

A sample teaching design of 'Water Conductivity' Unit

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Introduction

- The aim of this paper was to present a sample teaching design of “Water Conductivity”, through digital educational video.
- The teaching of the thematic unit “Water Conductivity” causes difficulties and alternative conceptions to many students because of its abstract nature.
- The purpose of this research is twofold and results from the desire to understand the difficult perceivable concepts, a fact that is also related to the absence of the strongest teaching tool of a chemist, which is no other than the experiment.

Introduction

- The success of learning, its duration and its transformation from inferior forms to higher ones depends on the way in which basic principles function, such as: the principle of repetition and practice, the principle of small steps, the principle of automation and the provision of equipment material for consolidation learning, the principle of individualization, the principle of generalization, the principle of organization and order, the principle of learning through play and the principle of living and self-correction [1].

Introduction

- The teacher makes the design of the teaching, thus identifies specific teaching goals on a case-by-case basis.
- These goals are both cognitive and skill development and he/she progresses towards their achievement through carefully designed varied activities.
- He/she integrates his/her teaching interventions in an annual educational planning-programming [2], taking into account the entity of the goals of the curriculum, by class and teaching subject.

Introduction

- Then, when designing a thematic unit, he/she takes into account the basic principles of pedagogy as well as the important phases from which it is necessary for teaching to pass across in order to achieve the best possible learning outcome [2-4].
- The article present the first organize attempt in the Greek education for both a modern and e-learning teaching for the unit “Water conductivity”.
- The proposed method has applied in the International Hellenic University and the results indicates very encouraging outcomes.

Introduction

- Modern didactics provide a strong emphasis on the designing of teaching [2-5] and seeks strategies that serve an exploratory-inquiry and collaborative learning tailored to students' learning facts and rhythm.
- The computer as a training tool facilitates the realization of these didactic requirements, provided, of course, that the teacher has educational competence and readiness [6] in order to be able to proceed with the designing of the teaching process.
- In order for a subject matter to be able to be attributed effectively to the educational video, it should be adapted to the narrative ways and potentialities of the medium.

Introduction

- This implies a particular study of the basic building blocks of the video, such as figure and sound.
- The final message stems from the composition of the structural elements and is determined uniquely by their interaction (for example, the relationship of speech and image, interchange of scenes, the relationship of music and image, visual effects and so forth) [7-8].
- The above are very important parameters of the process of designing and developing a video recorded educational experiment for educational purposes.

Introduction

- The creation of video recorded educational experiments concerning the way of analyzing and drawing conclusions on a water sample for the “Water Conductivity” parameter, results from the fact that books need additional material.
- In addition they do not include guidelines for activities involving students in reading online texts with a specific goal. It is worth noting that the indifference and negativity that characterizes students is an element that occurs in many thematic modules and not only in the chemistry lesson.

Introduction

- According to a study by the Organization for Teacher Training [9], the main cause of the problem is the fact that the appropriate methods for the teaching of the course have not yet been ensured.
- As such factors can be mentioned:
 - a) The non-positive teaching tradition of the course;
 - b) The monotony in the approach of the subject and
 - c) The absence of the exploitation of technology.

Results

- The video presented in this research aims to familiarize students with the method of analysis of a water sample concerning the “Water Conductivity” parameter, in terms of the designing and implementation of the experimental process, as well as the theoretical part of the parameter that frames the analysis process [13-14].
- The measurement of the specific conductivity does not allow us to determine which these ions are, but it must certainly be considered as a water quality parameter that reflects Total Dissolved Solids (TDS).

Results

- The specific conductivity depends on the type of ions (and consequently of the salts), their total concentration, ion valence as well as the temperature of the solution.
- For this reason, all specific conductivity measurements refer to room temperature (20°C).
- Modern conductivity meters are equipped with a thermometer and reduce the measurement result automatically to the desired room temperature (20°C) (Figure 1-2).

Results



Figure 1: The conductivity meter was used for the measurement of the specific conductivity.



Figure 2: Specific conductivity measurements refer to room temperature (20°C).

Results



Figure 3: Conductivity measurement.

