

MULTI-FACTORIAL ANALYSIS IN THE DESIGN OF L2 MULTIMEDIA TASKS FOR PRIMARY SCHOOL CHILDREN

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ABSTRACT

L2 multimedia tasks for Primary School children can pose a wide range of challenges for both the language teacher and computer specialist alike. The design of linguistic content and technological adaptation to young learners' and their psychological and physical features make the study of certain factors necessary, such as the educational context, linguistic constraints, cognitive abilities, conceptual and psychomotor restrictions, and so on. This type of questioning approach for the creation of multimedia tasks has led us to analyze learning factors, and devise proposals, in order to deal with these possible linguistic, conceptual and technological demands in the children's learning environment.

General results in the preliminary phases of the study indicate the need to veer the path towards a more adapted means of communicating with children. In the light of these findings, we have devised a set of multimedia tasks for Primary levels which satisfy multi-factorial teaching / learning needs in the L2 context.

This paper is divided into four sections which starts out with a brief introduction to the combination of ICT (Information and Communication Technology) and FL (Foreign Languages) in the context of very young learners, followed by data collection through an analysis of the factors involved, then, the design of multimedia tasks appropriate for primary school children are dealt with, and finally, those conclusions we draw from the information found are presented.

1. ICTs and Foreign Languages for Children

Nowadays, Information and Communication Technology is a common resource used at all educational levels as a way to improve and enrich the teaching process. However, the effective incorporation of ICTs in the classroom, and the suitable use of educational software for early ages, is not exempt from some very important challenges.

In this period, small children have not yet developed all the language and cognitive abilities that older learners have. These circumstances demand an exclusively visual interface from the system, and require, in addition, previous training in the use of computers and input devices, in particular, with the computer mouse and the keyboard.

According to Haugland (2000:12-18), the appropriate use of computers, as well as the educational software implemented, may increase creativity and even self esteem in children. He also claims that children, exposed to software that tends to boost their development, may successfully increase their intelligence, verbal and non verbal skills, visual and movement-related abilities, structural knowledge, long-term memory, problem-solving and decision-making abilities, as well as abstraction and conceptual formation skills.

On the contrary, the uncontrolled use of ICTs in the classroom could provoke a negative impact on children, causing possible rejection or frustration, and, therefore it is a subject that should be properly addressed. In this sense, our research group GEXCALL (Group Extremadura for Computer Assisted Language Learning) works on the development of materials suited to young learners and promotes ICTs in foreign language learning adapted to the specific needs of primary school users.

Our first task was to find out exactly what kinds of resources were being used in the early language learning classrooms in our community, “Extremadura”, situated in a fundamentally rural environment in south-western Spain. As a result of regional governmental policies and funding encouraging computer literacy starting in Pre-School on up, Extremadura has become a leader in Europe with regard to implanting ICTs at this early level (one computer for each two students in Secondary school and one computer for every six-seven Infant /Primary School students).

