Message from the editor-in-chief

Malaysian Online Journal of Educational Technology (MOJET) highlights the current issues in educational technology. MOJET is an international, professional refereed journal in the interdisciplinary fields sponsored by Faculty of Education, University of Malaya. This journal serves as a platform for presenting and discussing the emerging issues on educational technology for readers who share common interests in understanding the developments of the integration of technology in education. The journal is committed to providing access to quality researches ranging from original research, theoretical articles and concept papers in educational technology.

In order to produce high quality journal, extensive effort has been put in selecting valuable researches that contribute to the journal. I would like to take this opportunity to express my appreciation to editorial board, reviewers and researchers for their valuable contributions to make this journal a reality.

Professor Dr. Saedah Siraj
January 2018
Editor in chief

Message from the editor

The Malaysian Online Journal of Educational Technology (MOJET) is aimed at using technology in online teaching and learning through diffusing information from a community of researchers and scholars. The journal is published electronically four times a year.

The journal welcomes the original and qualified researches on all aspects of educational technology. Topics may include, but not limited to: use of multimedia to improve online learning; collaborative learning in online learning environment, innovative online teaching and learning; instructional design theory and application; use of technology in instruction; instructional design theory, evaluation of instructional design, and future development of instructional technology.

As editor of the journal, it is a great pleasure to see the success of this journal publication. On behalf of the editorial team of The Malaysian Online Journal of Educational Technology (MOJET), we would like to thank to all the authors and editors for their contribution to the development of the journal.

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A Case Study of The Online Interactions Among ESL Students To Complete Their Narrative Writing Task

Nagaletchimee Annamalai [1]

ABSTRACT

The study is a qualitative case study that investigated the patterns of interactions among ESL students during their online interactions to complete their narrative essays. The study found that students were engaged in interactions related to language related assistance, using partner as a resource and providing encouragement as suggested by Golonka et al. (2017). Nevertheless, these interactions were only focused on aspect related to sentence fluency and word choice. Interactions related to organizations and ideas were minimal. The findings implied that the presence of a teacher is pertinent for students to construct knowledge in a more meaningful way in the virtual classrooms. A number of pedagogical implications were suggested in this study.

Keywords: online learning, interactions, language teaching methodology, writing skills

INTRODUCTION

The increasing prevalence of digital media has afforded educationalists and practitioners the opportunity to assimilate new technologies while designing diverse pedagogies in English language learning. Online interactions seem to be important feature in the use of technology as it complements teacher fronted interactions by providing a context of practice. According to Mark and Coniam (2008) meaningful online interactions will not only equip learners with language skills but also provide learners with authentic learning context that traditional classroom setting does not offer. In the framework of social-cultural tradition suggested by Vygotsky (1978), learning takes place when interactions take place more than in learners’ minds and knowledge is co-constructed via the network of interaction. Swain (2010) termed interactions as ‘languaging’ that help learners make sense of their learning unambiguously. According to Hsieh (2017) language mediates learners’ higher order thinking and help them generate ideas to reach new understanding in a problem-solving process (p.115).

Research have demonstrated the different methods of utilizing online interactions in various online environment. For example, Zou et al. (2016) conducted a study among 32 students in an online (Wiki) language exchange programs between China and the United Kingdom. The study found that the online interactions helped students to correct language errors and eventually students improved their writing skills. In Taiwan (2014) wikis was used to explore whether it can be used to encourage foreign language acquisition via peer interaction and collaboration. The study reported that students’ interactions on wikis increase their motivation to learn English and students appeared more confident. Yen et al. (2015) studied the students’ activities by integrating Facebook and Skye as online platforms found that students improved their speaking
and writing skills via peer-interactions. In a Cyber University in Korea, Kang and Im (2013) found that instructional interactions positively affected perceived learning achievement and satisfaction that interactions related to social interactions. In all these studies, there was positive relationship between interaction and learning outcomes. Infact, interaction is also viewed as an important strategy of self-regulated learning.

