comprehensible output*
    - The learner needs to produce output, i.e. use the language, in a meaningful context.
    - Multimedia can be used for enabling meaningful communication.

5.1 An Example of the Use of Multimedia in CALL

Perhaps the most evident use of multimedia in CALL is the illustrative one in vocabulary acquisition. Al-Seghayer (2001) advocates the use of multimedia annotations, especially those with videos and pictures. However, there are certain guidelines that make the use of annotations more effective.

For instance, Al-Seghayer (2001) has found that learners learn and recall more previously unknown words when they are given annotations that contain textual and visual modes, rather than the textual mode alone. What is more, the dynamic mode proved more useful than the static. In other words, videos aided instruction more than pictures. They were also preferred by students, and were a better retrieval cue.

The use of multimedia annotations creates a learning environment which supports language acquisition. The variety of multimedia material engages learners and provides them with more cues for recall by enabling them to create mental representation in different modes. It is easier to conceptualise information and the multimedia materials (especially the dynamic ones) are attention-grabbing (Al-Seghayer, 2001).

5.2 Animation in CALL

Animation refers to sequencing of static images, where a fourth dimension (time) is added in order to depict motion or change (Sundberg, 1998). Animation can be coupled with written or narrated text (or both). However, Paivio's Dual Code Theory (2006) and Mayer's multimedia design principles (2001) support the use of narration with animation.

Sundberg (1998) gives several reasons for the use of animation in instruction. Motion implied by animation is excellent at getting learners' attention due to human sensitivity to motion perception. Moreover, it can be a great motivator, especially for children, and intrinsic motivation is stronger than external. Those with lower imagery ability (children and people

with low spatial aptitude) especially benefit from the use of animation in instruction. What is more, animation can aid not only intentional learning (which is goal-focused), but also incidental learning (which need not happen consciously).

In CALL, animation is useful for learning how to express motion and/or change of state. For example, it can be used to illustrate the meaning of parts of speech used for expressing changing/moving reality, as well as for making distinction between verb tenses and aspects. Parts of speech denoting motion/change are: prepositions of dynamic location, prepositions of time, participial adjectives, verbs of motion, nouns of phenomena, verbal nouns (Sundberg, 1998).

All in all, according to Sundberg (1998), animation can find its application in the following second-language skill areas:

a) *teaching pronunciation*
b) *teaching the calligraphy*
c) *teaching reading*
d) *teaching listening*
e) *teaching morphology and syntax*
f) *teaching culture*

Al-Seghayer (2001) supports the use of the dynamic mode, as well, especially in annotation used for vocabulary acquisition. Some of the reasons for that, apart from those already mentioned above, are contextual richness and cultural authenticity. It is evident then that animation and video can at the same time be great assets for effective vocabulary acquisition and learning about a foreign culture.

5.3 Guidelines for the Use of Animation in Instructional Design

Sundberg (1998) gives several suggestions which should aid animation incorporation into instructional material:

a) *Animation is most effective when used for conceptually new material.*
b) *Learners should have some familiarity both with animation as a medium and with the topic presented, at least at a rudimentary level to profit from the animation.*
c) *The material which is illustrated by the animation should be at a learnable level for the intended audience.*

d) *Animation should be an inherent part of the material presented, not a gratuitous add-on.*
e) *Sequencing and presentation of instructional modes – text, sound and animation – need to be planned for maximum effectiveness.*
f) *Children should benefit more from animation than adults, although there does seem to be some ancillary benefit to adults.*
g) *Allowing the viewer greater control over the animation results in more learning.*
h) *Computer-generated animation may be superior to video when greater simplicity of image and saliency of the focal point is critical to the instruction.*
i) *Animation should be created at a sufficiently professional level for its intended audience.*

Clark (2005) proposes two general guidelines for the use of animations:

1. *Consider visual alternatives to animations*
    - In some cases, such as presenting relatively simple processes and concepts, animations do not significantly aid learning in comparison with static graphics. In such cases, static material can be used instead, and line drawings can be used as motion indicators.
2. *Manage cognitive load when using animations*
    - Individual components should be presented before the whole process.
    - Learners should have control over display of content in order to progress at their own pace.
    - Animations should be described by narration.
    - Use cues to direct the user's attention to relevant portions of the animation.

6. Features of CALL

Clark (2005) points out three capabilities of computer aided learning:

1. *Dual modalities* – ability to present visual and auditory content
2. *Movement* – ability to present visual content in dynamic formats (animation, video)
3. *Simulation* – ability to create a dynamic and responsive environment for the user

Multimedia enables the content to be presented in dual modalities. Optimal learning with the aid of multimedia is accomplished when related audio materials are used for explaining relevant visual material in a complex context to a novice learner (Clark, 2005).

