



EXAMINING KNOWLEDGE AND RETENTION LEVELS OF FINE ARTS' STUDENTS: A STUDY ON BASIC DESIGN COURSE WITH WBCL

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ABSTRACT: This study discusses the utilization of Web-based Collaborative Learning (WbCL) within the Basic Design course. WbCL is expected to confer benefits to art students' knowledge and retention levels. This empirical study is conducted to examine WbCL and human-tutored models in the colour design element of the course at the six weeks period of the study. The sample for the research constituted of two group of students in the Basic Design course at the Faculty of Arts and Design at Gazi University, Turkey. Each randomly assigned group consists of 20 students. Data was analyzed by T test for independent and paired samples and Two-way Variance Analysis were used to get a better understanding of the students' knowledge and retention levels. The results showed that students in the WbCL group performed better in knowledge tests. However, the reduction between the post-test and retention test scores of both groups is not significant.

Keywords: WbCL, knowledge-retention levels, basic design

GÜZEL SANATLAR ÖĞRENCİLERİNİN BİLGİ VE KALICILIK SEVİYELERİNİN ARAŞTIRILMASI: TEMEL TASARIM DERSİNE WBCL MODELİ UYGULANMASI

ÖZET: Bu çalışmada, temel tasarım dersinde Web Tabanlı İşbirlikli Öğrenim modelinin kullanımının öğrencilerin bilgi düzeylerinin yükseltilmesi ve bilginin kalıcılık seviyesine sağladığı avantajlar incelenmektedir. Bu deneysel çalışmada altı haftalık süre içerisinde tasarım elemanlarında renk konusu üzerine yapılmıştır. Bu çalışmada örneklem için Gazi Üniversitesi Sanat ve Tasarım Fakültesi'nde aynı eğitmenlerden ilk defa temel tasarım dersi alan birinci sınıf öğrencileri arasında 2 grup için toplam 40 öğrenci seçilmiştir. Gruplardan biri deney, diğeri kontrol grubu olarak seçkisiz rasgele atanmıştır. Deney ve kontrol grubu öğrencilerinin puanlarının karşılaştırılmasında bağımsız gruplar için T testi ve öğrencilerin bilgi ve kalıcılık seviyelerini daha iyi anlamak için 2 yollu varyans analizi kullanılmıştır. Çalışmanın sonuçlarına göre Web Tabanlı İşbirlikli Öğrenim modeliyle öğrenim gören öğrenciler testlerde daha yüksek puanlar almışlardır. Ancak, araştırma sonunda her iki gruptaki öğrencilerin araştırma süresince öğrendikleri bilgilerin aynı seviyede kalıcı olduğu görülmüştür.

Anahtar Kelimeler: WbCL, bilgi-kalıcılık seviyesi, temel tasarım

INTRODUCTION

Web-based Collaborative Learning permits learners a more accessible and flexible way of instruction tailored to their needs. Hence, it is a widely accepted and utilized method in higher education (Armellini & Aiyegbayo, 2010: 923). Learners receive information through various communication channels, choose, regulate and combine new information with existing knowledge (Moreno & Mayer, 2007: 312). Teaching is defined as the transmission of ideas, knowledge and expertise from educators to learners; however, good teaching focuses on how students obtain the necessary skills to survive within a competitive global market (Spanbroek, 2010: 119). Kolb's Learning Style Inventory Style Inventory, which affects personal academic competence, also allows each student to perceive the self, the environment and the relationship between the self and environment. (Wang, Wang, Wang & Huang, 2066: 208). Within this context, learners aim to increase their course performance by seeking specific methods (Hilbert, Renkl, Schworm, Kessler & Reiss, 2007: 317). In line with this, M. Ollila and E. Carling (2000: 2) state that university graduates with a digital educational background which enables them to visually develop and implement output in a digital environment are preferred compared to peers. Therefore, institutions of higher education should rearrange their programs to include WbCL in their curriculums (Guri-Rosenbilt, 2005: 490).

