

An Example of Evaluation applied to a course adapted to learning styles of CHAEA's test

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Abstract: This paper shows the results of an evaluation of a course adapted to learning styles of CHAEA's test. It is a comparative analysis between an adapted course and a course without adaptation also.

1 Introduction

Normally, the courses published in the Web are thought to get the learning of the students that visit the web site, but the majority of these courses do not include adaptation, which means that the student has to adapt himself to the Course and not the Course to the user. When the user has to adapt to the Course, often the result is not as desired, since the user is not comfortable and will probably not visit the Web site again and the initial goals of learning and diffusion are not carried out.

The adaptation is necessary, but the question is: What type of adaptation: Lexical [1], syntactic [4] or conceptual? The conceptual level seems the most appropriate [7], because this type includes cognitive parameters. These cognitive parameters are very important in the design of the on-line courses.

2 CHAEA's Test

There are a lot of cognitive parameters, but, one of the most important is the learning style. The learning styles are the way of thinking, the way of processing the information, and the way of learning each individual student has. There are a lot of classifications of the learning styles, but the classification selected in this paper is the CHAEA's test.

This test offers an acceptable reliability and validity that has been proved in Spanish Universities [2] and returns the preferences of the student at the time of learning. There are four styles in this classification: Theoretician, Activist, Reflexive and Pragmatic. The test returns a value between 0 and 20 for each style. With these values we get know the learning style. For example, if the student gets 20 in Activist style, he/she is Activist and she/he is going to learn like an Active learner.

Each style has its own characteristics and particularities that are clearly defined by the author [2] but we are going to explain some characteristics that we consider important in order to understand the adaptation [3].

Firstly, the adapted course has been implemented for the Theoretician and Activist learning styles. The selection of these learning styles is because the Theoretician and Activist are the base of Pragmatic and Reflexive learning styles.

Secondly, the Theoretician student likes the theory and she/he doesn't learn with examples or exercises. She/he learns in an inductive way and the contents have to be organized by concepts; however the Activist students like very little the theory and they prefer the exercises. They need a continuous feed-back.

3 Evaluation

In this experiment a Course about HTML is designed [5]. This course is very basic and it consists of six lessons: First Page with HTML, Headings, Paragraphs, and Design with Style, List and Links. It has been adapted for the Theoretician and Activist Users.

3.1 Formulation of hypothesis:

There are two questions:

1. Is the learning with adaptation better than the learning without adaptation?
2. Does the way of evaluating depend on the learning style?, if, do theoretician students resolve only theory questions? Do activist students resolve only active questions?

The experiment has to prove the following hypothesis:

1. The learning with the Adaptation Model is more effective than the learning without the Adaptation Model.
2. The evaluation of the knowledge does not depend on the learning style. The most important thing is the learning itself and not how this learning is evaluated.

3.2 Identification of variables

Two variables have been selected to develop the experiment: The learning style (independent variable), and the result of the evaluation of knowledge (dependent variable).

3.3 Population and Sample

The population consists of students of the subject Information Systems of the Business School of University in Oviedo.

The sample is composed of 54 students. 27 of them are theoreticians and 27 of them are activists. For all of them it is the first time that they have been registered in the subject and they do not know anything about HTML.

There are three groups: A Control group, an experimental group and the Non_Adapted_Test Group. These groups are homogeneous in their composition, so, there are nine theoretician and nine activist students in each group. The distribution of students is random in each group.¹

3.4 The design of th experiment

There are two types of courses:

1. An adapted course: This course has different interfaces depending on the student [6]:
 - The Theoreticians have more theory than exercises and the theory is organized in concepts.
 - The Activists have more exercises and more examples than theory.
2. A course without adaptation: This course offers the same interface with theory, examples and exercises for each lesson.

There are also two types of tests:

1. Test with questions adapted to learning styles
2. Test with questions without specific adaptation, so, there are questions of both learning styles.

The experimental sessions are developed in the Business School of University of Oviedo. Each session is 110 minutes long.

These sessions have four parts:

1. Attitude Test².
2. Chaea's Test.
3. Surfing on the Course
4. Acquired knowledge test.

The 1st and 2st parts are equal for all groups, but the 3st and 4st parts are different depending on the group.

The control group students have to surf the course without adaptation and they have to do a test adapted to the learning style.

The experimental group students have to surf the adapted course and they have to do a test adapted to the learning style.

The Non_Adapted_test group have to surf the adapted course and they have to do a test without adaptation.

The students of these groups are different.

The test is formed by 15 multiple answer questions. At the end of it, the students know the score.

The test has 3 questions for each lesson of the course.

¹ Each group has majority of girls than boys because more girls than boys registered in the subject Information Systems.

² This test is in bases om Likert Scale with numeric answers where 1 represents the lowest agreement and 5 represents the highest agreement.

Each correct answer scores 1 point and each incorrect answer scores -1 point and the non answered question scores 0 points.

