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Engage students with dyslexia in video-based learning activities

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ABSTRACT

The aim of this paper is to focus reader's attention on “mobile” use of iTunesU and USiena model, as future compensatory tools. Starting from multimedia learning theories, a mobile course model has been designed (USiena model) and the experimental method has been used

to carry out a “pilot study” with 32 dyslexic students. The goal of experimentation was to investigate how iTunesU associated with USiena model influences learning. The experimental hypothesis was that the proposed design solution would favor the contents transmission compared to the "talking book" improving learning and proposing (iTunesU and USiena model) as a possible compensatory tool for the future. Two audio contents have been recorded, two video contents have been produced (with USiena model) and the learning level has been compared. The obtained results confirmed the experimental hypothesis.

Keywords: Mobile, Mobile learning, iTunesU, Dyslexia, Compensatory tool

1. INTRODUCTION

The aim of this paper is to focus reader's attention on “mobile” use of iTunesU and USiena model, as future compensatory tools.

Starting from multimedia learning theories – in particular the Dual Coding theory (Paivio, 1991), the Cognitive Load theory (Chandler and Sweller, 1991), the Multimedia Representations theory (Schnotz, 2001) and the Cognitive Theory of Multimedia Learning (Mayer, 2005) – a mobile model course has been designed (USiena model) and the experimental method has been used to carry out a “pilot study” with 32 dyslexic students.

The experimentation was divided into four experiments. In each experiment, the students used a tape recorder to "listen" a learning content and an iPad (with iTunesU App installed) to "view" a second content (the video has been produced using "mobile course model" designed) . After each experiment, a multiple choice questionnaire has been used to evaluate the learning level. To achieve a direct and immediate feedback from the students, the test ended with an interview.

The goal of experimentation was to investigate how the USiena model associated with iTunesU influences learning. The experimental hypothesis was that the proposed design solution would favor the contents transmission compared to the "talking book" improving learning and proposing (USiena and iTunesU model) as a possible compensatory tool for the future.

Two audio contents have been recorded, two video contents have been produced (with USiena

model) and the learning level has been compared. The obtained results confirmed the experimental hypothesis: iTunesU associated with USiena model facilitated the contents transmission (with an average of 26/30 correct answers) compared to using a tape recorder (with an average of 20/30 correct answers).

In particular the learning level has been influenced by the device used (considering the devices in their generality and considering the device in relation to a specific content) while the other contents showed the same ease of learning / learning difficulties.

2. MATERIALS AND METHODS

Dual Coding theory (Paivio, 1991) shows how the visual and auditory stimuli coming from the outside world, are intercepted by different senses and are processed by our brains differently. There are two coding systems for the processing and representation of the information: a verbal system and a non-verbal system. These systems are divided into subsystems deputies to develop visual, auditory and tactile information. A verbal input matches a verbal output, a non-verbal input matches a non-verbal output. In multimedia learning, according Paivio, these two systems are integrated but are processed separately. The experimental data confirm the hypothesis according to which the memory benefits from the dual coding [4] [5].

The Cognitive Load Theory (Chandler and Sweller, 1991) focuses on the concept of cognitive resources available during task execution, the modality through which these resources are used during learning, the way through which are directed toward specific learning targets (avoiding cognitive overload). The student, to learn, needs to process information by building integrated representations of text and illustrations. Seen that cognitive resources are limited, is only possible to process simultaneously a certain amount of information. Reducing the cognitive load associated with the construction of such representations, are increased the resources allocated to the learning process. From the point of view of multimedia learning, not to excessively overload the brain, is preferable to use various teaching tools rather than just one [6].

The Multimedia Representations theory (Schnotz, 2001) shows that there are two types of representations: external and internal. External representations can be “exclusively” descriptive (verbal symbols as a text) or pictorial (iconic symbols such as images or shapes);

in both cases the representations are associated with a certain content. Internal representations belong to the subjective dimension and coincide with the mental models (or mental images). Mental models can be broken down into simpler symbols (verbal representations) but retain the structural characteristics (pictorial representations); they can take "simultaneously" a descriptive and pictorial nature. Schnotz describes the multimedia learning how the interaction between external and internal representations, emphasizing the nature and role (fundamental) played by these representations in the construction of a multimedia knowledge [7].

