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Full Length Article

A web aided education model that can be used in power electronics course

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ABSTRACT

In this study, the effect of web based power electronics courses on the success of electrical engineering candidates was examined. The participants are consisted of daytime education (30) and evening education (42) students who attended the "Power Electronics" course. First, groups were randomly assigned as experimental and control groups and experimental group and control group were examined according to the students' GPAs, university entrance exam results, academic grades depending on 8 different lectures related with power electronics.

According to the results obtained from validity and reliability of Power Electronics Course Achievement Test, the total correlation values and the standard deviation values of Power Electronics Course Achievement Test were between .301–, .598 and between .304–, .506, respectively. In addition, KR20 coefficient was found as 0.844. Before application of the "Power Electronics Course Achievement Test", there was not a significant difference in total scores of both daytime and evening education students. Although students received Web-Based Education and Web Aided Education were selected as experimental group, the students received "Traditional Education" were selected as control group. After the application, significant differences between the total grade points of both experimental and control groups of daytime education and evening education students were detected.

1. Introduction

The rapid development in technology enriches the academic environment and offers different alternatives. The academic achievement of these alternatives turns the direction of traditional education to web aided education. Transferring theoretical knowledge into web aided educational model and the enrichment of web aided education are now possible applications. The academic benefits of web aided models took academic attention academicians from different fields of science so model studies for implementation have been increased. Very successful applications in science fields such as engineering, science and technical education are available today [1–4].

It is hardly difficult to fulfill practice courses on Technical Education and on Engineering through distance learning technology. Therefore it is a field that has to be examined very carefully. Despite its difficulties when the advantages are taken into account web aided models have potential to increase students success in technical education [3,5–8]. So web aided application of a course in technical education field and the effect of the model on academic success are examined. Today enriching the educational programs provided by using distance learning technology makes it easier to give practice courses appropriately through distance learning technology. Providing practical courses appropriate with distance learning technology has great advantages for researchers, academicians, students and educational institutions.

Advantages of web based education versus traditional educational are as follows [3,5,9–20].

Students have the opportunity to repeat the courses they choose any time they wish.

There will not be any difference among the students from different branches or groups regarding the source of education (teacher) and this will lead to learning equality in general. For example, in case of lectures from different teaching assistants from different branches, some students may complain about the teaching style of the assistant and may state that they are less lucky than other students.

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Control of the learning is completely in students' hands. Students try to learn according to their own detection pace and intelligence level and acquire the responsibility for self-learning.

Students can access the needed lecture notes and other sources of the field immediately.

Evaluation and observation of student learning will be done in computer environment more easily and centrally in a short time.

There is no space and time problem. Where there is access to computer and internet the education can take place anytime and anywhere.

Web based education is more convenient in terms of cost when compared to traditional learning. It can be seem at high cost at first. However, it is highly economical in terms of using the same material many times with same quality.

The content of the education can be revised parallel to the technological development and can easily be updated.

Considering the advantages above, in this research increasing traditional education quality by using different educational models was examined and two models were designed. In the study, model used for traditional education (TE 1) and two different education models (WBE 1 and WAE 1) on web based platforms were used and "power electronics" course for junior students in Faculty of Technical Education, Teacher Training in Electrical Works Department was selected. At the end of the application the effects of these two different models on students' academic achievement was examined.

The experiment group of the study received the web based and web aided education programs. There were 48 students in the experiment group. The control group of the study continued taking the traditional education model. Control group consisted of 24 students.

The research is an experimental study and used two group pretest posttest research model. For this purpose the following hypothesis were tested in the study.

No significant difference was found between pretest scores of experimental and control groups.

There is no significant difference between the pretest and posttest scores of experiment group.

There is a significant difference between posttest scores of experimental and control group in favor of experimental group.

It is possible to see many distance learning models in the field of education in Turkey in recent years [4,21–34]. Most of these studies have a technological structure rather than being education oriented. Effectiveness and efficiency of the programs are discussed in general with these researches. Therefore a lot of research needs to be done in the field. Among these studies, stating steps and rules that must be fulfilled to prepare educational programs through a scientific method, laying out the missing, incorrect and correct sides of the design after evaluations done with ideal and scientific criteria and showing the effect on academic achievement can be the significance of this study.

2. Method

2.1. Research design

The research is designed as an experimental study. There were multiple groups (experimental and control) and random assignment was used to form these groups. So a pretest–posttest control group model was chosen (Karasar, 2012). "Effectiveness of Interactive Aided Education Program of Web Based Designed Power Electronics Course" is given to the experimental group and "Power Electronics" course in undergraduate program was given to control group.

2.2. Study group

Study group of the research consisted of male junior students studying at Faculty of Technical Education, Teacher Training in Electrical Works Department. %41.7 of the study group was day time education students and %58.3 was evening education students. The distribution of the students regarding their high schools were Industrial Vocational High School was %38.9, Technical Vocational High School was %33.3, Anatolian Vocational High School was %22.2, regular high school was %1.4 and others were %4.2.

As seen in the Table 1, there were totally 72 students; 48 were in the experimental group and 24 were in the control group. Experimental 1 group received the program prepared through web based training platform. Experimental 2 was supported with program prepared through web based training program as well as the traditional education. Control group received only traditional education. Basic knowledge of the experimental and control group was tested before the study (pretest) and it was found out that they were at the same level.

2.3. Data collection tools

2.3.1. Demographic form

Demographic form used in this study was developed by the researcher and consisted of eight questions determining the gender, type of education, type of secondary education, for how long s/he uses computer, where he learned using internet and computer, daily average internet usage, group type in the study and review of the courses.

2.3.2. Power electronics course achievement test

"Power Electronics Course Achievement Test", which was designed by the researcher, was used to support Power Electronics Course Education Program and identify the effectiveness of the program. The test consisted of 60 items. Result of the analysis for validity and reliability study of "Power Electronics Course Achievement Test" total correlation values were between .301 and .598, standard deviation values were between .304 and .506 and K20 coefficient was found 0.844.

2.3.3. Web based education platform

It is a platform designed by the researcher to carry out and support the education program given to the web based and web aided education groups in the experimental group. The platform provided the opportunities of not only synchronous training providing online classroom environment but also repeating the whole lesson with asynchronous training. At the same time more comprehension of the course content issues with the help of interactive audiobooks including theoretical knowledge was supported.

Table 1
Group types.

Type of Education	Group Type	Groups	N
Daytime Education	Experimental 1	Web Based Education (WBE I)	10
	Experimental 2	Web Aided Education (WAE I)	10
	Control	Traditional Education (TE I)	10
Type of Education	Group Type	Groups	N
Evening Education	Experimental 1	Web Based Education (WBE I)	14
	Experimental 2	Web Aided Education (WAE I)	14
	Control	Traditional Education (TE I)	14

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