Despite the well-acknowledged role of interactions, some findings show that not all types of interactions are effective nor do they contribute to effective learning (Strijbos, Narciss & Dunnebier, 2010; Shute, 2008). More specifically, there are only a few studies on what type of interactions may best contribute to improving learners’ writing and learners failed to use the strategy appropriately to their advantage. A number of studies have pointed out that that the virtual classrooms have not been accompanied by a necessary shift in interactions which is obviously a challenge for educators because they tend to carry on with traditional pedagogical practices that is not appropriate in online classrooms and learners. This implies that online interactions which is part of online learning needs to apply appropriate strategies in order to stimulate effective learning. It appears findings related to online interactions have not been perfected and requires further research. Positive findings on online interactions cannot be generalized to other educational settings or populations with different background. With the increase number of online learning courses more studies are needed to explore students’ interactions and the ways in which we can improve the interactions in teaching and learning activities.

Given the relevance of interaction and its influential role in educational environment, the researcher’s aim in the present study is twofold. First, to explore the online interactions of a group of ESL learners. And these interactions improve the interactants’ writing quality. Informed by the Vygotsky’s (1978) social cultural theory and the concept map suggested by Golonka et al. (2017) this study aims to provide valuable insights into the patterns of online interactions in a group of ESL learners and explore the pedagogical implications for writing skills. This study is intended to yield insides that provide greater insights online interactions of high school students in the Malaysian contexts. This study can form a basis for defining how feedback can be designed to improve virtual classrooms in the Malaysian context. It is also envisaged that the findings of this study will be able to provide suggestions on how learners and instructors need to be trained to maximize the benefits from online interaction. This will further able the researcher to suggest pedagogical suggestions and the required interactions for the instructors in future.

Thus, the present study is an attempt to add to the literature of online interactions in the social networking sites. The research site is in an urban high school knows as CLHS in Malaysia. In Malaysia, students have been traditionally faced with challenges in the effort to acquire writing skills in the ESL classrooms. These challenges range from mother tongue interferences to practical issues of time and space to communicate outside the classroom. The shortage of interactions indirectly affects the students writing in English. Online interactions can play a pertinent role to address the many challenges facing EFL learners. ICT tools have contributed to many advantages in EFL instructions. In fact, the Malaysian Blueprint (2015-2015) has stressed the importance of the use of ICT in teaching and learning activities.

Facebook is used as an interactional platform in this study due to its popularity in Malaysia. Social networking sites such as Facebook inherit some of the highly sought after qualities that are effective and long have been practiced in traditional classrooms and higher learning. In fact Staines and Lauchs (2013) pointed out that social networking sites such as Facebook should be leaners’ normal extension and part of their daily life practice.

This study was designed to answer the following questions:

What are the types of student-student interactions that enhanced the quality of their narrative writing?

While the academic and research literature provides pertinent views to guide the current study, the researcher holds the perspective that practice should be considered by the emerging data from the context it is taking place.
Literature Review

In this study the researcher focused on theoretical framework of social constructivism theory suggested by Vygotsky to explain the conceptualization of interactions in learning. According to social constructivism theory meaningful learning occurs when complex ideas and information are combined with students’ experiences and prior knowledge to form personal and unique understandings (Keengwe et al., 2008, p. 86). Vygotsky (1986) found that all cognitive functions are based on social interactions and interaction in knowledge communities is a constructivist process. Social constructivism perceives learning not as knowledge transfer but knowledge constructed. Thus, exploring the interactions in the online discussion is pertinent, not to acknowledge the social and motivational factors but to realize the quality of the discussions and achievement (Andresenm 2009). In the current era, the introduction of ICT tools into the practice of online education has heightened the interest of practitioners to the notion of interactions. Interaction is considered important strategy in self-regulated learning.

Lin et al. (2016) notes the heightened capacity of online interactions, when the content analysis found of the group page and Chi Square tests discovered significant relations among interactions types, initiation types and response type for the posts. Semi-structured interviews were conducted to investigate the positive and negative experiences of the participants. Against the background he asserts the strong presence of the instructors to foster the online learning environment. Also acknowledging the capabilities of online interactions are Gikandi and Morrow (2013) who draw attention to feedbacks the encourage active learners’ participation and meaningful engagement. The qualitative study found that the interactions engaged the learners in dialogic peer feedback that eventually provide learning support and self-regulation. In the local scenario, Choo et al. (2014) reported that co-construction of knowledge when the interactions were categorized based on Gunawardena et al. (1997) Interaction Analysis Model.