According to Richard Mayer, professor of psychology at the University of California, learning requires the "active" participation of the student, through a series of cognitive processes: content selection, content organization in a proper mental representation, content integration with the acquired knowledge. The outcome of this process is the construction of a coherent mental representation, useful for the learning content (concept of "active processing") [8].

The principle known as "multimedia principle" states that "people learn more deeply from words and pictures than words alone" (Mayer 2005, p. 47). However, simply adding words to images is not an effective way to achieve multimedia learning. Then develops a model that takes into account the theories described above. The goal is to create instructional media in the light of how the human mind works. This is the basis for Mayer's Cognitive Theory of Multimedia Learning [9] [10].

This theory proposes three main assumptions: there are two separate channels (auditory and visual) for processing information, each channel has a limited (finite) capacity, learning is an active process of filtering – selecting – organizing – and integrating information based upon prior knowledge. Presents the idea that the brain does not interpret a multimedia presentation of words, pictures and auditory information in a mutually exclusive fashion; rather, these elements are selected and organized dynamically to produce logical mental constructs.

The best way to achieve meaningful learning outcomes is "active learning": the learner is operationally active both cognitively and physically. The main multimedia learning objectives are to "remember" and "understand" (transfer). The first term refers to the ability to play or recognize the presented material, the second term refers to the ability to understand what has been studied.

Many studies have shown that theory is valid and evolving today. For over a decade, Richard Mayer has studied how students learn and the best way to stimulate both channels. He has

used eleven studies to compare whether students learn better from animation and narration alone or from text and illustrations versus text alone [11].

Mayer, starting from experimental evidence, proposes some basic multimedia learning principles (first six and currently ten) divided by action areas [12] [13].

Reducing Extraneous Processing

1. Coherence Principle: people learn better when extraneous material (words, pictures and sounds) are excluded from a multimedia lesson rather than included.

2. Signalling Principle: people learn better when cues that highlight the organization of the essential material are added.

3. Redundancy Principle: people learn better from animation with narration than from animation with narration and text except when the onscreen text is short, highlights the key action described in the narration, and is placed next to the portion of the graphic that it describes.

4. Spatial Contiguity Principle: people learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.

5. Temporal Contiguity Principle: people learn better when corresponding words and pictures are presented simultaneously rather than successively (i.e. the words are spoken at the same time they are illustrated in the animation).

Managing Essential Processing

6. Segmenting Principle: people learn better when a narrated animation is presented in learner-paced segments rather than as a continuous presentation.

7. Pre-training Principle: people learn better from a narrated animation when they already know the names and characteristics of essential components (main concepts).

8. Modality Principle: people learn better from graphics with spoken text rather than animation and on-screen text.

Fostering Generative Processing

9. Multimedia Principle: people learn better from words and pictures than from words alone. This allows people to build connections between their verbal and pictorial models.

10. Personalization Principle: people learn better from a multimedia lesson when words are in conversational style rather than formal style. If people feel as though they are engaged in a conversation, they will make more effort to understand what the other person is saying.

2.1. SPECIFIC LEARNING DISORDERS

Specific Learning Disorders (SLD) are neurodevelopmental disorders that depend on the different operating modes of neural networks involved in reading, writing and calculation processes [1]. Depending on the type of specific disorder involved, SLD are divided into

- dyslexia: specific reading disorder that manifests as a difficulty in decoding the text;
- dysorthography: specific writing disorder that is manifested by a difficulty spelling and phonographic competence;
- dysgraphia: specific handwriting disorder that manifests as a motor difficulty in the writing ability;
- dyscalculia: specific disorder related to the numerical and calculation skill, which is manifested by a difficulty in understanding and working with numbers.

It is important to underline the fact that the SLD are not a disease, are not caused by sensory deficits or by a deficiency of intelligence, not dependent on psychological or environmental problems. They relate to the ability to read, write and calculate quickly and correctly.