In art education, the curriculum should be structured to facilitate and advance student learning for forthcoming courses and projects. Generally, the curriculum is composed of *fundamental courses* that develop design knowledge, *technology-based courses* that develop computer-related skills, and *project-based courses* for strengthening artistic competency and expression. Consequently, the design courses, which combine elements of these three types of

courses, constitute the most crucial part of design education (Demirbaş & Demirkan, 2003: 438). The key to establishing a knowledge base for teaching lies at the intersection of content and pedagogy. Visual arts education typically has its origin either in education or in the art world (Lindström, 2011: 8). Art and design education should develop pedagogical models to satisfy the needs and expectations of art students with a focus on creating positive experiences (Micklethwaite, 2005: 92). Art education focuses on the development of an intra-personal aesthetic, intelligence, expression and experimentalism. It also concentrates on learning and encouraging innovation in the forms of expression and communication between students' conscious and subconscious. Effective art education requires a dynamic balance between stability and change. Individual skills and social knowledge have strong influence on art education. Knowledge sources in art education include the following; *individuals* such as art educators, artists and critics; *artefacts* such as books, documents, movies, and images; and *acts of inspiration-seeking* as ideation, exploration, conceptualisation, experimentation, refinement and production (Chua & Heng, 2010: 328). According to Delacruz (2009: 262), a properly fashioned and technology-enhanced art curriculum aids educational goals in art education.

The Basic Design course allows students to learn design fundamentals (Boucharenc, 2006: 1). The course, which is the core of following studio courses, orients students to the shared traits of critical design thinking and the interplay between studio and lecture (Teal, 2011: 39). Design allows interactive understandings that are both analytic and experiential (Teal, 2010: 295). According to D. A. Lauer and S. Pentak (2007: 1, 3,7, 117, 238, 242), the artist arranges elements to make an artwork, which has elements of both content and form; content is what the artist says and form is how the artist says it. The creative process includes thinking, looking, doing, critiquing and re-doing. A good art and design framework consists of the proper incorporation of design principles and elements. Design principles, which apply to all art and design works, generally include *unity, emphasis and focal point, scale/proportion, variety, balance and rhythm*. Moreover, *line, shape/volume, value, colour, texture, mass and space, and illusion of motion* are accepted as design elements (Çağlarca, 1996; Tepecik, 2002; Seylan, 2005; Öztuna, 2007; Alakuş & Özsoy, 2011). The experiment is conducted on the colour design element subject. Briefly, colour is a property of light, not an object itself. A cylindrical three-dimensional colour system, which is needed to represent the full range of possible colours, takes three factors into account: hue, saturation and value. In the subject, students study primary colours, secondary colours, cool-warm colours, various colour combinations, emotional colour and colour symbolism on their projects.

The collaborative learning works on social interaction among students as a means of knowledge constitution (McInnerney & Roberts, 2004: 204). Collaborative learning facilitates the understanding of individual thought processes, the support of group learning, synthesis of relevant information from sources, participation in inquiry practices, the discussion of interactions with annotations, collaboration with others, and application of the students' own methodologies to build knowledge-based structures (Land & Greene, 2000: 45). The utilization of digital technologies builds necessary social and communication skills through its functions among both learners and educators (Kirschner, Martens & Strijbos, 2004: 4).

Digital technology has been transforming education and research since Computer-aided instruction (CAI) first appeared at the late 1950s, followed by CAL (computer-assisted learning), CBL (computer-based learning), HCI (human-computer interaction), CMC (computer-mediated discourse), CSCW (computer-supported cooperative work), WBL (web-based learning), TEL (technology-enhanced learning) and CSCL (computer-supported collaborative learning) (Säljö, 2010: 55). Digital technology creates beneficial change for both teachers and students (Wang, 2010: 180). Moreover, digital technology allows students and educators to interact with information, resources, and instruction (Forsblom & Silius, 2004: 18). In the U.S.A., the use of computers in arts courses of higher education began in the late 1980s (Busby, Parrott & Olson, 2000: 190, 198). In art education, computer technologies increase interaction between educators and learners and among learners, too (Delacruz, 2009: 262). Moreover, image editing and vector drawing software packages are also highly recommended as tools for completing assigned projects because they reduce the time required less time to design alternative projects and allow students to devote more time for the design process. More importantly, recent technology reduces barriers for finding design solutions and increases the quality of the design over time (Yantaç, Özcan & Emengen, 2011: 41). Computers are used in fine arts instruction is no longer in question; the focus is on how they are used (Busby et al., 2000: 198).