As such, online interactions can be regarded as an important and constructive behavior to solve problem in learning activities. However, the usage of online interactions is not without the number of challenges. Students who have used interactions have reported their dissatisfaction on feedback, low quality of discussion higher order skills deficiency and inadequacy of involvement (Ishtaiwa et al.,2015; Arnold and Ducte, 2006; Ishtaiwa & Abdullah, 2012). Conceptualizing online interactions in the literature is still not clear and not enough is known. The lack of in-depth qualitative studies makes it hard to learn about the online interactions and learning outcome and indeed little is known about this relationship. One significant qualitative study that is relevant to the current research is by Golonka et al. (2017) who found various behaviors of students in online interactions.

The online interactions were related to language learning, such as providing language related assistance (self and peer correction, negotiation of meaning) using their partner as a resource (for clarifying information, modeling language use or helping with unknown vocabulary) and providing encouragement (responding positively to the task and to each other, eliciting information from a partner). Despite promising findings the study was not conducted with the ESL learners in the Malaysian setting. It is these perspectives on learning that informed the design of this study. The present study intends to use the Vygotsky social constructivism theory and the concept map suggested by Golonka et al (2017) to categorize the online interactions. investigate online interactions of a small group of Malaysian students. when they were engaged in the online writing environment to complete their narrative writing task. Thereupon it would be vital and informative to investigate the factors that help learners to add quality to the language leaning in a different setting. Figure 1 illustrates the concept map for types of peer interactions during chat sessions.
Therefore the most pressing issue that need to be addressed is not how to promote online and beneficial learning attitudes to solve problem in online interactions, but to find out whether the online interactions are able to add quality of the students narrative writing. The online interactions in this study only involved student-student interactions.

**METHODOLOGY**

The study was a qualitative research to examine the online interactions of a small group of ESL students from an urban school in Malaysia. A qualitative research will be able to detail human behavior and characters. Due to its in-depth nature, the current study only focused on a small sample. The researcher was not the instructor of the current course, thus there should not be any concern on issue of biasness and conflict of interest over the study. The writing task was part of their regular syllabus and there should not be any problem of biasness. Since the main aim of the current study is to examine the online interactions of the students instead of the products of the collaboration, the primary data is the categorization of the online archives based on Golonka et al. (2017). The researcher is concerned about the process as well as the product. Therefore students’ scores of the writing task will also be discussed briefly. The researcher modelled ways of interactions with examples to the students. The interactions were related to explaining, confirming, referring to information from web-resources and resolving.

**Context of the study**

The study was carried out in an urban Chinese school in the norther region of Malaysia. The school was interested in this study as it would be a worthwhile approach for students to integrate technology in language learning. Firstly, the Form Four students were selected by the Head of the English Panel after consulting with the Principal as this study was expected to be an avenue for the students to perform well in their SPM examination (Year 10) in the following year. Furthermore, the Form Four students were not sitting for any government examination in the year of the present study. Therefore, it is easier to get the administrative and parental support for a more effective and thorough study.
Participants

The six participants were students of Year 10 have sufficient familiarity with the use of Facebook. The tasks given to them were based on their public examination in Year 11. Pseudonyms were used for all the participants. The students come from lower to the higher income group. The student population is Chinese. The Indian and Malay students are considered the minority in the school. However, there were no Malay and Indian students in the class where the research was conducted.

The Research Site: The Chinese Secondary School

The school is a co-educational school located in a middle-class residential area in an urban part of Penang. The total number of teachers in this school is 120 and it had an average enrolment of 2300 students. It is a premier school where students who obtained outstanding results were selected to this school. However, the Head of English Panel pointed out that students are generally weak in their writing particularly in continuous writing and it is reflected in their SPM results.