At the beginning of the session the student is told that it is part of a teaching quality evaluation of the University of Oviedo, so the student is not conditioned by the test.

3.5 Results

With this experiment, information is about the attitude and what knowledge the students acquire after surfing the course.

With this information, it is possible to determine if the adaptation has an influence on the learning and if the way of evaluating depends on the learning style.

The statistical software SPSS is used to get this analysis.

Firstly, it is necessary to determine if the groups had a similar one on the attitude: A Tstudent is applied to prove this³.

Secondly, it is necessary to check if the results of the control group are better than the results of the experimental group.

Thirdly, we must compare the results of the experimental group (adapted test) and the Non_Adapted_test group (test with a mixture of theoretician and activist questions).

The results of this analysis are shown in the appendix.

In the first part of this analysis, all groups (Control Group, Experimental Group and Non_Adapted_Test group) have a normal distribution for each learning style. Besides, the attitude has a normal distribution in Control Group and Experimental Group.

In the second part of this analysis, the control Group and the Experimental Group have a homogeneous variance and, the Experimental Group and the Non_Adapted_Group have a homogeneous variance too. The Attitude variance is homogeneous in the Control Group and Experimental Group. So, it is possible to apply the TStudent to get the differences and the improvements.

The application of TStudent in the Control Group and Experimental Group returns an improvement, so, the scores obtained in the Experimental Group are slightly better than the scores obtained in the Control Group. This result proves the first hypothesis: There is an increment of learning with the adaptation.

The application of Tstudent in the Experimental Group and Non_Adapted_test returns that the difference is not significant, so, the evaluation is not important, the most important thing is the learning. When a student learns, she/he can answer any type of questions. The evaluation is independent of learning style.

³ TStudent compares independent samples (for example, the different groups scores) and it is used to know if the differences are significant. The TStudent's proof requires normal distributions to apply it. The Shapiro-Wilk test is used to get this, it is also necessary that the variances are homogenous; the Levene's Proof is used to do this verification.

4 Conclusions

The evaluation offers a determinant conclusion: adaptation of contents versus adaptation in the evaluation of contents. The most important thing is the adaptation of contents, and not the adaptation in evaluation of the same ones.

Learning increases with the adaptation of contents, but there are not differences between the evaluations of adapted or not adapted contents. The process of teaching-learning has to focus on the adaptation of contents and not on the evaluation of the contents.

A course that respects the learning style makes the learning more efficient. Internet is the most adequate way to do this adaptation. The contents can be shown in a personal way to every user of the net: this is the power of the Web, since the same contents it can come in different ways to different individuals and this is a fundamental idea : The same knowledges explained in a different way depending on the characteristics and particularities of every user.

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Appendix

Note: Significance level of 95% (0, 05)

1. Normal Distribution for Control Group in Final Score (Shapiro-Wilk)

Learning Style	W	Sig
Activists	0,946	0,637>>0,05 → Distribution can be normal
Theoreticians	0,871	0,163>>0,05 → Distribution can be normal

2. Normal Distribution for Experimental Group in Final Score (Shapiro-Wilk)

Learning Style	W	Sig
Activists	0,854	0,092>>0,05 → Distribution can be normal
Theoreticians	0,854	0,091>>0,05 → Distribution can be normal

3. Normal Distribution for Not Adapted Group in Final Score (Shapiro-Wilk)

Learning Style	W	Sig
Activists	0,828	0,064>>0,05 → Distribution can be normal
Theoreticians	0,828	0,064>>0,05 → Distribution can be normal

4. Normal Distribution of Attitude in the Control Group in Final Score (Shapiro-Wilk)

Learning Style	W	Sig
Attitude	0,924	0,223>>0,05 → Distribution can be normal

5. Normal Distribution of Attitude in the Experimental Group in Final Score (Shapiro-Wilk)

Learning Style	W	Sig
Attitude	0,924	0,223>>0,05 → Distribution can be normal

6. Homogeneity of variance between the scores of Control Group and Experimental Group for each learning style

Learning Style	W	Sig
Activists	3,115	0,097>>0,05 → Variances are homogenous
Theoreticians	4,283	0,006>>0,05 → Variances are homogenous

7. Homogeneity of variance between the scores of Experimental Group and Not Adapted Test Group for each learning style

Learning Style	W	Sig
Activists	0,142	0,711>>0,05 → Variances are homogenous
Theoreticians	0,139	0,715>>0,05 → Variances are homogenous

8. Homogeneity of variance between the scores in the Likert Scale for the attitude

Levene	Sig
0,002	0,899>>0,05 → Variances are homogenous

9. TStudent for Control Group and Experimental Group

Learning Style	gl	Sig
Activists	16	0,001<<0,05 → The significant improvement
Theoreticians	16	0,002<<0,05 → The significant improvement

10. TStudent for Experimental Group and Not Adapted Test Group

Learning Style	gl	Sig
Activists	16	0,567>0,05 → The different is not significant
Theoreticians	15	0,567>0,05 → The different is not significant

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