

DOCUSCHEMAS: EXPERIENCING WITH A MULTIMEDIA TOOL FOR SUPPORTING HIGHER EDUCATION

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Abstract

The use of multimedia technology contributes to elevate the quality of the learning process, as interacting with a multimedia program complements and reinforces the learning. In this work the Docuschema was the multimedia tool we developed for our experiment, this was carried out with students in an Information Systems course at two Universities of the Chiapas State, Mexico. Our research hypothesis was that Docuschemas, when used for supporting a learning process, offer a clear structure in the declarative information, facilitating its recording in the student's memory. We have also paid special attention to the more human aspects involved in the use of Docuschemas, collecting data about students and teachers reactions to the Docuschemas, and not basing our conclusions on academic results exclusively.

Keywords

Multimedia, technology, tools, learning process, Docuschema, experiment, higher education.

1. INTRODUCTION

The multimedia technology is widespread in higher education, many courses being already in use and delivered to learners. The multimedia technology contributes to elevate the quality of the learning process, as interacting with a multimedia program complements and reinforces the learning [4].

The technology has radically changed the form to interact and obtain information, but in the educative systems this is not sufficient [10]. It's necessary not only transmit information but also obtain the effective assimilation of the knowledge.

In this work the *Docuschema* was the multimedia tool we developed for our experiment. Actually, this was the motivation for our work: testing in a real environment this new paradigm. The experiment was carried out with students in an Information Systems course at two Universities of the Chiapas State, Mexico. The participants were randomly divided in two groups, one taught in a traditional manner and the other taught with *Docuschemas*.

Our aim by conducting this experiment was researching on the supposed benefits of the use of *Docuschemas*. Finally, in this work we have also paid special attention to the more human aspects involved in the use of *Docuschemas*, collecting data about students and teachers reactions to the *Docuschemas*, and not basing our conclusions on academic results exclusively.

2. CONCEPTUAL MODEL DESCRIPTION

Basically, a *Docuschema* is a multimedia-based tool for e-learning. It is a conceptual tool that involves the careful design of a learning model, based on cognitive and pedagogical principles [1], followed by a comprehensive analysis of the different technological alternatives to implement it [2]. The main objective of the *Docuschema* is the use of multimedia elements as the most important vehicle for conveying contents, instead of text. As sight is the most important sense in humans, an only image filling all the space of contents in the multimedia page will be more easily assimilated. With respect to the type of image to use, we have chosen the schema because it gives bigger freedom for organizing and exposing

ideas. In addition, a schema denounces the structure of the displayed contents, making it easier the creation of a network or concepts in the brain of the student.

Once the student gets the node, the initial schema is kept on the screen for a few seconds, for the student to familiarize with it. Afterwards, audio begins the explanation of the general ideas in the schema, and introduces the exposition of the first important concept. Then that concept is fully explained by means of a several minutes long video or animation, and the sequence begins again: another audio segment, linking the end of this partial exposition with the beginning of the next one, followed by a video or animation. When all the concepts in the schema have been explained, the presentation is over. Let's conclude this brief summary of the Docuschema's principles with a list of its main cognitive advantages:

- It is both, a schema/summary of the contents and the contents themselves, at the same time.
- Conveys a clear structure in the declarative information, facilitating its recording in the student's memory.
- Stimulates the perceptive system of the learner, emphasizing the important concepts.
- Contributes to increase student's motivation and interest.

3. THE EXPERIMENT

3.1 Experimental hypothesis

In general we tried to study the pedagogical validity of Docuschemas. In relation with the students, we expect to obtain empirical evidence of the improvement that the use of Docuschemas supposes in the comprehension and retention of the thematic contents, as well as to evaluate a possible improvement in the integration of knowledge. From the teachers we expect to know how they develop with this conceptual tool and know how suitable in its educational work.

Our research hypothesis of this experimental work has been expressed of the following way: *Docuschemas, when used for supporting a learning process, offer a clear structure in the declarative information, facilitating its recording in the student's memory. Furthermore, they stimulate the perceptive system of the learner, emphasizing the important concepts, and contributing to increase the student's motivation and interest and are useful to the teachers in his educational work*".