The Internet is now a core educational element in universities (McGill & Hobbs, 2008: 191). Students' willingness to accept an e-learning system is determined by their technological expectations and the compatibility of technology with education (Chen, 2011: 1501). Current web-based tools create more flexible conditions for collaborative learning with regard to time and place for students and instructors (Karakaya & Şenyapılı, 2007: 102). Computer-



based multimedia learning environments introduce a potentially richer ground for developing learners' understanding in their studio and home via the Internet than traditional education alone (Mayer & Moreno, 2002: 116; Mayer, 2003). It is now easy to reach art sources around the world via the Internet (Sang, 2009: 216). Additionally, many studies demonstrate that digital educational data can be reused at any time (Wang et al., 2006: 209; Ullrich & Melis, 2010: 102). Nevertheless, students face common problems such as feelings of isolation, over reliance on text-based learning, difficulty finding available computers and accessing the Internet. Hybrid courses, which combine various components of face-to-face teaching with online experiences, will continue to emerge as a growing trend in academic institutions. WbCL's benefits include information sharing among multiple people, international collaboration, flexibility, knowledge construction, negotiation, multiple learning modes of interaction and project-management (So & Bonk, 2010: 189-191). Also, instant feedback and repetition of knowledge tests strengthens students' knowledge and retention levels (Wang et al., 2006: 209). However, most educators do not recommend utilising computer-aided web-based learning as the sole teaching model because of the advantages of face to face teaching. Virtual learning environments enable both synchronous and asynchronous exchanges among students and instructors through face-to-face and distance-learning university courses. Experiments have explored WbCL's benefits (McGill & Hobbs, 2008: 191) such as stimulation and deeper communication (Cress, Wodzicki, Bientzle & Lingnau, 2011: 308). In addition, WbCL consists of the mediation of learning, interaction, and cognition by digital mediums. WbCL research focuses on the systemic and dialogical. Systemic research examines the outcomes and cognitive abilities of individuals. The dialogical approach analyses how instructional materials and resources are used in teacher-student interactions (Krange & Ludvigsen, 2008: 29).

METHODOLOGY

WbCL has been applied in many educational fields. However, the utilization of WbCL is limited in art education limited, because of the practical nature of the subject and the master-pupil relationship between the teacher and the student. Within this context, this study focuses on the comparison of the effects of WbCL and traditional face-to-face instruction in on the colour design element subject of the Basic Design Course in terms of knowledge and retention levels of art and design students.

The main goal of this study is to discover whether there are significant differences in students' cognitive abilities and academic achievement between WbCL and human tutored models in the colour design element subject in the Basic Design. Five research questions are explored within the context of this research.

1. Is there a significant increase from the pre-test results to the post-test results in the learners in the WbCL model?
2. Is there a significant increase from the pre-test results to the post-test results of the learners in the human-tutored model?
3. Is there a significant difference between the post-test results and the retention test results of the learners in the WbCL model?
4. Is there a significant difference between the post-test and retention test results of the learners in the human-tutored model?
5. Is there a significant difference between the post-test and retention test scores across the two groups?

The related hypotheses of the study are as follows: a) implementation of WbCL in the colour design element subject in the Basic Design Course positively affects the knowledge level of the students and b) learners' retention level improves when they can easily access knowledge from various sources anytime and anywhere.