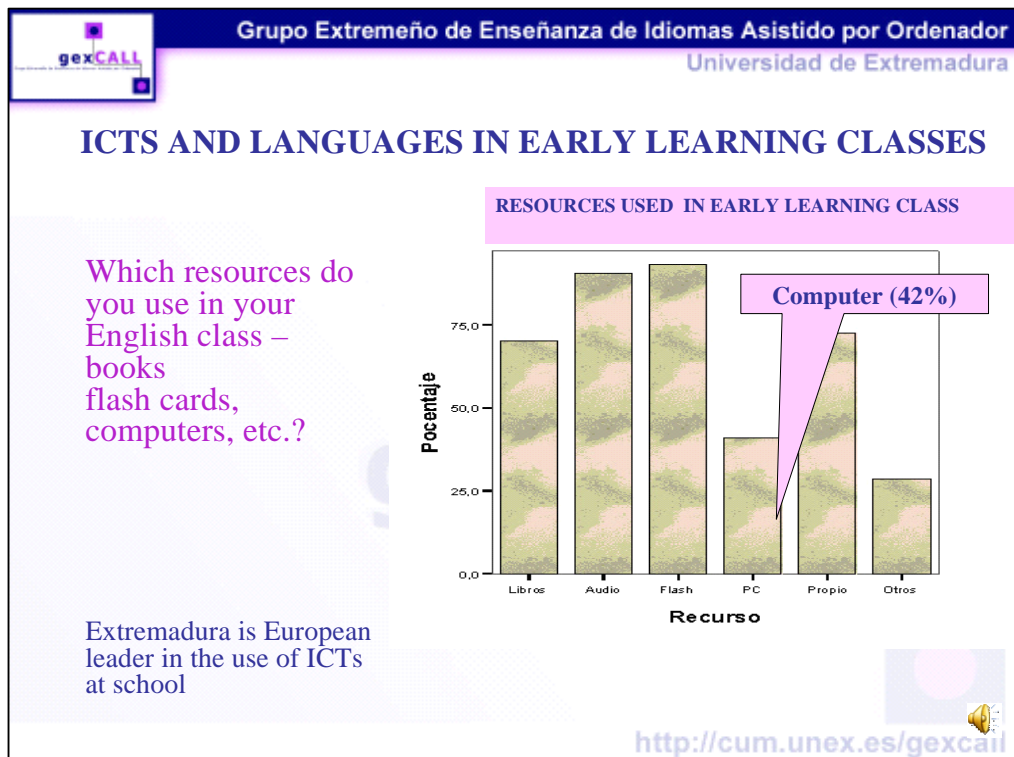


Figure 1

In addition to the traditional resources used and measured by percentage from left to right in Figure 1 are BOOKS, AUDIO MATERIAL, and FLASHCARDS, followed by the new technology resource object of study, COMPUTERS, which reaches a respectable 42% use in foreign language classrooms in Primary Schools in the area under research. We also observe that teachers continue to develop many of their own materials as represented in the second from the last column. The final column pertains to other resources such as games, tales and toys used by primary school teachers of foreign languages.

2. Factor Analysis and Data Collection

Considering the type of users our work is addressing, that is, the creation of multimedia tasks for primary school-aged children, it is necessary to examine some of the learning variables involved, a questioning process which recommends quantitative analysis in order to study the influential factors at this level. There are four main factors identified and dealt with in this section.

2.1. Integration of the computer within the classroom

According to some research experts like Haugland (2000) and Wardle (2000), in addition to our own direct classroom observation, claims are made to the effect that computers should be physically introduced in kindergarten and primary level classrooms in a coherently integrated fashion with all the other educational resources and materials encountered therein, as opposed to the creation of a separate computer room removed from the habitual learning area of the children. Regarding the recommendable student /computer ratio, Haugland (op.cit.) maintains the suitability of having one computer for every seven pupils, at most.

Classrooms for early ages must be organized in such a way as to globally enhance knowledge-building. Specific methodological proposals of classroom organization can include activity corners and collaborative tasks that promote cooperation by means of tools like digital boards and computer stations. Furthermore, in this kind of atmosphere it seems that children activate their cognitive strategies, observe each other, play an active role in the learning process, explore and experiment with everything around them, exercise memory, develop motor skills, and so on. An added bonus is that collaborative work could also encourage the most advanced learners to behave as helpful peer-tutors of those who are not quite as adept.

2.2. Appropriate educative software for early ages

The question of appropriate educative software for early ages obliges considerations surrounding needs and abilities addressing this particular age group. Emphasis on the visual or graphical aspect is a high priority. Such a scope results from our perception of children's demands and preferences in the learning environment, where suitability in terms of graphical characterization, layout, setting, and interface function are direct factors for increasing motivation and interest among young learners.

From our research and in-class observation, it could be stated that the graphical interface should be efficient and effective, highly intuitive and easy to use; the resources and tools must be created to accomplish specific functions with the fewest possible number of steps, that is aim for simplification; and, attractiveness, intuition and familiarity should also be recognizable in the environment in order to stimulate the child's curiosity and interest in learning.

As for the level of knowledge and content presented, educational software must be open and invite exploration in order to increase the child's creativity as well as enhance motivation and commitment. Attitudes of this nature are closely connected to performance when confronted with challenges, stimulated by fantasy, piqued by curiosity and negotiating control.

At this level, in which children do not yet have sophisticated reading and /or writing skills, the oral presentation of instructions plays a leading role. Moreover, appropriate

educational software for the early ages must have the capacity to adapt its content to the special characteristics, specific level and individualized progress of each child. For these reasons, all activities, the interface, software structure, vocabulary, and other ingredients must be tailored to the age of the potential users of the product.

Likewise, a process called scaffolding coined by Chiasson, S. y Gutwin, C. (2005), the hierarchical building of sequential activities for completion, is another key element for calibrated involvement through computer support. Scaffolding could enable young students to reach objectives and educational goals, and make children progressively integrate in the social environment, promote their autonomy, and build new competencies in an expedient fashion.

2.3. Cognitive / Mental Development

Regarding those factors to keep in mind for creating multimedia material for young learners, the importance of the degree of cognitive development should be highlighted. Young learners have difficulties in understanding abstract concepts since they have not yet acquired most of the basic knowledge required for complex conceptualization and intricate information. They in turn, understand visual icons and relate to recognizable items which help them to extend knowledge and meaning. Within cognitive abilities at this age, imagination is instrumental and it plays a leading role. Children are clever at associating learning situations with situations in real life, a quality which can be exploited for learning purposes.

In this sense, most metaphoric proposals should be carefully reserved for higher levels, since at lower stages children tend to expect all the objects to present the proprieties as their real-life counterparts. This does not mean that abstract content must be altogether omitted, a point of view that will be justified a bit further on (see section 3).