Instructional design and procedure

To gather the online archives for this study the teacher set a closed group discussion in the Facebook environment. Students were invited to join the group. All the information was available to the teacher and the students.

The process involved three phases:

Initial Task (Week 1) Students were to write their essays traditionally without the help of the online environment. The title of the essay was: A Narrow Escape. Six essays will be collected for this task.

Main Task (Weeks 2-7) Teacher upload the title, examples, tips and suggestions for students to write their narrative writing. Students were instructed to interact with their peers to add quality to the essays. Students need to write their essays individually before interactions and another essays after the interactions. Students are given a duration of two weeks to submit the essay after the interactions. Interaction on the task is solely on the online environment and there was no discussion in the traditional classroom environment during the main task. The titles of the essays were ... For every task, each student need to write two essays before and after the interactions (2 essays). For three tasks, 36 essays were collected. The titles of essays were “Describe the most embarrassing experience you have had” (Task 1), Write a story beginning with “the students were excitedly unloading” (Task 2) and “Write a story ending with “tears welled up in his eyes” (Task 3). Final Task (Week 8): After the online environment students were to write their final essays in the traditional classroom without the help of the online environment. The title of the essay was “Saved at the Eleventh Hour”. The entire study lasted for 6 weeks. In total 12 essays were collected from initial and final task and 36 essays from the online environment will be collected.

Coding of the online interactions

The online archives were analyzed and categorized based on Golonka et al.’s (2017) framework. The online interactions were identified based on Swain and Lapkin’s (1998) definition that ‘any part of a dialogue where language learners talk about the language they are producing, question their language use or correct themselves or others’ (p.326). Two coders independently identified the online interactions. The inter-rater reliability was 80%. Following the discussion, a third rater were considered for unresolved interactions. Therefore 100% agreement were achieved.

Materials

The writing task was narrative writing which were part of the syllabus for public examination. Students were instructed to write one individual essay and another essay after the interactions. Each essays contains about 400 -500 words. The teacher provided the students with materials and relevant resources, tips and suggestions to complete the task. The expected structure of the narrative essays was based on Labov and
Waletzky’s narrative structure (1988). There was:

- **Abstract**: What is the story about?
- **Orientation**: Who, when, where, what?
- **Complicating Action**: Then what happened?
- **Evaluation**: So what, how is this interesting?
- **Result of resolution**: What finally happened?
- **Coda**: That’s it. I’ve finished and am “bridging” back to our present situation.

**Feedback guideline**

Students were guided with examples on how to give feedback to their peers. The researcher offered examples and enriched the meetings with ideas and probes. Linguistic aspects related to organization, content, vocabulary and mechanics. The instructor’s interactions are not considered in this study intentionally to investigate on what aspects of writing are students able to handle independently in their virtual classroom and what are the aspects in writing that is lacking in their interactions.

**Data Collection**

**Scores for the narrative essays**

The essays were rated by three independent raters. There were trained by the researcher by using the pilot study scripts. The raters were guided by the Model Assessment Scale by Spandel (2005).

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<th>Trait</th>
<th>Scores</th>
<th>Definition</th>
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<td>Ideas(I)</td>
<td>20</td>
<td>Ideas create the writer’s message. They form the thesis or argument of writing and are supported with details, examples and anecdotes that inform the reader’s understanding.</td>
</tr>
<tr>
<td>Organization(O)</td>
<td>20</td>
<td>The internal structure that guides the reader smoothly from beginning to end. Here the writer provides transitions that guide the reader from one idea to another while paying attention to the overall logical order of the writing.</td>
</tr>
<tr>
<td>Voice</td>
<td></td>
<td>This is the persona or presence writes create through their engagement with their own writing. The writer’s own interest, feelings and reactions to the topic shine through in the writing, creating a style and expressiveness that engages the reader.</td>
</tr>
<tr>
<td>Sentence Fluency (SF)</td>
<td>20</td>
<td>Reader. This trait is concerned with the rhythm and cadence the writer produces in the text, a flow of word structures that engage the reader and make reading more pleasurable.</td>
</tr>
<tr>
<td>Word Choice(WC)</td>
<td>20</td>
<td>Choosing the right word at the right time can create just the mental image or impression the reader needs to understand the writer’s intention. It brings to life the writer’s thoughts.</td>
</tr>
<tr>
<td>Conventions (Con)</td>
<td>20</td>
<td>The mechanics of writing, this trait concerns punctuation, spelling, grammar and usage and proper paragraphing.</td>
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FINDINGS AND DISCUSSION

The participants were actively involved in the interactions with a minimum of 8 comments and a maximum of 45 comments per week. There was a total of 568 online archives collected from this study. All the students completed the 3 three tasks given to them.