Normally these abilities develop automatically, while a boy with learning disorders these skills require much effort, with learning outcomes sometimes deficient. In Italy these disorders, which occur with the onset of schooling, affecting 3-4% of the population. A dyslexic boy, for example, can read and write but must use its mental and physical energy: get tired quickly, gets distracted, can make mistakes and can constantly feels in difficulty [2].

Experimental research showed that, to improve the learning level, course materials must be presented through different formats. Basically, in addition to teachers and students are added languages and different types of sign, typical of multimedia environments. All approaches consider the multimedia learning as an “active” information processing, which are showned in multiple formats [3].

Multimedia technologies allow to replace the standard learning scheme “face to face” with a new type of learning that can be blended (mixed) or completely online (e-learning). The

teacher's role is not only to transmit knowledge: mediating between students and technology, the lecturer becomes a facilitator of knowledge.

The lecturer must choose the most appropriate instrument, since the instrument changes the teaching model (ie the teaching approach).

2.2. ITALIAN LEGISLATION

12 July 2011 were signed the "Implementing decrees" [14] of the law n. 170 of 8 October 2010 [15] and with them the "Guidelines for the right to education of school pupils and students with Specific Learning Disorders" [16].

A boy can be helped to study using some "compensatory tools". Beware though, these instruments should not be seen as something that serves to emphasize a diversity, but as objects that allow students to "do better" and "with less effort" particular activities. These tools are useful both to compensate for the difficulties of the boys, but also to enhance their abilities and their potential.

The same law n.170 art. 5 paragraph 2b, talking about "educational and didactic measures of support", stresses the importance of the introduction of compensatory tools, including alternative means of learning and computing technologies, to which are added the dispensatory measures toward those school activities deemed "non-essential" for the concepts quality to be learned.

History has taught us that the evolution of compensatory tools has allowed to improve the "quality of life" of the human race. Anyone using these tools, eyeglasses, transportation, household appliances, pens – which are used mainly as a storage medium – are just a few examples.

Among the identified compensatory tools we can remember computers using speech synthesis programs for reading documents, calculators, mental and conceptual mapping, formulas tables, digital dictionaries, audio recorders, spoken book.

The universities, as stated in paragraph 6.7 of the guidelines for the right to education of students with Specific Learning Disorders, must make available to students diagnosed with SLD both the facilities that the tools eventually already used in high schools: recording of lessons, use of texts in digital format, speech programs, other technological facilitation tools (in the study and examination phase).

Is in this context that we can frame the present work.

2.3. WHY MOBILE?

The present work is part of a larger project that involved the design and publication of the "iTunesU Siena" platform [17], followed by the design of a prototype mobile course - as a form of traditional teaching support for students.

Why a mobile course? Because mobile has become the preferred mode for internet access.

According to research published in 2014 on Msoft.it site, 40% of italians own a smartphone (the percentage rises to 66% if under 30 are considered), 22 million italians connected to the web from smartphones and 7 million by tablet (out of a total of 39 million connections), 2 of 3 italians operate regularly on the internet and 1 of 2 does it from mobile [18]. Another study conducted in Italy in March 2014 by Audiweb shows that on an average day italians between 18 and 74 who use the web are about 20 million and of these about 75% are using a mobile device [19]. Audiweb is a Joint Industry Committee, which detects and distributes data of internet audience in Italy offering to the market objective data, quantitative and qualitative, on the use of the medium.

The report provided by Apple ™ in 2015 - access to the "iTunesU Siena" platform (visitors by device) – provides further evidence of "mobile" use iTunes: 82% of the accesses occurred from a mobile and 18% from a consumer desktop (figure 1).