Design

The study aims to illustrate and empirically test an extended framework of students' goal orientations related to their knowledge and retention levels in the Basic Design Course at the Faculty of Arts and Design at Gazi University, Turkey. The sample for this research consisted of two groups of students at the spring semester in 2009. Each group consists of 20 students. One of the groups is randomly assigned to WbCL group for testing the instruction medium and the other is assigned to human-tutored group. The students who enrolled in both sections of the Basic Design course did not have a high level of knowledge or experience with computer-aided learning. Both sections were taught by the same instructor, and all students submitted the same projects. All were studying the subject 'Colour', one of the design elements. The experimental group's students were each given a canvas, four brushes, and 2 tubes of oil

paint per week for their participation and were further motivated to take part in the project by being told that the tutorial might help them to learn the material associated with the subject. The duration of the instruction was six weeks. The research measured and compared the students' knowledge based on their post-test and retention test scores of the students in both groups.

Knowledge Test

In order to prepare a reliable and valid knowledge test, a questionnaire relating to the Basic Design element 'Colour' was prepared by four instructors experienced in the Basic Design Course and Measurement and Evaluation in Education. At the beginning, there were 50 questions on the test. Each question provided four possible answers, and participants choose the best answer to their knowledge. Although the questions mostly had positive roots, some questions had negative roots. One hundred twenty-five questionnaires were sent out to first-year undergraduate art students at four universities: Kadir Has University and Maltepe University in Istanbul and Başkent University and TOBB ETU in Ankara. Out of 125 questionnaires, 82 were returned. Each question was coded as either 0 or 1 for correct and incorrect answers, respectively, to ensure the validity and reliability of the test. The reliability coefficient was calculated as 0.74. The item discrimination powers and the reliability coefficient were analysed according to the ITEMAN 1988 programme (Tekin, 1996: 249). Thirty-two questions were selected as having significant effect (item discrimination power = 0.30) on the model based on expert opinions, item difficulties, and dissociation indices of substance and total item correlations. This paper-based knowledge test was administered three times to the participants in both groups during the experiment. The questions were matched on the pre-test, post-test and retention test so that each question on the pre-test had a corresponding similar question on the post-test and the retention test, either by re-writing the question or, where appropriate, re-arranging the choices and the placement of the question in the list. The difference among the test-gain scores reveals how much learners' knowledge and retention levels improved (Ruttun, 2009: 1011). The pre-test measured the amount of participants' pre-existing knowledge on the subject matter before the study. The post-test was utilised to measure knowledge accumulation after learning the subject from the given learning system after the experiment. The retention test focused on participants' ability to recall information about the content one month after the study. The difference between the post-test and retention test indicates the extent to which the students remained familiar with the given knowledge.

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Instruction Instrument

Literature of the theory of multimedia learning was carefully examined because of preparing the most suitable instruction medium for the experiment. The theory involves active cognitive processing using multiple channels (Mayer & Moreno, 2002: 111). In the ideal instruction instrument, the multimedia presentation contains a combination of images, animated sequences, textual and verbal elements, and online interactions between an educator and students. Also, it has connections to other related websites for better understanding (Chou & Liu, 2005: 65; Ainsworth, 2006: 184; Yantaç & Özcan, 2006: 91). According to the spatial contiguity effect, students learn more profoundly from multimedia presentations when corresponding words and images are placed near each other on the screen (Mayer, 2003: 133). Additionally, the readability of the text on screen is important (Andrewartha & Wilmot, 2001: 7). Text content, which consists of information from the literature, instructor's course notes, and textbooks, can greatly improve the learning process (Decoo, 1984: 43). Textual information is preferably presented through spoken language to increase the chances for a better understanding (Hilbert et al., 2007: 317, 318). Thus, freeing capacity in the text channel boosts processing of the visual channel more efficiently (Mayer & Moreno, 2002: 115). Additionally, animated images take precedence over static images (Höffler & Leutner, 2007: 722). However, several studies compared the advantages of static graphics and animated graphics, but the results diversify (Sangin, Dillenbourg, Rebetez, Bétrancourt, & Molinari, 2008: 395). According to learning preference theory, some students learn better from images, others from spoken words and others from text (Mayer & Moreno, 2002: 115, 116). Thus, multimedia learning with more than one presentation is the most effective. Multi-representational systems provide flexibility to distribute information to learners (Ainsworth, 2006: 184). Students become qualified to construct significant representations because of active learning processing (Mayer, 2003: 130). Nonetheless, the very flexibility of the hypermedia learning systems confuses students who do not succeed in non-linear multimedia learning systems (Ruttun, 2009: 1007). Moreover, independent study may feel confusing (Mitchell, Chen & Macredie, 2005: 53). Students who expect high-quality computer-based training learn more than learners expecting low-quality computer-based training. In order to cope with quick navigation buttons, page labels and successful visual elements direct students to the contents, sub-contents and images in an orderly fashion (Haimerl & Fries, 2010: 499). Also, the instruction medium contains questionnaires that enable to evaluate students' knowledge levels (Rodicio & Sánchez, 2010: 2) for recalling knowledge of the colour subject. Therefore, a high degree of planning and coordination skills are required when preparing multimedia channels of the instruction medium (Kirschenmann, 2001: 16).