Language Assistance

Language related assistance that were evident in this findings were partner corrections, self-corrections and negotiation for meaning. The peers have indicated the error by highlighting the sentence with error as well as writing out the appropriate sentence (Example 1).

Example 1

Also evident was language assistance related to spelling errors.

Example 2

There was also participant who began to comment on a series of language errors.

Example 3
Grammatical errors were also evident in their essays and were highlighted in their interactions (Example 4). Such interactions allow students to reflect on grammar and language use to produce accurate sentence structures.

Example 4

Joyce Chee makes me feel embarrassing, = made, past tense
June 29 at 10:20pm · Like · 1

Joyce Chee Peony Moon had experienced is past prefect...i think you remembered wrong..
July 1 at 9:57pm · Like

Joyce Chee was been arranged to duty with me = had been arranged
June 29 at 10:22pm · Unlike · 2

The interactions also emphasized the appropriate use of vocabulary.

Example 5

Joyce Chee to eat the nutrition food = the is for specific, but u dint mention about nutrition food earlier, so better to use same nutrition food
June 28 at 8:26pm · Like

Monster KBlue oh i see.. heart cannot 'popping out'...it will be jump out from our body ... ahha
July 17 at 9:54pm · Unlike · 1

Prompting corrections

Example 5 illustrates the interactions that made some noteworthy contributions by encouraging participants by giving clues on how to correct their errors.

Example 5

Peony Moon had experienced? i tot we have to put original word after had? or have i mbb wrong??
June 30 at 5:56pm · Like · 2

Monster KBlue The students were discussing about their strategy in the competition en route to the destination although their teachers have asked them to take a rest... I found the word 'en'... is it correct? what does it mean? can someone explain to me?
July 14 at 6:02pm · Like
Negotiation of meaning in this study is based on one participant seeking assistance in understanding the other speaker’s message (Pica, 1987). The interactions were coded by identifying the following three steps suggested by Golonka et al. (2017).

1. Look for a signal that communication has broken down
2. Trace back to identify the trigger
3. Look ahead to find the resolution

Example 6 indicates on how the participants were interacting on various types of sounds to make meaning. Example 7 illustrates negotiation of meaning related to appropriate sentence structures.

Example 6

Example 7

In summation, the interactions related to language assistance seems to engage students with active learning and reduces their reliance of teachers’ response and facilitate interactions that permit students for effective learning.

Using partners as a resource

Using partners as a resource includes modelling, helping with vocabulary, clarifying instructions and helping with technology problems. Partners were used as a resource in the meaning making process. Such interactions represent language learning process, making online interactions a potential aspect in writing in collaboration. Modelling in this study is refereed to examples given to enhance the quality of the essays. Example 8 illustrate on how certain ideas were illustrated with examples to gain better understanding and to be transferred to sentence structures in the essays.
Modelling

A number of various linguistic aspects were discussed and models were made to make the ideas to be considered in their writing. Examples of such interactions were illustrated in the next section.

Example 8

Valentini Belbo hyphenated word is like a noun is it? such as: He is a 12-year-old boy
July 29 at 8:51am · Unlike · 1

Deer Tommy Cuneorally Belbo has a good command of English... She can describe the actions very well... Well... Her essay really makes me "shiver"... and I feel ashamed because I can't use some BOOMASTIC words like her... By the way, I like her essays "STYLE"... It was truly a SPM standard essay...
June 27 at 5:40pm · Like · 1

Catelite Nina last time I checked for the word silenced. the dictionary said it was grammatical error
July 30 at 7:07pm · Unlike · 1

Deer Tommy Silence is a noun. Silenced is a verb?
July 30 at 6:47pm · Unlike · 1

One of the participant reported on technical problem and one of the peers suggested solution to overcome the problem.

