

A Structural Equation Modeling Approach to Students' Homework Assignment Web Sites Usage

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Abstract

The purpose of this study is to test a model of the elementary students' usage of online homework assignment sites. Changes in students' homework assignment preparing and completing behaviors have caused new educational, ethical and financial dimensions for educational policy makers, teachers and parents. Data is gathered through Homework Assignments Sites Usage Scale. 637 elementary school students (6, 7, 8th graders) participated in the study from an elementary school in Turkiye. According to the confirmatory and exploratory factor analysis (CFA and EFA), the scale considered three factors of subscales: Effectiveness, Ethics and Usability.

1. Introduction

The ongoing development of Internet and the fields it restructures, various theoretical studies have been carried out in order to ensure better understanding of how they are used by students. One of those fields is the students' usage of the internet for completing their homework assignments. Together with the development of information technologies, there have been crucial changes in assigning students and the students' homework assignment preparation processes. Students make research, share, discuss and get academic information collaboratively in various online environments in order to improve their skills on preparing a very well-done homework. Nevertheless there are also students who are searching for the ways of downloading and retrieving the most appropriate ready-made homework. The increasing demand of students has emerged a new field for responding those demands: Commercial Homework Assignment Sites. The spread of online homework assignment sites with highly commercial aims has opened a new research area regarding the structure, aim and the significant role of homework in education. Homework assignment sites are also a dimension of distance learning.

Hence, the purposes of assignments are to encourage students to learn how to study independently, plan efficiently, get organized in groups and improve their thinking styles [1]. Although assignments function as supplementary materials for school work, and there are major differences between learning at school and learning at home [2]. House atmosphere,

families, friends, time, interest and efforts of students have an influence on this process. In addition; individual differences, motivation of learners, where, when, how and with whom the assignment will be done are the points to be taken into consideration.

2. Literature Review and Theoretical Background

Homework is defined as written/oral individual or group tasks assigned to students by the teacher to be done out of school time with the purpose of getting prepared for a new learning material or reinforcing, expanding, practicing or completing newly learned material [3,4]. Homework assignments also promote students' self-discipline, independence and responsibility characteristics [5]. In a general sense, assignments reflect classroom activities and assist students to reinforce what they learn at school by helping students to acquire new skills. Besides positive effects of homework described as immediate achievement and learning, long-term academic and nonacademic benefits, there are also some negative effects such as satiation (loss of interest in academic material, physical and emotional fatigue), denial of access to leisure time and community activities (parental interference, pressure to complete and perform well, confusion of instructional techniques), and cheating (copying from other students, help beyond tutoring) [6]. Especially, in middle and high school (Grades 6-10); there is a positive correlation between the amount of homework completed by students and their grades. In the lower grades (Grades 2-4), however, this relationship is negative. This finding, coupled with research showing that students' emotions are depressed when they are engaged in homework [7], has led some to argue that homework can indeed be detrimental in elementary school. Also, the changes in the role of teacher and students constructed by the use of information technologies in education and instruction should not be ignored. Teachers' roles have changed from "assignment giver and organizer" to "facilitator and supporter". Teachers provide students to utilize their skills and practice what they learn by using technology instead of giving all students the same assignment [8]. Assignment sites present several purposes. These sites contain different studies such as on-line courses and assignments written by students. The sites mention about the age and grade which they target on their pages. Packhard and Holmes [9] state that there are seven types of assignment sites: Portal, information, article, ask someone who knows, online encyclopedia or library, course service and sites containing various books or summaries.

The claims utilizing Internet technologies in education that improve learning and increase motivation have caused several arguments. For example, students have to check the accuracy of information and this task appears to be difficult for them [10]. However, it has been known that the Internet is a powerful mean to access sources since only a mouse click is needed to access sources which used to be very hard to find in the past. Nevertheless, students have to distinguish between reliable and unreliable information sources [1]. In order to make students use relevant and reliable web outputs, the dimension of the "ethical use of the internet" is needed to be taken into consideration.

Although assignment sites are mostly used by students, teachers are also interested in them. Packhard and Holmes (2001) created a web-site to get feedback related to assignment sites and response to students. They aimed to prevent the possible problems about the use of assignment sites. On this site, students are asked about the requirements of assignments, their expectations, use of sites, design of the sites, type of feedback, learning opportunities, and teacher feedback. According to the results of the study, assignment sites should be user friendly to provide students acquire knowledge. They should also include multimedia facilities in feedback content. Fisher and Holme (2000) investigated the teachers' use of assignment sites [11]. They defined the web-

based database practices that are used to organize information in lessons. Database practices have a crucial role in presenting information in different ways. They used Filemaker Pro Software for the database. There were skill-based tests, support for reporting practice results and questions related to web-based assignment sites in the study. It can be claimed that “usability” dimension of the online homework assignment environments is needed be taken into consideration in the designing process for providing effective means for both students and teachers.