According to Seljan et al. (2006), CALL should encompass interactive communication. In other words, when doing exercises, the student should be given appropriate feedback. Lauc, Matić and Mikelić (2006) highlight the motivation factor and the temporal factor (less time is spent on preparing materials) as key advantages of CALL. In addition to that, materials can be individualised to suit every learner's needs, and teachers can create the materials themselves.

Dovedan, Seljan and Vučković (2002) consider the Internet as a source of different multimedia activities for SLA. Examples of such activities are: grammar exercises, comprehension reading exercises, writing of abstracts and letters, solving puzzles, vocabulary learning through themed articles, translation between languages. Lauc, Matić and Mikelić Preradović (2007) stress the role of movies, music videos, video games and similar materials in SLA. Warschauer (1996) enumerates a variety of CALL programs and applications for different aspects of language learning (grammar, listening, pronunciation, reading, text reconstruction, vocabulary, writing, comprehension). In addition to that, there are programs such as word processors, concordancers, grammar checkers etc. Hubbard (2009) mentions online dictionaries as an alternative for glossing.

7. Computer Assisted Vocabulary Acquisition

Kavaliauskienë and Janulevièienë (2001) highlight the importance of teaching lexical phrases, such as collocations and expressions, in teaching English for specific purposes (ESP). Key words (high-frequency lexical items) are especially important because they are the basis for general understanding. In order to minimise forgetting, study materials should often be revised. Students can be given various exercises, e.g. they could be asked to fill in the blanks, to match pairs, to sort separate lexical items to form meaningful lexical phrases, to create pictorial schemata which would stand for lexical phrases. Therefore, Kavaliauskienë and Janulevièienë (2001) propose the following steps:

1. checking comprehension of authentic passages
2. providing more practice
3. revision

4. consolidation

Since such lexical phrases usually can also contain lexical items with abstract meaning, their recall can be improved with the application of multimedia learning. According to Paivio, "instructions to use imagery augment recall, especially for concrete language but even for abstract language if conditions encourage participants to concretize abstract words" (2006, p. 6). Due to the type of recommended exercises and need for regular revision, acquisition of lexical phrases would benefit from CALL, i.e. teaching lexical phrases would easily be accomplished with the help of computers. An example of multimedia collocation software will be discussed later in the paper.

Idioms, which are expressions whose component words create a different meaning when combined than when separate, make good candidates for multimedia learning, as well. Such expressions could be presented in form of equations using multimedia symbols. Establishing consistent imagery to present abstract lexical items in multimedia learning would be a prerequisite in such cases in order to avoid confusion.

Tabatabaei and Mirzaei (2014) studied the effect of multimedia glosses on comprehension and idiom learning of Iranian EFL learners. Different types of glosses were used in the experiment: textual, pictorial and textual plus pictorial. The control group didn't use any glosses. Both comprehension and idiom learning were more successful when learners had access to glosses. In addition to that, textual plus pictorial glosses significantly outperformed the other two kinds of glosses in idiom learning, although there was no significant difference in comprehension between the groups who used glosses during reading. However, in both cases, textual plus pictorial glosses aided the learners the most, followed by pictorial glosses, while textual glosses turned out to be the least helpful. It was concluded that language learning can be aided by using computers and multimedia glosses in language teaching, L2 reading comprehension and idiom learning. Furthermore, pictures were more helpful than standalone textual definitions, but pictures accompanied with definitions outperformed other types of glosses due to pictures alone being less explicit and open to interpretation.

Lauc, Matić and Mikelić Preradović (2007) have worked on a multimedia collocation software which uses text, sound and animation. The dynamic mode was used to attract and engage the learner, but also to contribute to the reality of the material. Furthermore, Lauc, Matić and Mikelić Preradović state that "animation of both lexical segments of a collocation gives an impression of connectivity" (2007, p. 497).

Devi (2005) researched the effect of an animated cartoon on teaching phrasal verbs. It is suggested that learners identify and note down phrasal verbs when they are used in the cartoon. This should improve contextual comprehension, but can be impractical to repeat the exercise depending on the length of the animated movie. Learning could be aided by providing cues, e.g. pausing the cartoon after a phrasal verb has been spotted.