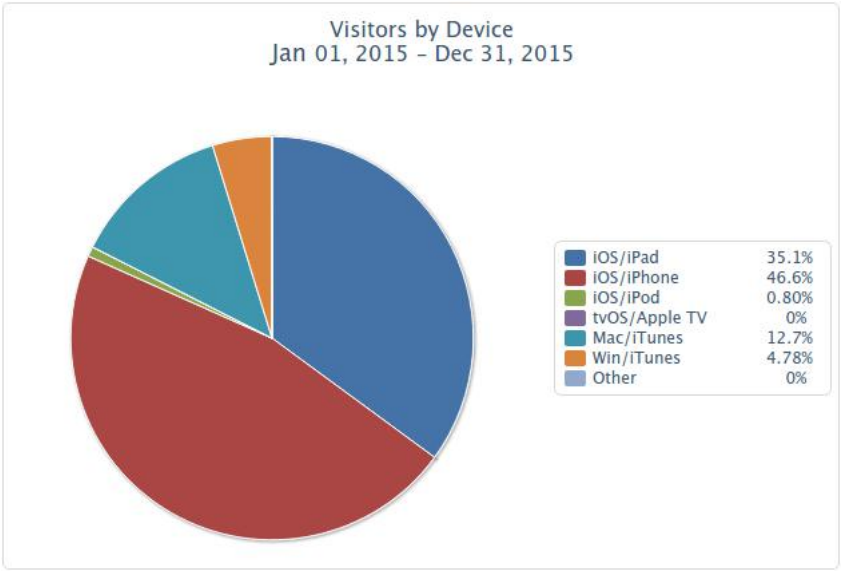

figure 1 - Accesses to the iTunesU Siena platform - 2015 (University of Siena source)

2.4. THE EXPERIMENTAL METHOD

The experimental method is the basis of investigations and research in science and can be described through four basic stages: observation (the researcher observes the phenomenon under study), hypothesis (a possible explanation of the observed phenomenon is proposed), testing (experimental verification of the hypothesis; the experiments have to be produced under controlled and repeatable conditions), theory and/or law (if the experimentation confirms the cause-effect relationship, the hypothesis becomes law and is recognized as a theory).

The phenomena to be studied can be represented by different events and considered in their complexity. When experimentally studying an event, a part of its complexity must be eliminated: this process involves taking the phenomenon and turn it into one or more variables.

The "variable" term indicates a condition (attribute or feature) of an event (or a person), which varies depending on situations (or individuals). It is therefore a feature that, at least theoretically, can be measured.

The experimental method is characterized by the relationship between the "independent variable" and the "dependent variable". The independent variable is a stimulus (or behavioral event) that generates changes on the dependent variable. The dependent variable is the variation of certain behaviors that are supposed to depend from modifications to the independent variable. In summary, the independent variable is manipulated by the experimenter and is the cause of the dependent variable, the dependent variable is affected by the changes implemented on the independent variable.

At the base of an experiment there is always its design, which determines its characteristics: the experimental design. The experiments can be "between subjects" (comparisons between subjects) and "within subjects" (comparisons between the different manifestations of the same variable).

During the experiment, in an artificial and controlled way, the phenomenon under study is reproduced. The researcher manipulates the independent variable in order to discover the effects on the dependent variable. The purpose of the experiment is to validate (or refute) the hypothesis formulated by the scientist, hypothesis whose purpose is to explain the mechanisms behind the phenomenon.

3. MOBILE COURSE MODEL

The present paper – being a feasibility study – has been very useful to define the experimental methodology, the type of content to produce (adjusted according to the specific target audience), the interaction aspects and the model to be adopted.

A mobile course model has been designed using the User-Centered Design (UCD) methodology - starting now USiena model - and the experimental method has been used to carry out a "pilot study" with 32 university students with dyslexia.

The UCD is a working method in which – at every stage of the design process – the designers pose the greatest attention to the “point of view” and the “needs” of the end users. Is a process consisting of several activities and is based on the iteration of different analysis, design and verification tools.

Students have been involved in a participatory planning, to define the mobile model course (today's students design the course for the tomorrow's students). The most significant aspects of the design were:

- the course will have a modular structure (this will allow lecturers to add, edit and remove the single module without altering the course structure);
- each module will contain only a specific topic;
- each module will have a maximum length of 10 minutes;
- for each module will be made available audio, video and PDF contents;
- each video content will begin with a concept map concerning the topic of the module;
- in all video contents will appear – simultaneously and permanently – the lecturer who explains (on the left, in a small box) and the slides used during the lesson (on the right, to reinforce the concept shown);
- when the lecturer explains a specific concept contained in the slide, some “highlights” will be used to attract the student’s attention on that specific point;
- for each course will be produced an initial “Welcome” video (illustrating the content of the collection), a “Getting started” video (outlining the learning environment and the modules that will be contained), a series of videos related to “Tests in process” (the student directly verify his learning level).