Motivation is also significant in WbCL (Schoor & Bannert, 2011: 560). During the preparation of the instruction instrument, six meetings with students took place. Their opinions were highly valued so that they felt like an important part of the study. According to an achievement goal theory, instructors' motivation also is important (Butler, 2007: 241). A website should be designed in collaboration with educators (Sang, 2009: 216) in order to meet their goals, such as learning goals, performance approach goals, performance avoidance goals and work avoidance goals (Nitsche, Dickhäuser, Fasching & Dresel, 2011: 575). Hence, educators can convince students about the necessity and importance of WbCL with peace of mind.

The research study that would incorporate 'Basic Design Education Web', www.temelsanategitimi.com, was begun in October 2008 and completed in January 2009. The instruction instrument was prepared by four independent educators, who also prepared the knowledge test. The instrument is on the basis of a range of didactic criteria such as the structure of learning subjects, clarity of content, images, animations, coherence and pedagogy. Within this context, an interactive CD, which was also designed with the same framework and elements as the website (Beaufils, 2000: 115), was prepared using the authoring software Macromedia Director MX 2004 (Hilbert et al., 2007: 321). It was provided to students in WbCL model for offline access.

Procedure

The study divided into six phases, listed in chronological order below.

- 1) The final version of the instruction medium was introduced to the WbCL group and the educator. Thus, they had the opportunity to individually explore the computer-based learning environment to learn how to navigate, use the forum, log in and log out for one hour before the project began.
- 2) Before the experiment, the participants in both groups took the pre-test to find out their knowledge level because of ensuring the reliability and validity of the experiment. The duration of the test was 30 minutes.
- 3) The instruction medium, 'Basic Design Web', was online. Additionally, its CDs were delivered to the students of the experimental group in case of disconnection from the Internet.
- 4) The educator was responsible for conducting the colour design element lessons for both groups for six weeks.
- 5) All students submitted their assignments at the end of the experiment. On the same day, the learners of WbCL returned the CDs. The website then went offline. In both groups, the students took the Post-tests after the six weeks. The duration of test was 30 minutes.
- 6) In both groups, the participants took the Retention test a month after the end of the experiment. The duration of the test was 30 minutes.

FINDINGS

This study focused on the relationship between students' learning styles and their achievement in two different learning environments: WbCL and human tutored. Both teaching groups' pre-test, post-test and retention test scores were used in the comparison of the WbCL and human-tutored groups. T test for independent samples and Two-way Variance Analysis were used to find the interaction effects of domain knowledge and system experience on students' learning performances. A significance level of $P > 0.05$ was adopted.

Before the experiment, T test for independent samples was used to find out a significant difference between the pre-test's scores of students in both groups answered. Table 1 presents the findings.

Table 1 The results of the pre-test knowledge level comparison

	Groups	N	Mean	Std. Deviation	t	df	p
Pre-test	WbCL	20	15.150	2.18	-0.558	38	0.580
	Human-tutored	20	15.600	2.87			

Table 1 presents the pre-test results of the students of WbCL and the human-tutored models. There is no significant difference between the performances of the WbCL and human-tutored models. This is important to ensure the validity and reliability ($t = -0,558$; $p > 0.05$) of the research because of the same knowledge level of student in both groups.