8. Second Language Acquisition and e-Learning

Clark defines e-learning as "instruction delivered on a computer that is designed to achieve specific learning goals" (2005, p. 591). It can be asynchronous, which allows students to participate at any time, or it can be synchronous, which requires students to participate at the same time. Furthermore, asynchronous learning can be used for solo or collaborative learning (Clark, 2005).

E-learning encompasses online courses in a virtual learning environment (VLE). According to Seljan et al., "a VLE is a Web-based package designed to help teachers to create online courses, together with facilities for teacher-learner communication and peer-to-peer communication and can be used to deliver learning materials within an institution or within a local education authority" (2006, p. 270). An example is Moodle. Its version Omega will be discussed below.

Another two terms important for CALL are distance learning and blended learning. Distance learning refers to learning individually at a convenient time and place using different resources (resource-based learning), and it is characterised by a certain level of openness regarding time, location, content and pace (open learning). Blended learning combines online distance learning with face to face tutorials (Seljan et al. 2006).

According to Seljan et al. (2006), integrating such forms of learning with language teaching enables delivery of content, target language communication, community building, computer aided assessment (CAA). Moreover, it makes course management easier and more effective and supports collaboration between the participants.

An example of blended learning can be found on Omega. Omega is a customised form of VLE Moodle appropriated for use at the Faculty of Humanities and Social Sciences in Zagreb. The system is used for CALL at the Department of English. Seljan et al. (2006) describe the translation workshop for English language students as an example. Regular lectures are

combined with an online course. The Omega system is used for uploading translation tasks and examples of corrected translations as a form of feedback. A helpful feature is the possibility to set a deadline for uploading assignments. In addition to that, the online course is a valuable source of relevant materials for the course.

9. Other Uses for Computers in Language Learning

CALL has found its application in improving written and oral skills alike. Apart from assisting language acquisition, computers are being used in computer mediated communication (CMC), computer assisted language testing (CALT), online learning and intelligent CALL (ICALL), all of which can be connected to learning languages (Hubbard, 2009).

According to Warschauer (1996), CMC can be synchronous (real-time) or asynchronous (not simultaneous). Moreover, CMC can be both one-to-one and one-to-many communication. Hubbard (2009) notes that CMC can use text, audio or video. It, for instance, includes chat, email, discussion boards and commenting on blogs, and, therefore, allows the learner to employ and improve his knowledge of a particular language in realistic situations, using relevant and contemporary vocabulary, and even to receive feedback from native speakers. Moreover, it seems that it improves "an underlying linguistic competence available to the learner regardless of the modality" (Hubbard, 2009, p. 11).

Hubbard (2009) explains that online learning can include a variety of options for learning with the help of a computer and an Internet connection. It can include independent learning, but it can also refer to several forms of tutoring. For example, the teacher can even combine face-to-face taught classes with online instruction (hybrid or blended learning), and the number of learners can vary from one student to a whole group of people.

The term ICALL refers to a type of computer-assisted language learning still in development, in which the computer functions as a teacher. In order to successfully fill that role, the computer should be able to identify mistakes and give feedback where needed, provide the student with appropriate materials and tasks, which are in accordance with the student's level of proficiency, and interact/converse with the student (Hubbard, 2009).

CALT enables adaptive testing, where question difficulty is adjusted depending on the progress the learner is making in the test. Other benefits include greater security, automatic

scoring and easier question randomisation (Hubbard, 2009). Gunn (1997), as well, views the use of computer in language learning as an opportunity for revising what was previously learned in a language course (e.g. vocabulary and grammar structures). That can be seen as a form continuous assessment, but it also has an instructive and remedial role. Exercises should be relevant and challenging, and they can contain stimulating multimedia material. There are plenty of options to choose from, such as crosswords, word puzzles, written and aural comprehension exercises, quizzes and multi-choice questions (Gunn, 1997).

Rister (2006) highlights several more advantages (and disadvantages) of CALT and online assessment. Apart from the already mentioned feedback, use of multimedia, adaptive assessment, other noteworthy advantages are availability, privacy, reusability, lower cost, efficiency, mass assessment, objectivity and reliability, attractiveness, shared resources, and integration into VLEs. On the other hand, there are disadvantages such as technical difficulties, safety issues, cheating, inflexibility, need for IT knowledge.

Cetinić and Seljan (2011) have evaluated an online multimedia assessment conducted among Croatian students of Italian Language and Literature studying at the Faculty of Humanities and Social Sciences in Zagreb. The research has shown that online testing is more appropriate as a complementary method than as a standalone assessment. Furthermore, it can be best applied to reading with comprehension activities and finding synonyms. In comparison, it is more effective to test the writing skill and the speaking skill separately from the online test and in a traditional manner. The latter was, however, not tested in the research due to requiring additional equipment. Testing the listening skill should involve a video clip with cultural elements in order to achieve greater success, or it should be assessed by traditional methods. In general, participants found online testing easy to use and motivating, and they reacted positively to it.