Regarding the video format used (figure 2) a prototype module was produced, in which appeared – simultaneously and permanently – both the teacher when explaining (on the left, on a smaller scale) and the textual part (right, to reinforce the concept shown). Also, when the teacher outlining a specific concept content in the slide, some "highlights" were used to attract the student's attention on that specific point.

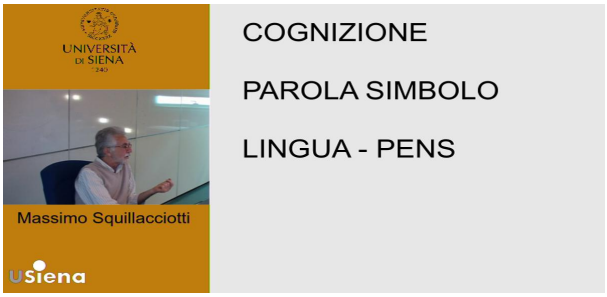

figura 2 – Format video (University of Siena source)

In the analysis and content design phase – in addition to students indications – information, directions, news and guidelines available at the web sites of associations, institutions and national organizations were considered [1], [2], [20], [21].

With regard to the contents readability:

- capital letters will be used (less tired the view and is easier to read);
- bold will be used (to highlight the keywords and the most important concepts);
- colors will be used (to group concepts and contents related to each other);
- "Optima" font will be used (sans-serif font – like Optima, Verdana, Georgia, Arial – are easier to read);
- a "50" points type size will be used – for example if a 12-point body may be acceptable to the Verdana capitalized, for other smaller types of fonts you need to use at least one body 14/16 points;
- the double-spacing will be used (for readability, sufficiently space the rows);
- headers paragraph will be used (especially if the text is very long);
- left alignment will be used (avoid the justified alignment because saccadic movements are not helped by variable space between words);

- words will not be broken (if is necessary to break lines);
- after each point of suspension will wrap (paragraphs).

With regard to text and content organization:

- concept maps and diagrams will be used;
- each module will begin with a concept map;
- the schemes will be used to help the student to mentally represent what he read;
- the material to be studied will be divided into small parts (giving to each of them a meaning);
- 100 characters (maximum) per page will be used (avoiding too long texts);
- the information will be grouped in thematic blocks;
- text will be written using a "typewriter" effect (one character after the other with a wait of about two seconds between one letter and another);
- in addition to the text, even images and tables will be used (in a clear and straightforward way) but avoid "cluttering" the pages with too much content;
- the keywords will be written one per line, with a maximum of 5 lines (so as not to divert student attention from watching videos);
- a simple vocabulary will be used (according to lessons content and age of learners);
- short statements will be used (preferring the coordinates to the subject);
- the indicative mood and the active form will be used;
- double negatives will not be used;
- sentences with too many pronouns will not be used (need inferences and increase the cognitive load).

4. THE EXPERIMENTATION

The task assigned to students was to listen and view a learning content, extracted from an undergraduate course teaching, evaluating the learning level through a multiple choice questionnaire.

The goal of experimentation was to investigate how the USiena model displayed through iTunesU influences learning. The experimental hypothesis was that USiena model would favor the contents transmission compared to a lecture recorded on audio file and listened with a tape recorder (similar to spoken book), improving learning and "proposing" (iTunesU) as a possible compensatory tool for the future.

From “Anthropology of education” course, “Teaching methods in higher education” lecture was chosen. From this learning content two concepts were extrapolated: “The book method” and “The cognitive method”. Then, using the mobile model course designed, two audio and two video content were produced.

Were involved in the experimentation 32 university students with dyslexia (16 males and 16 females) – aged between 21 and 25 years – attending degree courses in economics, law and the humanities and social sciences.