In addition, users have different reasons to use the homework assignment sites. Arkan and Altun (2007) studied with 219 primary and pre-school novice teachers [12]. They found that 61.6 % of the participants used assignment sites. The participants stated that saving time, inadequate sources, advertisements on other sites, suggestions of friends, spread of assignment sites and too many assignments cause them to use these sites. They stated that homework assignment sites should be supervised by teachers and experts. Also in traditional instruction, stale assignments cause problems for students and their families. However, one of the benefits of information technologies that require parents to contribute to their children’s assignments has been a problem for some of the families. Reach and Cooper (2004) stated that most families cannot understand the assignments of their children and they needed support and assistance [13]. Students’ perceptions about assignment may have a negative effect on their achievement since teachers give a lot of assignments which are mostly stale, causing them to search for new shortcuts to make their homework ready.

To sum up, educators use homework assignments as a means for providing their students effective ways of learning. Encouraging students to make research and construct their own learning, educators have to guide them through their use of the research resources, online environments and techniques ethically. This can be done by providing students usable research and learning environments. By knowing how students complete their homework assignments and prepare themselves for learning effectively, policy makers and educators can provide a better guidance for students by facilitating them on their own learning. This view that comes from the literature review made us to propose and test a model for students’ homework assignment sites usage.

3. Statement of the Problem

It is clear that homework is perceived and associated with achievement by students. As students grow older, their own attitudes about homework play an increasingly important role in how much homework they complete for their class grades [6]. The focus on usage of information technologies and online environments which can provide easier, time-saving and adequately searched well-done homework, can explain students’ homework completion processes. a) Do students search for the most practical and effective ways of completing much homework in less time by using online environments? b) Do they care about ethics? c) At what level the usability of the environment is important for them? d) Can the possible answers for these questions contribute to a model explaining students’ usage of online homework assignment environments? To make clear these questions, this study aimed to describe the exploration degree of students’ “homework assignment sites usage” (HASU) by using a “homework assignment sites usage scale” (HASUS). The scale was developed by Rankin and Alton in 2007 including validity and reliability analysis. By analyzing the data gathered from elementary students (6, 7 and 8th grade), it is possible to find the correlation between observed/latent variables of the students’ homework assignment sites usage. The main purpose of this study is to test a proposed model for students’

use of homework assignment sites within the framework of the three dimensions of their usage: Effectiveness, ethics and usability. Specifically, the purposes of the study is a) to examine the factor structure of the scale with a sample of 6, 7 and 8th graders, b) to test the best fitting model for the students' HASU. The variables "effectiveness", "ethics" and "usability" which predict the latent variable "usage of the homework assignment sites" were calculated using the relevant items as a result of the factor analysis carried out on the items, in the data collection, which tend to explain the purposes of students' HASU.

4. Research Method and Procedure

4.1. Participants

A total number of 637 students from an elementary school (6, 7, 8th graders) in a city located in Aegean Region (South Western) in Turkey participated in the study voluntarily. The volunteer students who use internet at school and at home frequently are selected randomly from the 6, 7, and 8th graders. Table 1 presents information about the grade, age, gender frequency and percentages of the participants.

Table 1: Demographic Features of Participating Students

Demographic Features		Frequency	%	
1	Grade	6	188	29.5
		7	223	35
		8	226	35.5
2	Age	11	5	0.8
		12	174	27.3
		13	225	35.3
		14	205	32.2
		15	28	4.4
3	Gender	Female	313	49.1
		Male	324	50.9
4	Assignment Site Users	Yes	543	85.2
		No	94	14.8
		Total (N)	637	100

4.2. Courses and the Need for Web-Based Homework Assistance

The participant students responded that they need web-based homework assistance for the courses; 62.8 % Science and Technology, 62.4% Social Sciences, 42.2% Turkish Literature, 42.1% Math, 17.9% Theology, 15.3% English, 15% Information and Communication Technologies, 13.7% Technology and Design, 11.3% Introduction to Citizenship, 9.9% Physical Education and 9.9% Arts. All of the courses are in 6, 7 and 8th grades. In Turkey, the elementary education refers to 1-8th grades and high school education refers to 9-12th.