Moodle[1], as well as Omega, offer the possibility to design a quiz activity module (Figure 2). Some of the question types offered are multiple choice, true-false, and short answer questions. Questions can be re-used due to being stored in a Question bank. Multiple attempts can be allowed, and feedback can be given during or after the test. Tests are automatically marked, but scoring can be customised.

[1] Modular Object-Oriented Dynamic Learning Environment (https://docs.moodle.org/29/en/Quiz_module)

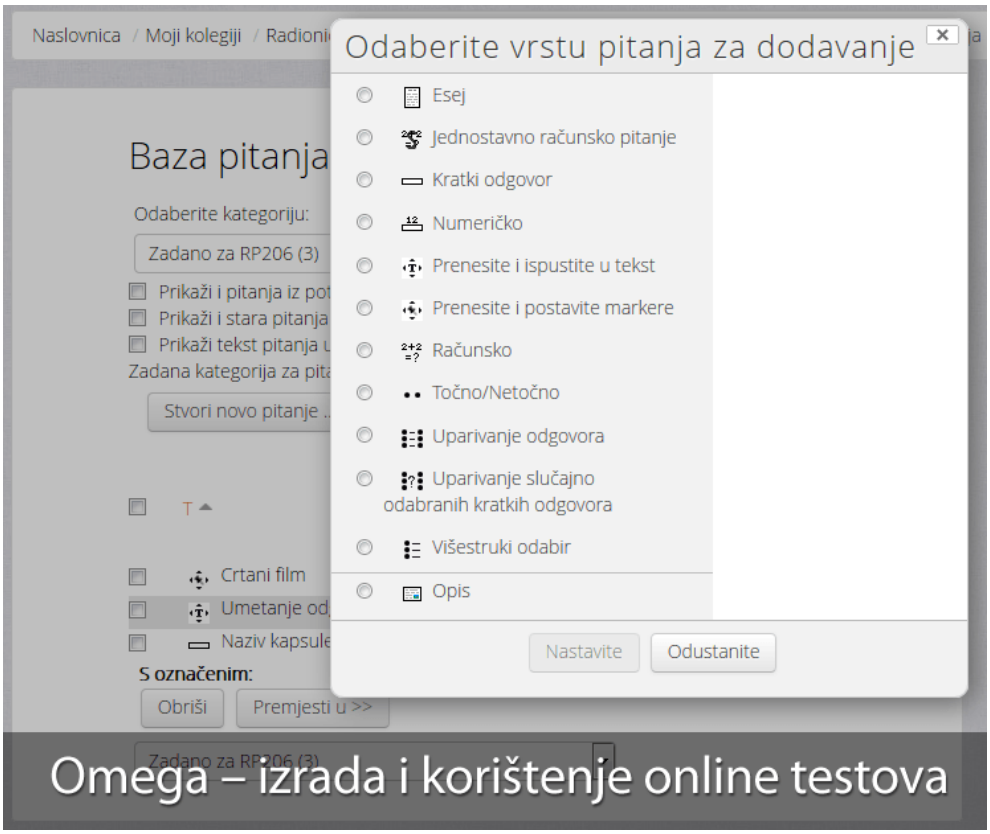

Figure 4. Creating online tests in Omega.

Conclusion

Established theories of cognition connected with the learning process support the use of different modes of presenting learning materials, which can be easily accomplished by the use of computers. From the overview of cognitive theories and guidelines for multimedia design, it is visible that in order for CALL to be successful certain rules need to be adhered to when making materials for language learning. However, individual differences of learners need to be taken into account, i.e. not all principles are applicable to all learners. In addition to that, language learning itself differs from learning other subjects, which means that general principles of multimedia learning need to be tested and, if needed, adjusted in order to aid language learning. CALL is a promising field, and, as it is visible from the examples presented in this paper, there are many attempts at implementing it into traditional language courses. The use of animation accompanied by narration has proved useful for vocabulary acquisition. It can, for instance, be used in glosses. Computers are also useful for assessing knowledge, especially for checking reading comprehension. Moreover, CALL is already, more or less successfully, being used by learners across the world who harness the potentials of the Internet by making use of the materials available online and connecting with other learners, as well as native speakers.

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