Four “between subjects” experiments were performed in a mobile perspective (an outdoor area near the university building). Students involved in each experiment were 8. Subjects were invited to speak loudly – preferably expressing doubts and misgivings – to videotape the interaction. Students were informed that the answers to their questions would be given only at the end of the test (not to influence them).

Each student used an tape recorder (to hear a learning content) and an iPad with iTunesU App installed (to view the other learning content). Students were free to stop listening or watching, to better deepen the concepts they did not understand. The independent variable is the compensatory tool used, while the dependent variable is the quality of answers given by students at the end of the experiments (learning level).

In the first experiment, the iPad has been used to study "The book method" concept (USiena model) and the tape recorder to study "The cognitive method" concept (Sparring model). In the second experiment, the tape recorder has been used to study "The book method" concept (Sparring model) and the iPad to study "The cognitive method" concept (USiena model). In the third experiment, the iPad has been used to study "The cognitive method" concept (USiena model) and the tape recorder to study "The book method" concept (Sparring model). In the fourth experiment, the tape recorder has been used to study "The cognitive method" concept (Sparring model) and the iPad to study "The book method" concept (USiena model).

Table 1 summarizes the experimentation:

Experiment 1	Experiment 2	Experiment 3	Experiment 4
book (usiena) vs cognitive (sparring)	book (sparring) vs cognitive (usiena)	cognitive (usiena) vs book (sparring)	cognitive (sparring) vs book (usiena)
Legenda: book = "Book method" concept cognitive = "Cognitive method" concept usiena = "USiena" model (iPad) sparring = "Sparring" model (tape recorder)			

Table 1 – Experimentation (University of Siena source)

After each experiment, a multiple choice questionnaire with sixty questions (thirty for "Book Method" concept and thirty for "Cognitive method" concept) has been used – to evaluate the learning level. To achieve a direct and immediate feedback from the students, the experimentation ended with an individual interview.

5. RESULTS

This work, although was only a pilot study, showed surely interesting results. Table 2 shows – for each experiment – the total number of correct answers given by the students.

Experiment 1			**Experiment 2**		
subject 1	book(usiena): 27	cognitive(sparring): 19	subject 9	book(sparring): 21	cognitive(usiena): 25
subject 2	book(usiena): 24	cognitive(sparring): 17	subject 10	book(sparring): 18	cognitive(usiena): 23
subject 3	book(usiena): 28	cognitive(sparring): 21	subject 11	book(sparring): 21	cognitive(usiena): 26
subject 4	book(usiena): 26	cognitive(sparring): 20	subject 12	book(sparring): 21	cognitive(usiena): 26
subject 5	book(usiena): 25	cognitive(sparring): 20	subject 13	book(sparring): 19	cognitive(usiena): 24
subject 6	book(usiena): 27	cognitive(sparring): 19	subject 14	book(sparring): 20	cognitive(usiena): 23
subject 7	book(usiena): 28	cognitive(sparring): 21	subject 15	book(sparring): 22	cognitive(usiena): 25
subject 8	book(usiena): 26	cognitive(sparring): 20	subject 16	book(sparring): 23	cognitive(usiena): 25
Experiment 3			**Experiment 4**		
subject 17	cognitive(usiena): 26	book(sparring): 19	subject 25	cognitive(sparring): 20	book(usiena): 26
subject 18	cognitive(usiena): 27	book(sparring): 20	subject 26	cognitive(sparring): 21	book(usiena): 25
subject 19	cognitive(usiena): 26	book(sparring): 18	subject 27	cognitive(sparring): 20	book(usiena): 27
subject 20	cognitive(usiena): 25	book(sparring): 18	subject 28	cognitive(sparring): 22	book(usiena): 27
subject 21	cognitive(usiena): 27	book(sparring): 21	subject 29	cognitive(sparring): 19	book(usiena): 25
subject 22	cognitive(usiena): 25	book(sparring): 20	subject 30	cognitive(sparring): 19	book(usiena): 26
subject 23	cognitive(usiena): 24	book(sparring): 19	subject 31	cognitive(sparring): 20	book(usiena): 25
subject 24	cognitive(usiena): 26	book(sparring): 20	subject 32	cognitive(sparring): 21	book(usiena): 26