3.2 The random sample

The public universities of the south of Mexico are characterized to have little budget destined to the educative innovation, the University of Chiapas and the Tuxtla Gutiérrez Institute of Technology are both, representative public institutions of higher education of Chiapas state.

Our election to work with these two institutions was not a trivial process, the university degrees of Computer Systems, are the only common degrees that are imparted in both institutions. We analyse that the physical conditions such as laboratory and bibliographical materials were equal for both institutions. In the same form, the curriculum maps of the degrees are similar in an 80%. With this information we select the subject: *"Design and implantation of Information Systems"*, because the similarity of contents in the subjects (in both institutions) was a key factor for taking decision in the planning of this work.

The sixth semesters were the universe of students from whom the random sample was taken. We had special care that the selected random sample kept an equivalent proportion with regard to sexes of the represented in the original groups.

We worked with 48 students in the experimentation group, of which 29 are men and 19 women, this random sample is representative with regard to the proportion of men and women of which the original groups are formed. Also the control group was formed by 53 students.

3.3 Characteristics of the chosen subjects

Fundamental part of the degree in computer systems is the subject *Design and implantation of Information Systems*, because its main objective is that the students know and understand the techniques

of analysis and design of systems to apply them in a innovating form, in the development of computerized information systems.

During the course each student puts in practice the knowledge acquired by means of the analysis and development of a information systems project, that supports the transformation of the processes of some real business company.

The experience of the teachers with the courses in previous years was determining for the election of these subjects, since they are those that as much present negative degree of incidence in the evaluations as in failures in the final projects. Additionally to these reasons, the subjects were chosen given their feasibility of being transformed into schemes and being enriched with diverse examples, which are the principles of the Docuschemas.

3.4 Procedure

The experiment was planned and carried out during two months. The work sessions were organized so that each group of experimentation worked with Docuschemas two hours per week in the laboratories. We decided that the lectures were equal for both groups (experimentation and control) and the Docuschemas were used like support material. We introduce this variant in the experiment to isolate the possibility of any type of idea attributed to the substitution of the figure of the teacher in the classroom.

3.5 The measurement tools

With the purpose of capture a complete registry of all the data and incidents that arose during the experimentation process, we used and adapted to the specific characteristics of the experiment, a set of tools designed and grouped by [6][7], basically they are: evaluation matrix, anecdotal record form, implementation log, questionnaire, user interface rating form, evaluation report sample.

4. RESULTS

4.1 Observations during the accomplishment of the experiment

During the work time with Docuschemas a series of observations for teachers was made, we summarized here most significant.

Selection of the sample

In the process of selection of the random sample, those that were not selected were disappointed and showed their displeasure with commentaries and attitudes such as the curiosity, since they approached the laboratories in working hours in order to investigate what it was. In future works of experimentation this factor will be considered and we use a different model that allows both groups to participate in the experimental process and at the same time to be able to discriminate the results of an effective form.

Initial attitudes

In the initial session and during the explanations phase , 80% of the students showed lack of interest since it's a subject that becomes much difficult to them, his first explorations were passive and without consulting doubts. The interest was increasing as they were interacting with the tool. This must to that when a subject becomes difficult to them they prefer to evade it and to be disinterested.

Restrictions

With the purpose of isolating any possibility of mixture of the groups, and this form to measure with all precision the effect of Docuschemas, we restrict to obtain copies of Docuschemas, in spite of, we detected three students tried to copy in a CD the information.

Time

Although initially the students showed disinterested attitudes and tried to evade the subjects, and that the conditions of schedule and climate was unfavorable, this wasn't a limitation to catch their attention, their interest was increasing when they discovered that the Docuschemas's interaction was easy, they were

surprised with the tool for subjects that normally are to them little attractive. The integration of data, voice and image capture their complete attention, this could be verified in the fact that they did not notice of the passed time although they always leave hurriedly to reach the last bus of the night turn.

4.2 Cognitive increase

The cognitive increase was valued on the basis of comparative results of exams and the final project of the groups of experimentation and control.

Exams

The experimental group obtained an average of 8,5 in the final evaluations. The control group obtained an average 7. This supposes a cognitive increase of a 15% between both groups.