Example 9

Helping with technology problems

Deer Tommy My laptop Kapersky can't go into this website~
SAD~
July 22 at 8:24am · Like

Nanthini Maniam Don't worry Deer Tommy...you try to surf through any online dictionary which can suit your computer security setting
July 22 at 10:28pm · Like · 1

Helping with vocabulary

The help of vocabulary was evident with a brief clarification for a better understanding. Quick solution was given for errors. Code switching (Example 10) was found in the interactions offering a translation form English to Chinese and also Example 10 illustrates interactions related to vocabularies.

Example 10

Monster KBblue oh i see... heart cannot 'popping out'... it will be 'jump out' from our body ... ahh
July 17 at 9:34pm · Unlike · 1

Monster KBblue hw can handling obedient students a challenging job for u?
June 29 at 10:28pm · Unlike · 1
Providing encouragement

Providing encouragement will be the interactions related to giving support, confident and hope to continue writing. Participants interactions were found to be encouraging feedback. It is hoped that such interactions will provide opportunity to construct and refine their knowledge and language learning.

Elicitation

Elicitation refers to gathering information and ideas to improve the essays. The peers have given constructive comments for the particular participant to continue writing. Such positive comments in a way have encouraged the participants to complete their task.

Example 11

Helping with task completion

Participants helped their peers to clear their doubts and provided web-based materials to provide language accuracy for the participants to complete their tasks. The following section illustrates the example.

Example 12

Humor

Christophel and Gorham (1990) humor reduces social distance and encourage concerns and willingness and reveal their personal information for other individuals to know more about each other and provide a better environment to establish trust, support and a sense of belonging. Such interactions were
evident in this study as illustrated in Example 13.

Example 13

There were certain types of interactions not found in the study. For example, self–correction. Self-corrections refer to interactions of repairing owns errors right after they happened without being prompted by peers. In other words, self-corrections were self-initiated. Such corrections were not found in the interactions. There researcher found that the interactions related to positive affect, toward partner/chat, following instruction and staying on task are overlapping with other types of interactions. There is no clear cut definition on how to differentiate these interactions and interactions related to language assistance and using partner as resource. Therefore, the researcher found that such types of interactions were redundant and not considered in this study.

Quality of the Narrative Essays

All students performed better on the essays after the interactions rather than the essays before interactions. There were basically significant differences in aspect related to sentence fluency (SF) and word choice (WC) aspects. However, there were not much changes in scores related to organization (O) and ideas(I). Table I illustrates the scores.

The score before the interaction and after the interactions were illustrated in Tables 1. It is found that there was difference of 2-3 marks in their scores for aspect related to sentence fluency and word choice and there were no significant changes in aspects related to organization and voice aspects. There were significant changes in the total scores of initial and final tasks.

Table 1 Students’ Average Scores for Task 1

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>AVERAGE SCORES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BEFORE INTERACTION</td>
</tr>
<tr>
<td></td>
<td>O</td>
</tr>
<tr>
<td>S1</td>
<td>15</td>
</tr>
<tr>
<td>S2</td>
<td>14</td>
</tr>
<tr>
<td>S3</td>
<td>15</td>
</tr>
<tr>
<td>S4</td>
<td>14</td>
</tr>
<tr>
<td>S5</td>
<td>14</td>
</tr>
<tr>
<td>S6</td>
<td>17</td>
</tr>
</tbody>
</table>
### Students' Average Scores for Task 2

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>AVERAGE SCORES</th>
<th>BEFORE INTERACTION</th>
<th>AFTER INTERACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>O</td>
<td>I</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>S2</td>
<td></td>
<td>14</td>
<td>15</td>
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<tr>
<td>S3</td>
<td></td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>S4</td>
<td></td>
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<td>16</td>
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<tr>
<td>S5</td>
<td></td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>S6</td>
<td></td>
<td>17</td>
<td>18</td>
</tr>
</tbody>
</table>