Table 2: The Websites Used by the Participant Students

	Web Sites	Title	Type
1	www.odevara.com	“Search For Homework”	Payment / membership
2	www.odevarsivi.com	“Homework Archive”	Payment / membership
3	www.genbilim.com	“Young Science”	Portal
4	www.odevimtr.com	“My Homework”	Free / membership
5	www.odevsitesi.com	“Homework Site”	Payment / membership
6	http://tmb.mkutup.gov.tr	“National Library”	Online Library
7	http://tr.wikipedia.org	Wikipedia	Free encyclopedia
8	www.okulistik.com	Online Courses	Payment / membership
9	www.kimkimdir.gen.tr	Biography	Free/membership
10	www.fenokulu.net	“Science School”	Free/membership
11	www.odevci.com	“Homework”	Payment / membership
12	www.sanaldersane.com	“Virtual Classroom”	Free/membership
13	www.odevindir.net	“Download Homework”	Payment / membership
14	www.bedavaingilizce.com	“Free English”	Free/membership
15	www.odevyap.net	“Do homework”	Free / membership
16	www.tembeliz.biz	“We are Lazy”	Forum
17	www.odevbul.net	“Find Homework”	Payment / membership

The students referred to 17 different web sites (homework, portal and library) in total that provide content in Turkish Language for homework assistance and 7 of them are payment/membership based; 5 of them are free homework assignment web sites which include access to ready-made homework (Table 2).

4.3. Data Collection

Participant students filled out the paper-based “Homework Assignment Sites Usage Scale” forms voluntarily. Data related to the individual characteristics of elementary school students, reasons and suggestions for HASU were collected in two weeks in the second half of 2007. The Information and Communication Technology Course teacher has given the forms to the students.

4.4. Instrument

The scale “Homework Assignment Sites Usage Scale” is used for data collection. The scale is composed of subscales; (1) Questions concerning the demographic features and purposes of using assignment sites (2) Perceptions about assignment sites. There were 30 statements in the second subscale about the variables a) Effectiveness (10 item subscale, e.g.; “*Assignment sites help me learn independently*”), b) Ethics (10 item subscale e.g.; “*I feel guilty when I use assignment sites*”) and c) Usability (10 item subscale, e.g.; “*I think assignment sites are disorganized*”) to which participants indicated their opinions by marking “strongly agree”, “agree”, “no idea”, “disagree”, and “strongly disagree”. The items related with the three variables were given mixed within the subscale 2 and the variables were not visible in the scale.

5. Results and Analysis of the Structural Model

In data analysis, a structural equation modeling technique was used to test the proposed model including three variables; effectiveness, ethics and usability. SPSS 18.00 was used for Exploratory Factor Analysis (EFA) and the Lisrel 8.72 software was employed for Confirmatory Factor Analysis (CFA). In item analysis 0, 30 was used for item test correlation and 0, 40 was used for factor load as minimum limit. Cronbach's alpha was used to measure internal consistency of the whole scale and subscales ($p < 0.05$, Effectiveness $\alpha = 0.861$, Ethics $\alpha = 0.781$, Usability $\alpha = 0.772$).

HASUS was consisted of 30 items in its first design. After analysis and factor rotations (varimax rotation), items 1, 2, 5, 6, 19, 20 were removed from the scale as their item test correlations and factor loads were below the determined values. These 6 items were removed and a 24-item-scale was analyzed again. Following this step, principal components analysis was done for 24 items. As a result of the analysis, Kaiser-Mayer-Olkin value was 0.875. KMO test determines if the distribution is appropriate for factor analysis. KMO value must be higher than 0.60. 0.875 KMO value is an appropriate value for factor analysis [14]. Another test questioning the appropriateness of factor analysis for variables is Barlett's test of sphericity (BTS). In this test rejection of "correlation matrix=unit matrix" hypothesis is needed for factor analysis [14]. Approximate chi-square value for BTS was found 4785.613 ($p < 0.0001$).