Final project

As he were mentioned in section 3,3, during the course each student puts in practice the knowledge acquired in the analysis and development of a project of information system. This project is evaluated at the end of the course and we observed that 75% of the experimental group reflected in the final project the effective application of the new concepts acquired in the interaction with Docuschemas, mainly those that were related with the design of the data base. Comparatively 70% of the control group reflected in the final project the effective application of the new concepts acquired during the course. We observed that the obtained difference is not significant, and this can be attributed to the fact that on the final projects it was not possible to isolate the possibility of the collaborative work between groups of both samples.

4.3 Valuation of the tool

This section has been subdivided in two subsections, in order to analyse the valuation done by the participant teachers and their experiences in the development of Docuschemas like in its use in the classroom; as well as the opinion of students obtained through questionnaires and observations made throughout the experimentation process.

4.3.1 Teachers

After work with Docuschemas for subjects that before were prepared and developed of traditional form, the participant teachers made an evaluation and a series of commentaries. In general terms, they considered: *“Combine the strategies of education with a multimedia tool improves the learning of the students, promotes self learning and creativity. Docuschemas are easy, friendly, attractive and very useful like support tool to teaching. At the moment the young people live in a world of images and sounds that are opposed with the traditional education”*.

Docuschemas allowed to efficiently motivate the subjects that are key and they have always turned out complicated for the students because they represent a degree of greater difficulty in the learning process, mainly to be subjects that they require not only of the appropriation of concepts but of the understanding of such developing to the capacities of abstraction and analysis, such as learn to design of suitable way a data base. Additionally to the motivation, Docuschemas were useful, since from a given situation, the students were able to identify the involved elements, to relate them and elaborate an integral solution.

To accomplish the Docuschemas, the teachers invest many working hours for the design, since the work with multimedia in order to obtain that the combination of materials fulfilled the basic principles of Docuschemas. Like result of the interaction of the teachers with Docuwizard, we obtained an important feedback of the technical part, this information is very valuable for us and it will be taken for the future versions of the tool.

It's also important to mention that this work woke up the interest of other teachers who did not participate in this experiment, many of them have showed their interest in participating in the next semesters and generate a base of materials that can be of utility for similar courses. This experiment generated an appropriate motivational atmosphere for future works. Since the experiment with the students was positive and demonstrated that Docuschemas are a feasible didactic tool, the teachers have valued of very positive form their participation in the experiment.

4.3.2 Students

In general, Docuschemas were attractive and interesting for the students. The 97% of the students were agreed in considering Docuschemas like an attractive tool for the learning. With the analysis of the questionnaires results we can highlight that Docuschemas properly transmitted the objectives of the subjects developed, were a motivational tool for the 75% of the students, for the 84% of the students, the contents included in Docuschemas were essential for complete understanding of the subjects, as far as the complexity level all valued it like suitable. As far as the speed of the presentation, a 34% considered that the speed of the presentation wasn't appropriate, whereas 66% considered it suitable. The 21% of the students showed desire to interact more time with Docuschemas and a 22% suggested including more subjects of the course.

5. CONCLUSIONS

In terms of normal distribution of results, we can say that the cognitive increase of 15% is successful for our experiment, since it supposes that Docuschemas are useful to support the learning process of the students, with which we confirmed the initial hypothesis.

In relation to the teachers, initially this tool supposed an extra load of work and logistic organization as much as academic, but it turned out from much utility as much to obtain the motivation adapted in the course like also for the fulfilment of the learning objectives and reinforcing of the acquired knowledge.

We can affirm that this experiment encouraged the idea of the collaborative work between the other teachers who work with similar contents and an organization process has begun to elaborate Docuschemas in a more extension manner for common use in a knowledge area.

In addition, this tool also can be an important key in the courses of distance education that are being implemented in these Universities.

With the purpose of continuing perfecting the concept of Docuschema, a future line of work that is had contemplated as the following phase of the work, is the learning objects, since initially the project of Docuschemas comprises of an extensive vision but of elaboration of courses for education in the Web [1] and the reusability of the materials (audio, video, gifs, exercises) it supposes a pending and open subject for his continuity.

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