Table 2 presents the findings of the first research question, 'Is there a significant increase from the pre-test results to the post-test results in the learners in the WbCL model?' T test for independent samples was used to find a significant increase between the pre-test and post-test results for the learners in the WbCL model and its related interpretations.

Table 2 The results of the pre-test and post-test knowledge level comparison for WbCL group

Group	Tests	N	Mean	Std. Deviation	t	df	p
WbCL	Pre-test	20	15.150	2.18	-16.757	19	0.000
	Post-test	20	28.100	4.13			

Table 2 indicates that there is a significant increase from the pre-test to the post-test results of the learners in the WbCL model. When the arithmetic means are analysed in the WbCL model, the arithmetic mean of the post-test (28.100), is barely greater than the arithmetic mean of the Pre-test, (15.150). According to the results, WbCL learning activities have created a concrete way for students to interact with the instruction medium ($p < 0.05$). This change is observed in the success of the students in the experimental group. Due to the teaching and learning processes used in the WbCL model, students exhibited the desired behavioural changes.

Table 3 shows the findings of the second research question, 'Is there a significant increase from the pre-test results to the post-test results of the students in the human-tutored model?' and its related interpretations. T test for independent samples was used to find a significant increase between the pre-test and post-test results for the students in the human-tutored model and its related interpretations.

Table 3 The results of the pre-test and post-test knowledge level comparison for human-tutored group

Group	Tests	N	Mean	Std. Deviation	t	df	p
Human-tutored	Pre-test	20	15.600	2.87	-3.847	19	0.001
	Post-test	20	18.450	4.96			

According to the test results, this comparison reveals a meaningful increase between the performances on the two tests in the human-tutored model ($p < 0.05$). This meaningful change demonstrates the students in the experimental group increased their knowledge level during the experiment period.

Table 4 presents the findings of the third research question, "Is there a significant difference between the post-test results and the retention test results of the students in the WbCL model?" T test for independent samples was used to find a significant increase between the post-test and retention test results for the students in the WbCL model and its related interpretations.

Table 4 The results of the post-test and retention test knowledge level comparison for WbCL group

Group	Tests	N	Mean	Std. Deviation	t	df	p
WbCL	Post-test	20	28.100	4.13	2.438	19	0.025
	Retention	20	26.350	5.66			

The comparison in Table 4 reveals that there is no significant difference between the post-test and retention test results in the WbCL environment. This reduction is insignificant, as indicated by the result of analysis ($t = 2.438$, $p < 0.05$). Given the intervening one-month period, the students' knowledge levels remained high enough. There were gains using the WbCL model.

Table 5 presents the findings of the fourth research question, "Is there a significant difference between the post-test and retention test results of the students in the human-tutored model?" T test for independent samples was used to find a significant increase between the post-test and retention test results for the students in the human-tutored model and its related interpretations.

Table 5 The results of the post-test and retention test knowledge level comparison for human-tutored group

Group	Tests	N	Mean	Std. Deviation	t	df	p
Human-tutored	Post-test	20	18.450	4.96	1.931	19	0.069
	Retention	20	16.900	4.19			

The comparison in Table 5 reveals that there is no significant difference between the post-test and retention test results of the human-tutored model. This decrease is not reliable, as indicated by the result of analysis ($t=1.931$, $p>0.05$). Hence, it can be said the knowledge accumulated in both models is persistent.