Legenda:

book = “Book method” concept

cognitive = “Cognitive method” concept

usiena = “USiena” model (iPad)

sparring = “Sparring” model (tape recorder)

Table 2 – Correct answers (University of Siena source)

Based on these data, for each experiment, the average value of the results obtained by the students was calculated, considering the device used and the assigned task (Table 3).

	book			cognitive			usiena			sparring		
	A	M	SD	A	M	SD	A	M	SD	A	M	SD
Experiment 1	26	27	1.41	20	20	1.30	26	27	1.41	20	20	1.30
Experiment 2	21	21	1.60	25	25	1.19	25	25	1.19	21	21	1.19
Experiment 3	19	20	1.06	26	26	1.04	26	26	1.04	19	20	1.04
Experiment 4	26	26	0.83	20	20	1.04	26	26	0.83	20	20	1.04
Legenda: A = Average					M = Median				SD = Standard Deviation			

Table 3 – Average, Median and Standard Deviation (University of Siena source)

Table 4 shows, for each experiment, the graph relative to average values listed in the table above.

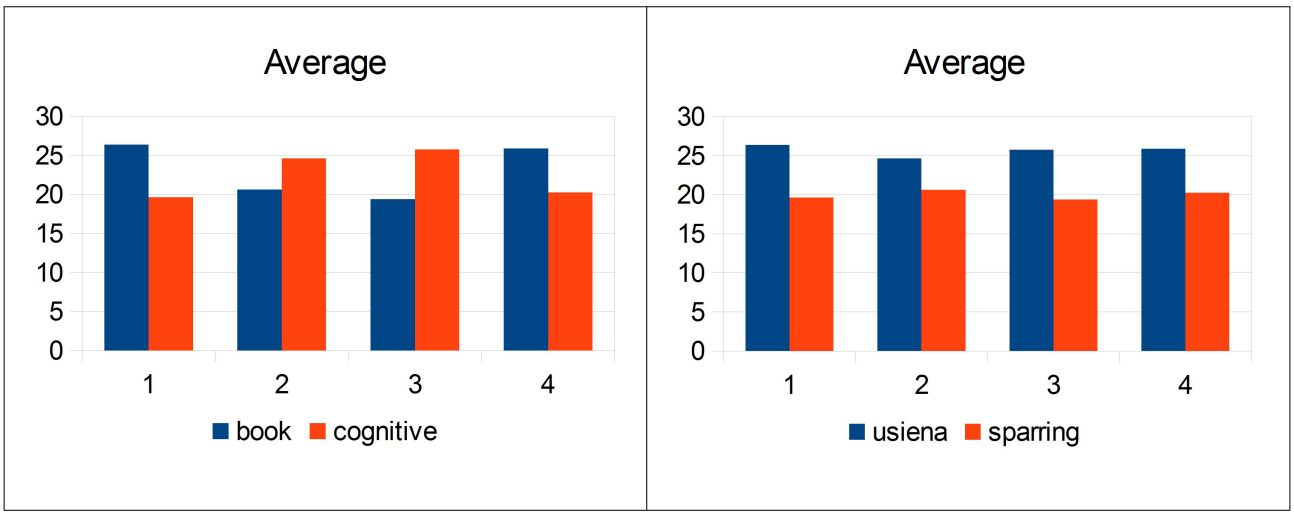

Table 4 – Average values for experiment (University of Siena source)

On the values obtained from 32 subjects (Table 2), the Wilcoxon Signed Rank Test was applied. Comparing the values of the variables within the same experiment, the test results were all significant (Table 5).

	book vs cognitive	usiena vs sparring
Experiment 1	V = 36, p-value = 0.01356	V = 36, p-value = 0.01356
Experiment 2	V = 0, p-value = 0.01298	V = 36, p-value = 0.01298
Experiment 3	V = 36, p-value = 0.01356	V = 36, p-value = 0.01356
Experiment 4	V = 36, p-value = 0.01356	V = 36, p-value = 0.01356