### Students' Average Scores for Task 3

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>AVERAGE SCORES</th>
<th>BEFORE INTERACTION</th>
<th>AFTER INTERACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>O</td>
<td>I</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>S2</td>
<td></td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>S3</td>
<td></td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>S4</td>
<td></td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>S5</td>
<td></td>
<td>14</td>
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</tr>
<tr>
<td>S6</td>
<td></td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

### Students' Average Scores for Initial and Final Tasks

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>AVERAGE SCORES FOR INITIAL AND FINAL TASKS</th>
<th>INITIAL TASK</th>
<th>FINAL TASK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>O</td>
<td>I</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td>12</td>
<td>12</td>
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<tr>
<td>S2</td>
<td></td>
<td>17</td>
<td>17</td>
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<tr>
<td>S3</td>
<td></td>
<td>14</td>
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<tr>
<td>S4</td>
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<td>12</td>
<td>13</td>
</tr>
<tr>
<td>S5</td>
<td></td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>S6</td>
<td></td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>
DISCUSSION

The qualitative coding of the online interactions highlighted three main types of characteristics: language related assistance, using partners as resources and providing encouragement. The interactions related to language is related to linguistic gains. This aspect is related to spelling errors, appropriate use of grammars and sentence structures. Such interactions are often considered to be meaningful in language acquisition as it encourages the noticing of language features that is pertinent to produce a good essay. The interactions also empowered the participants to look at the peers’ writing and broaden their knowledge with ideas from their peers. However, most of the interactions related to language assistance are considered ‘shallow interactions’ as students were not proved to further construct knowledge. There were interactions related to using partner as a resource, learners interacted and collaborated with their peers with vocabulary, modelling and technical problems. Pooling of ideas and web resources were evident for students to complete their tasks. This echoes Zou et al. 2016; Storch, 2013; Mark and Coniam, 2008 studies that interactions involve highlighting peers’ errors, arguing on language choices and requesting and receiving help. Such interactions highlight the transition of learners from traditional classroom learning to be more committed, purposeful and relevant. Such attitudes are in line with the 21st century learning skills that focuses on self-directed and peer support learning. It is evident that students are slowly moving towards autonomous learning.

It also need to be pointed out that the interactions did not engage in organization aspects of the essays. They were merely editing the essays and were not keen in revamping the essay for organization and content aspects. This is likely due to the fact that students are not aware of the advantages that is available in the online learning environment where they can be engaged in critical and higher order thinking. As evident most of the interactions were related to editing of the essays for grammatical and sentence structures and to enhance their vocabulary use in the essays.

When students are put in the online environment, higher order thinking can be achieved with the availability of materials, resources, time and space. Brief interactions as evident in this study will not result in deep learning. This is probably the deficiency of expertise in guiding the interactions. The online interaction environment is new for the students to work collaboratively. Thus, they might be going through the transition from traditional classroom environment to online environment. This in turn suggest the necessity of the proper guidance from the teacher before students’ engaging in the online interactions.

There are a number of pedagogical implications offered by this study to increase the effectiveness use of online interactions in the virtual classroom. There is a need for interactions that encourage to revamp the whole essay. Online interactions should not only be confined to editing the essay for grammar and sentence structures. At this point the research would like to suggest a check list for a more positive and effective attitude towards interactions. A detailed specific and restricted criteria need to be outlined for students to increase the quality of interactions. According to Slavin, (1991) online interactions should plan their activities at the initial stage for member to negotiate meaning, set goals, build trust and sentence structure is only one part of essay writing. With the growing interest in online interactions and collaboration work one more solid guidance for essay writing should be implemented for online virtual classrooms. It is also important to note that without the instructors or teachers’ supervision online interactions will not lead to significant interactions that allows higher order thinking to take place.