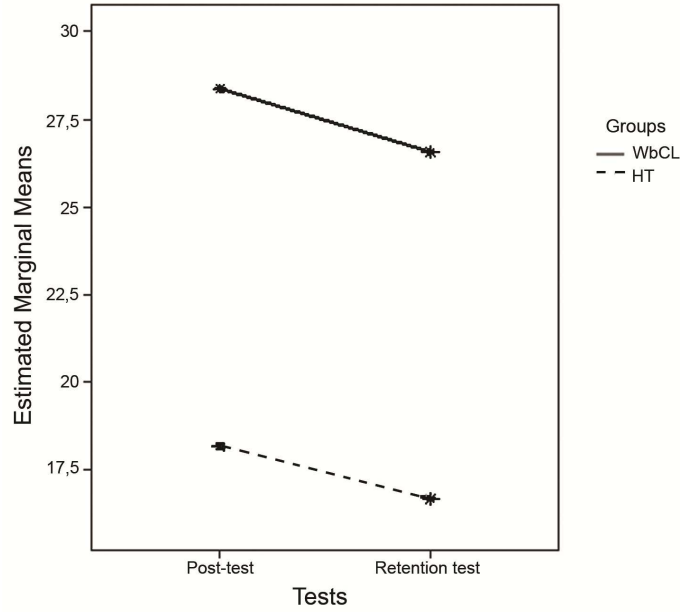
Table 6 shows the findings of the fifth research question, “Is there a significant difference between post-test and retention test knowledge levels across the two groups?” Two-way Variance Analysis was used to understand the comparison between the two models. Pre-test scores are accepted as variable covariance.

Table 6 The results of the post-test and retention test knowledge level comparison between WbCL and human-tutored groups

Resource of Variance	Type III Sum of Squares	df	Mean Square	F	Sig.
Intra-the Groups					
Measurement (Post-test-Retention test)	2.224612	1	2.224612	0.3864	0.538
Measurement* Group	0.475	1	0,475	0.0820	0.776
Deviation	213.036	37	5,758		
Between the Groups					
Group (Individual/Group)	2.001,030	1	2.001,030	80.657	0.000
Deviation	917.941	37	24.809		

The comparison in Table 6 reveals that there is no significant difference between the Post-test and Retention test results of the students in the both models ($F=0.386$, $p>0.05$). Furthermore, with regard to the results of the Post-test and Retention test across two groups, there is no meaningful difference between WbCL and human-tutored models ($F=0.082$, $p>0.05$). The decreases do not verify that there are significant differences between the post-test and retention test scores of the students. The differences were reliable, as indicated by the findings ($F=80.657$, $p<0.01$). The statistics barely prove the students got higher scores in the Post-test and Retention test in the WbCL environment, which develops their knowledge levels. It features in Figure 1. In the WbCL model, the transmission of knowledge from educator to student is not limited in terms of time and space. In both groups, successful students approach learning to satisfy their internal enthusiasm and to acquire new skills for upcoming courses and future careers. Others only aim to pass the course (Sithiworachart & Joy, 2008: 217).

Figure 1 The results of the knowledge and retention levels between WbCL and human-tutored groups



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Although the study generated significant results, there were some limitations of the study that can be improved in further studies. First of all, the experiment was only a small-scale study conducted over a relatively short period of time. Second, a larger sample needs to be taken into consideration over the course of an academic year to universalize results for the Basic Design Course instruction. The study provided an overview for the needs, requirements and additional benefits of the highly practical and project oriented nature of Basic Design Course, which might be a good starting point for future research. Thus, researchers need more comprehensive research to clarify and accomplish the goals of WbCL.

DISCUSSION

The primary goal of the study is to compare WbCL and face-to-face instruction models for the Basic Design Course, in terms of knowledge and retention levels over time. The findings of the study demonstrated that the WbCL model is more effective for the theoretical knowledge acquisition phase of the course. With respect to the positive result regarding knowledge and retention levels, the WbCL offered learners more knowledge resources within the instruction medium and links to related websites, even outside the classroom. Additionally, the obvious advances of the knowledge level of students in the WbCL were actually based on better understanding and employment of digital pedagogical methods. However, there is no significant difference in the retention test scores of both groups.

In addition, extending the experiment through the entire academic year enables the students to become more accustomed to studying with the WbCL. The successful integration of WbCL based learning not only depends on employing technology but also on how educators handle it. Moreover, the experiment is to give not only an opportunity to evaluate the success of WbCL used within the course but also a valuable pathfinder for other studio courses in art education.

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