Table 5 – Wilcoxon Signed Rank Test (University of Siena source)

Comparing the value of a variable between the four experiments, 10 significant and 14 not significant results were obtained. For example, the values obtained with the "Tape" device are reported (Table 6).

	sparring
Experiment 1 vs Experiment 2	W = 19.5, p-value = 0.196
Experiment 1 vs Experiment 3	W = 37.5, p-value = 0.5854
Experiment 1 vs Experiment 4	W = 24.5, p-value = 0.4432
Experiment 2 vs Experiment 3	W = 48, p-value = 0.09643
Experiment 2 vs Experiment 4	W = 38, p-value = 0.5531
Experiment 3 vs Experiment 4	W = 18.5, p-value = 0.1561

tabella 6 – Wilcoxon Rank Sum Test (fonte Università di Siena)

Table 7 shows the experimentation results, obtained by crossing between them the average value of correct answers given by 32 students (Table 2) – for each device and for each content.

book: 23	usiena: 26	book (usiena): 26	book (sparring): 20	cognitive (usiena): 25	cognitive (sparring): 20
cognitive: 23	sparring: 20	cognitive (sparring): 21	cognitive (usiena): 26	book (sparring): 20	book (usiena): 27
Legenda: book = “Book method” concept cognitive = “Cognitive method” concept usiena = “USiena” model (iPad) sparring = “Sparring” model (tape recorder)					

Table 7 – Results of experimentation (University of Siena source)

6. CONCLUSIONS AND DISCUSSIONS

The aim of this paper is to focus reader's attention on “mobile” use of iTunesU and USiena model, as future compensatory tools. The experimental hypothesis was that the proposed design solution would favor the contents transmission compared to the "talking book" improving learning and proposing (USiena and iTunesU model) as a possible compensatory tool for the future. Two audio contents have been recorded, two video contents have been produced (with USiena model) and the learning level has been compared.

The obtained results confirmed the experimental hypothesis (table 7): iTunesU associated with USiena model facilitated the contents transmission (with an average of 26/30 correct answers) compared to "talking book" (with an average of 20/30 correct answers).

In particular the learning level has been influenced by the device used (considering the devices in their generality and considering the device in relation to a specific content) while the other contents showed the same ease of learning / learning difficulties (table 7).

The main results obtained from the final interviews can be summarized as follows:

- 30 of 32 students positively evaluate the learning experience with iTunesU;
- 27 of 32 students report a good “personal satisfaction” using the application;
- 26 of 32 students report that their expectations about mobile model designed course are satisfied;

- 20 of 32 students emphasize the importance of the teacher's choice (by dialectics, diction and clarity point of view);
- 27 of 32 students believe that iTunesU can be used as a compensatory tool (essential are the contents that will be memorized).

ITunesU associated with USiena model, can be considered as future compensatory tools? Difficult to answer at this time. Certainly the experimental evidence emerged, suggests an affirmative answer to the question. Obviously is necessary carry out other experimentations, in particular by comparing the students learning level - using this mobile device and in absence of compensatory tools.

A very important aspect is the students perception, obtained in the final interview. Student feedback has been very positive, especially considering the "course model" and the "video format" designed. Just for information purposes we report the case of a student who, after listening to the audio content (assigned task), also asked us to view the video content.

What future steps we can identify?

Surely pass by a feasibility study like this to produce a complete mobile course, evaluating the learning levels "without" and "with" the instrument support. Of course to develop audio-video content is essential to involve students in a participatory planning.

For this purpose we can identify six Work Packages (WP):

- identify a specific different skill (designing contents for the visually impaired is very different from designing contents for the deaf);
- carry out a needs analysis based on the users identified above;
- identifying a specific common interest teaching;
- involve users in a participatory planning to assess whether the proposed format can be used (or a redesign is required);
- engage teachers in a participatory planning to implement a holistic-visual didactic (based on visual stimuli, concept mapping at high visual value, clues or key terms to help the students to retrieve the stored information);
- involve the lecturers with strong dialectical skills (tone of voice, diction, metric); in this regard the lecturer could follow a training course "ad hoc".

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