In essence, the principle rule of design for content and levels of difficulty is that the software be fully adapted to children's features and cognitive abilities.

2.4. Input devices and computer interaction

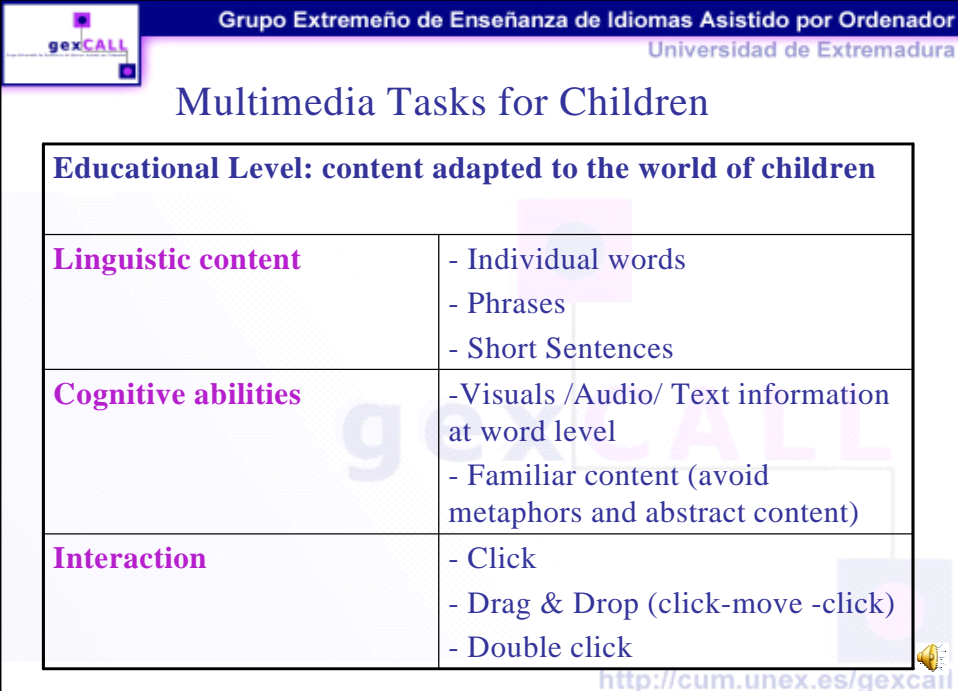
Of special interest in our analysis is the question of dexterity with the computer mouse and interaction with the computer itself. Children's motor abilities, as we know, are developed over time. For this reason they may encounter difficulties in controlling the input device chosen, have trouble selecting specific areas on the computer screen within the application, find holding down buttons on the mouse too hard at first, need development in skills like pressing keys on the keyboard, and so on.

Input options must be efficient and easy to operate in order to create a user-friendly environment. The device selected for interaction with the system is the mouse since it seems to be the most efficient device for this age (Wood 2004). Interaction with the mouse however, must be as simple as possible since a simplified interface is easier for children to deal with. For example, one-click is easier than dragging, or drag and drop, or double-click. As children are learning to use the mouse, operations like "double click" or "drag and drop" require repetition and extended practice. In other words, we need to adapt the use of the mouse in the activities and games to the dexterity children are able to handle. Furthermore, the ability to use the input device is fundamental as it means that the children can go on to tackling the cognitive tasks, whereas failure to handle the interaction device means cutting off the learning process at the root.

3. The Design of Appropriate Multimedia Tasks for Primary School Children

Having reviewed some of the results obtained from factor analysis for the design of multimedia tasks for Primary School, it seems only obvious to state that multimedia tasks should be adapted to the children's level of knowledge and interaction skills.

In order to achieve this goal we propose the need to adapt the educational level of the activities in three fundamental aspects as illustrated on the left in Figure 2, namely, linguistic content, cognitive abilities, and interaction.



Educational Level: content adapted to the world of children	
Linguistic content	<ul style="list-style-type: none">- Individual words- Phrases- Short Sentences
Cognitive abilities	<ul style="list-style-type: none">- Visuals /Audio/ Text information at word level- Familiar content (avoid metaphors and abstract content)
Interaction	<ul style="list-style-type: none">- Click- Drag & Drop (click-move -click)- Double click

Figure 2

- (1) Regarding linguistic content we highlight the careful selection of words, phrases, and as ability levels increase in the child, the inclusion of simple sentences.
- (2) For cognitive abilities the inclusion of mainly visual and auditory information is highly recommended, although textual information at word level is feasible. Metaphorical and abstract content is mostly avoided, and familiar content is thoroughly exploited.
- (3) The type of interaction required, that is, dexterity with the mouse in correctly executing a click, drag and drop, or a double click is carefully monitored.