Results

- At the end of the first semester, a questionnaire was given to 120 students of the School of Science, in the International Hellenic University. The participants were 60 women and 60 men.
- In table 1 there are the four components that refer to the video properties. The questions of first component can be characterized as general. The second component mentions to the supporting material, the third component to the educational material and the fourth component refers to the evaluation of the content.

Results

TABLE 1. THE FOUR COMPONENTS

	Component			
	1	2	3	4
01. General: I use educational programs on the computer.	,516	,086	,254	,178
02. General: I have enough time to spend by educational programs on the computer	-,777	-,021	,175	-,034
03. The supporting material of the educational program was understandable: And its content was aimed at solving problems.	,216	-,091	-,416	-,556
04. The supporting material of the educational program was understandable: And its content was clear and at the same time understandable.	,155	-,204	-,200	,785
05. The educational material in the educational program helped: Understand the definitions.	,132	-,589	,165	-,028
06. The educational material in the educational program helped: In solving the exercises.	,028	,768	,079	-,272
07. The educational material in the educational program helped: Understand chemical reactions.	,397	,561	,137	,421
08. Content - Teaching Materials: The terminology of the course was understandable.	,199	-,389	,447	-,312
09. Content - Teaching Materials: Content is unique.	,231	,293	-,526	,017
10. Content - Teaching Materials: Does it include knowledge that is not relevant to the subject of the application?	,090	,091	,775	,020
11. General: The ICT use reduce the inequalities.	-,704	,175	,037	,146

Results

- Table 2 shows the model summary. The values of the two coefficients, the correlation coefficient $R = 0.857$ and the determination index R squared = 0.734 are considered very satisfactory and indicate that the model explains the results at a rate of 80%.

TABLE 2 THE MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.857 ^a	.734	.714	.497	.734	37,869	4	55	.000	1,909

Results

- According to the table 3 (statistical Anova analysis) Sig = 0.000 which is <0.05 . This suggests that the results are statistically significant.

TABLE 3 ANOVA ANALYSIS

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37,403	4	9,351	37,869	,000 ^b
	Residual	13,581	55	,247		
	Total	50,983	59			

Results

- Finally, in Table 4 there are the coefficients which are all statistically significant and the equation is written as follows:

TABLE 4: COEFFICIENTS VARIANCE

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,817	,064		59,495	,000	3,688	3,945					
	General	,410	,065	,441	6,335	,000	,280	,539	,441	,650	,441	1,000	1,000
	Educational Material	,426	,065	,458	6,582	,000	,296	,555	,458	,664	,458	1,000	1,000
	Content - Teaching Materials	,399	,065	,429	6,164	,000	,269	,528	,429	,639	,429	1,000	1,000
	Supporting Material	,354	,065	,381	5,479	,000	,225	,484	,381	,594	,381	1,000	1,000

Results

- Question 12 (Results Evaluation) = $3,817 + 0,410 \cdot \text{General} + 0,426 \cdot \text{Educational Material} + 0,399 \cdot \text{Content - Teaching Materials} + 0,354 \cdot \text{Supporting material}$
- From the above equation noticed that almost all the groups contribute to the model, firstly educational material and last but not least the supporting material.

Conclusions

- The digital educational video, consist the tool for the teaching of module Water Conductivity.
- The video recording of a didactic and teaching demonstration experiment offers another opportunity for the computer as a presentation medium for teaching and learning in the classroom, in the laboratory and at home.
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- In this alternative presentation, there are all, one by one, the procedures of executing the experiment, elements of theory and lesson plans.

Conclusions

- The educational video contributed in order for the students to understand the aspects of modern science with the use of the appropriate teaching tools.
- Students discovered through these diverse activities the interconnection of the science of Chemistry with other branches of science, of the social and everyday life.
- The benefits are multiple because the knowledge and experiences of the students have been exploited, keeping their interest unchanged.

Conclusions

- For the teacher, the benefits are multiple because a comprehensive and effective teaching approach requires an interdisciplinary and continuous way of information not only on the subject to be taught but on many and varied issues, which he/she will consider capable to excite and attract the curiosity, the interest and the active participation of students. Concluded that videos contribute considerably both to the understanding of the definitions and to solve the exercises. It is obvious from the table 1 that the students have given a higher score to the main educational material because it helps them to solve the exercises.

**Thank You For Your
Attention**