Factor loading minimum limits range between 0.30 and 0.40 in principal components analysis (Dunteman, 1989). 0.30 was used as the minimum limit in this study. According to the results, the variance percentage values of factors which had the Eigen value over 1 was 49.699%. There were 3 factor defined in the study. The percentage of three factors' defining the total variance was 44.726%. The percentages between 40%-60% are acceptable to define the total variance in social sciences [15]. Therefore, the results in the study are acceptable. Total and loading variance percentages of these factors were 5.949 and 24.788% for the first one: effectiveness; 2.906 and 12.108 % for the second one: ethics and 1.879 and 7.830% for the third one: usability. After the varimax rotation of three factors, effectiveness factor had 18.209%, ethics factor had 13.863%, and usability factor had 12.654% for the percentage of the total variance explained. According to analysis results, the means of scale items ranged between 4.0298 and 3.0471; standard deviation ranged between 1.45527 and 1.10645. Item test correlation values ranged between 0.645 and 0.333. According to factor analysis results, the subscales were named as effectiveness, ethics, and usability.

In order to test construct validity, Confirmatory Factor Analysis (CFA) was done to confirm the factor in HASUS. CFA is based on the Structural Equation Model and these models are linear regression models measuring abstract psychological variables or behaviors that cannot be observed directly.

The analysis was conducted with the program LISREL 8.72. A model was constructed to test HASUS had three factors and an analysis was done to confirm it. Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Standardized-Root Mean Square Residuals (S-RMR), and Root Mean Square Error of Approximation (RMSEA) index of the model were analyzed. The criteria to command on the analysis were as following: GFI, AGFI and CFI ≥ 0.90 ; RMSEA and RMSR ≤ 0.08 [16, 17, and 18]. The results of CFA analysis and fit index are given in Table 3.

Table 3: Summary Statistics of Model Fit

Fit Index	Recommended Value	Observed Value
Chi square/Degrees of Freedom	≤ 3.00	2.5
GFI	≥ 0.90	0.93
AGFI	≥ 0.90	0.91
NNFI	≥ 0.90	0.92
CFI	≥ 0.90	0.96
RMSR	≤ 0.10	0.053
RMSEA	≤ 0.06 or ≤ 0.80	0.05

GFI = goodness-of-fit index;
AGFI = adjusted goodness-of-fit index;
NNFI = non-normed fit index;
CFI = comparative fit index;
RMSR = root mean square residual;
RMSEA = root mean square error of approximation.

The fit indexes which are commonly used in the literature ($\chi^2/d.f$, GFI, AGFI, NNFI, CFI, RMSR, RMSEA) were employed to test model fit. Chi-square / degrees of freedom less than 3, GFI, NNFI, CFI greater than 0.9, an AGFI greater than 0.8, RMSR less than 0.1, and RMSEA less than 0.06 or 0.08 are considered indicators of good fit. As seen in Table 3, all goodness-of-fit statistics are in the acceptable ranges together with Chi-square/degree of freedom.

Chi-square was 617.82 ($p < 0.01$), GFI=0.93, AGFI= 0.91, NNFI = 0.92, CFI= 0.96, RMSR= 0.053, and RMSEA=0.05. This goodness of fit indexes shows that model-data fitness was provided for the tested model. As a result, HASUS had a three-factor construct. The path diagram for the model is presented in Figure 1.