A specific example, TASK 1, designed for children from 5 to 6 years old, can be seen in Figure 3 as applying some of the aforementioned considerations with regard to adaptation of level, cognitive abilities and type of interaction for the educational competence of first grade children.

TASK 1: 5/6 years

- Language: phrases and short sentences
"What is your name? My name is Thai; I am a turtle...."
- Cognitive development: visual/ audio/ text. Void of abstract concepts
- Interaction: click



Figure 3

Children are presented words, phrases and simple sentences containing vocabulary pertaining to their familiar environment. This information is conveniently backed up with a visual or illustrative framework. Some textual content is represented in captions. The child will click at will on each of the characters, which will in turn, activate the introduction of each and every one of them. Moreover, the child can repeat the action as often as desired.

A second example Figure 4, labeled TASK 2 for the same age group, is a choose-type activity, where similar features to the former task can be observed. Here, the child is prompted to select a character based on features such as name, the kind of animal, and the country of origin.

Through scaffolding, that is, the gradual building of content, various levels are adapted. In Level 1 the animal is simply introduced by name; In Level 2 the animal is introduced by name, and extended to the kind of animal represented; In Level 3 the animal is introduced by name, and scaffolding includes the country of origin.

The idea of country can be considered an abstract concept although we have advocated avoiding this type of content for this age bracket. However, there are several reasons why it has been introduced in this exercise. First of all, we wanted to deal with the concept of cultural diversity as a building process for positive interpersonal relationships of identity. Secondly, diversity is represented in the multicultural reality of classrooms the world over. In Spain, many children are from immigrant families who have recently settled in the country, and in particular in our region, Extremadura, as much as a third of the class may come from other countries (Rodriguez Garcia et.al





2000). We admit that children do not understand the concept of either diversity or country as an adult does, but that they are quite capable of converting the concept to fit into the relevancy of their own little worlds. That is, “country” is somewhere, possibly somewhere far away, but, it is not here in this familiar physical space. Therefore, although the country of origin cannot be grasped in the full context of the word, it is an abstract concept which inherently contains familiarity for children in their current primary school learning situations and it supposes relevant educational content.

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TASK 2: 5/ 6 years

- Language: What is your name? My name is Thai / I am a turtle, I am from China
- Cognitive development: Choose: Visual & audio. No abstract concepts
- Interaction: click-move-click & drag and drop

Graphic Characters	Audio (Level and Language)		
	Level 1	Level 2	Level 3
	"I am Nose"	"I am Nose, I am an elephant"	"I am Nose, I am from Turkey"
	"I am Sese"	"I am Sese, I am a snake"	"I am Sese, I am from Scotland"
		"I am Lupe, I am a stork"	"I am Lupe, I am from Spain"
			"I am Thai, I am from China"

+ Textual Information



<http://cum.unex.es/gexcall>

Figure 4

Finally, and in addition to adaptation of linguistic and cognitive content, motor ability is extended beyond a single click of the mouse by including two new types of interaction, these being: click-move click, and, drag and drop. Training due to the increased complexity of these movements will be provided.

4. Conclusions

The conclusions drawn from the data obtained as a result of the factor analysis carried out can be summarized in the following points:

- (1) The language learning process in the design of L2 multimedia tasks for early ages must be studied in order to tailor designs to meet children’s requirements.
- (2) Multimedia tasks will be adapted to young learners, meaning that the tasks are adjusted so as to consider the children’s cognitive abilities.
- (3) Young learners may not quite be able to understand abstract or metaphoric concepts so these must be carefully selected and presented.
- (4) Early learners might not yet grasp other learning styles as quickly as visual and / or auditory ones so the audio-visual component is favored over others.

(5) Children may not yet have the ability to categorize or accomplish complex tasks such as the ones involving text information, therefore tasks should be simplified, and textual content should be restricted.

(6) As for dexterity with the mouse, the different interaction types (click, click-move-click, and dragging) may require previous training and extended practice in the case of young learners.

Based on the potential advantages derived from the positive attitude children show towards learning foreign languages, the research group GEXCALL aims to design and develop a web-based educational AHS called SHAIEX, whose Spanish acronym stands for Adaptive Hypermedia System for the Teaching of Languages at Early Ages built in Linux. The main objective lies in enhancing language learning at early ages by means of individualized tasks and potential multi-sensorial enrichment. Moreover, evaluation reveals that a key point in the design of the SHAIEX Project obliges the study of this aspect in detail in order to develop an effective teaching-learning system.

We are aware that computer-based evaluation with primary school children can be an extremely intricate process. Such complexity is caused to a great extent by the intrinsic curiosity of the child in those years with multiple distractions during an assessment activity. However, by keeping in mind the factors presented herein, undoubtedly among other considerations that can be made, a successful system can be elaborated to suit their special needs.

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