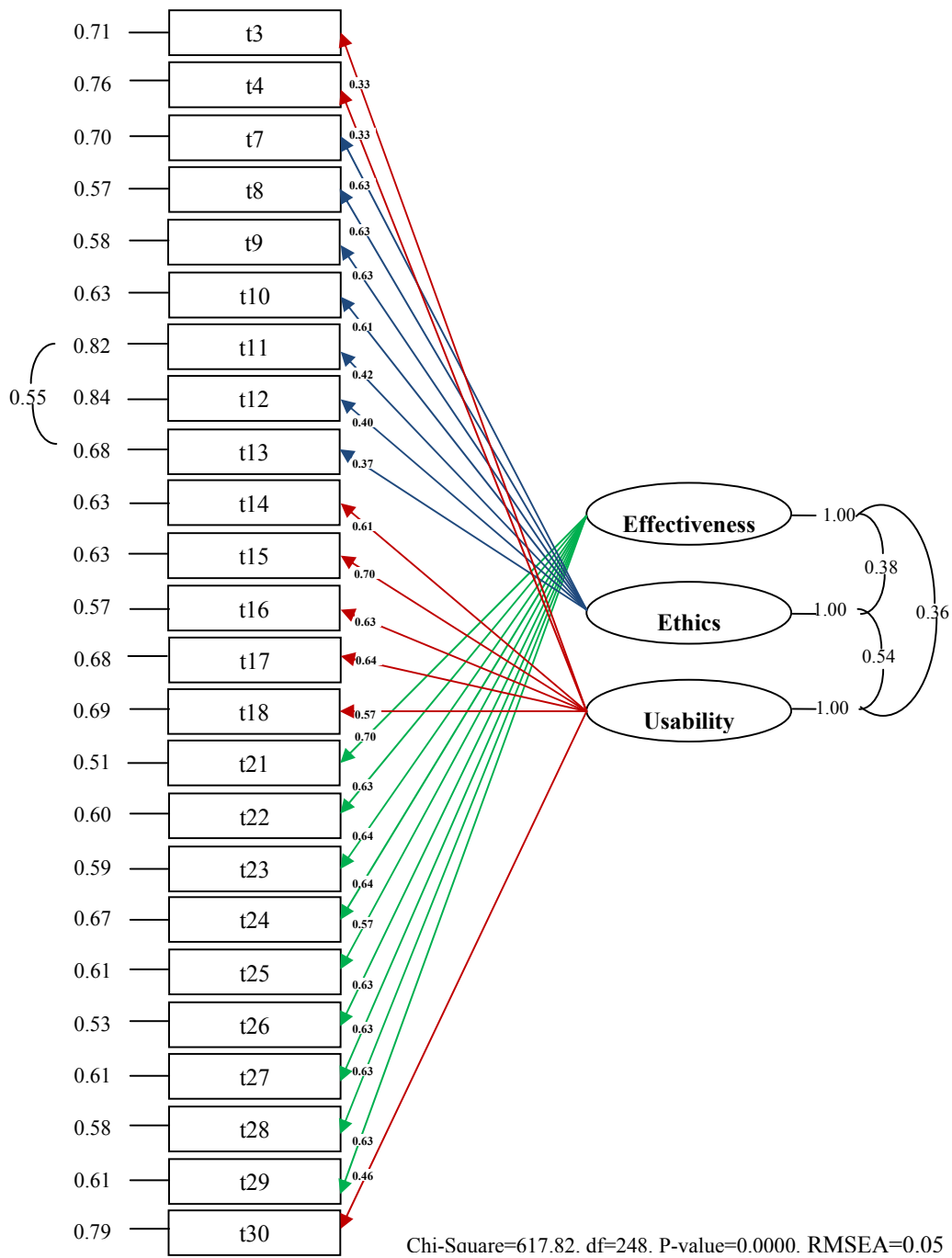


Figure 1: LISREL Test of Research Model

Figure 1 shows the graphical presentation of standardized LISREL path coefficients with their respective significance levels. The proposed structural model explained 45% of the total variance in the Homework Assignment Sites Usage. Figure 1 illustrates the significant structural relationships among the study variables. The three factors; effectiveness, ethics and usability are correlated with the students' Homework Assignment Sites Usage. These three dimensions of the

usage can explain almost half of the student's usage. Therefore effectiveness and usability of the homework assignment sites significantly have positive direct effect on HASU. Moreover the ethical use of homework assignment sites is also explaining the online homework assignment sites usage and is taken into consideration by students.

6. Discussion and Conclusion

The purpose of this study is to test a model for elementary students' homework assignment site usage. The findings of the study show us that HASU is getting more widespread in education and that the elementary students make use of HASU mostly as a means for getting their homework assignments completed. Three of the HASU are defined according to the factor analysis; effectiveness, ethics and usability in this study. The strongest sub-scale and the dimension of HASU was effectiveness. The results of descriptive factor analysis were confirmed by the confirmatory factor analysis. The defined sub-scales had significant relationships with each other and the whole scale items.

Some of the statements of "effectiveness", "ethics" and "usability" factors given in the scale which are strongly agreed by the students are as follows:

"Assignment sites guide me in doing assignments", "I think assignment sites provide information share", "I think using assignment sites promotes my success at school", "I feel guilty when I download a ready-made assignment from assignment sites", "I think I act unjustly toward my friends when I use assignment sites", "I think assignment sites are disorganized", "It takes me a lot of time to find the assignment I look for in assignment sites", "Using assignment sites is complicated..."

This study has investigated the underlying relationship between HASU and the factors of it. Under these circumstances, it is significant that HASU should be supervised and the students should be guided for the ethical completion of their homework assignments. Students' facilities to access resources should be taken into consideration while giving technology based assignments. The quality of sources in assignment sites and their operation should be supervised by experts and the teachers.

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