Overall, students were able to improve the quality of narrative writing tasks. However, in this exploratory study the researcher found that more effort is needed for students to be self-directed and self-regulated learners. Writing in English language involves the need to acquire grammatical aspects and students should be instructed to discuss aspects related to grammar such as different parts of speech. Discussion should be created for these aspects for life-long learning with minimal support from the teachers. Students should also be warned not to only give solutions to language problems. What is needed is how to solve the language problems. All these aspects have to be discussed by the group before the assignments are completed. Nevertheless, the teacher with effective and minimal guidance will be able to channel the discussion to construct knowledge.
Although the students have the flexibility to carry out the discussion, teachers need to set guidelines on what need to be included in the interactions. Number of posts by the students is not important. The quality of interactions related to higher order thinking should be emphasized. Thus, learning objectives suggested by Blooms Taxonomy (2001) such as apply, analyze, evaluate and create elements should be involved in their discussions. Xia et al. (2013) suggested that when their interactions are considered as part of their assessment, students will be able to interact effectively. Providing timely responses is also deemed pertinent for students to retain motivation and constructive interactions. Students need to be guided to find their own directions in learning, formulating their own learning problems, deciding their own action and reflecting on the outcome of that process. Therefore in virtual classroom the presence of teacher or instructor is vital. There must be a necessary shift in teacher’s pedagogical practices. According to Gikandi et al. (2011) effective learning in the virtual environment involves active, collaborative and reflective discourse to foster self-regulation. Designing online interactions to achieve positive learning outcomes is a critical task for ESL teachers in future.

The following are possible limitations of this study with further opportunities for future directions. A large scale study would be able to confirm and expand the findings of this study. The researcher used Facebook as an interactional platform, further studies should consider other platforms such as Edomodo, Bebo, Whats App to verify if the results hold valid in other social networking sites. Therefore, the findings of the study are useful for teachers who are keen to use the online interactions, in teaching of writing for ESL learners. This finding provides basis for development of effective online student-teacher and student-student strategies in the online learning environment. Teachers may need to think and try to figure out a way to help students on writing instruction that will help students to move to higher order thinking skills.

CONCLUSION

Although this finding have significant contribution in the field of online interactions an obvious drawback would be generalizability. As the use of online environment is new in the Malaysian context in high school. In summation, the current study provides valuable information for application for future research. The findings are culture specific since the study is situated in the Malaysian context. Future research could investigate the instructors’ perception on the efficacy of the online environment for online learning. Ethnographic study should also be considered to investigate the factors the influence students’ acceptance and participation in the online learning environment in longitudinal studies.

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Analysis of Students’ Online Information Searching Strategies, Exposure to Internet Information Pollution and Cognitive Absorption Levels Based on Various Variables

Adile Aşkım Kurt [1], Bülent Gürsel Emiroğlu [2]

ABSTRACT

The objective of the present study was to examine students’ online information searching strategies, their cognitive absorption levels and the information pollution levels on the Internet based on different variables and to determine the correlation between these variables. The study was designed with the survey model, the study group included 198 students attending Computer Engineering and Computer Education and Instructional Technologies (CEIT) Departments in two universities located two cities in the Central Anatolian Region in 2016-2017 academic year fall semester. The data collection tools were Online Information Searching Strategy Inventory, Internet Information Pollution Scale and Cognitive Absorption Scale. In the study, it was found that the scores of the students related to these variables were above the average. It was also found in the study that there were low levels of positive correlations between the students’ level of cognitive absorption and encountering information pollution on the Internet and online information searching strategies. Another finding was that male students’ average score for online information searching strategies was higher than that of the female students. Furthermore, the common interaction between department and grade level variables based on the Internet information pollution scores was statistically significant.

Keywords: Online information searching strategy, Internet information pollution, cognitive absorption, computer engineering, CEIT

INTRODUCTION

Along with the advances in web technologies, the teaching-learning activities that are conducted on the Internet also rapidly diversify. As the Internet became a significant source for the teaching-learning process, learners’ Internet skills are expanding to include information literacy skills such as access to information, acquisition, evaluation and utilization (Kabakçı, Fırat, İzmirli & Kuzu, 2010). The search for information and processing the acquired information is a complex cognitive process that requires learners to verify, evaluate, organize and synthesize information obtained from different sources (Walraven, Brand-Gruwel & Boshuizen, 2008).

When the magnitude and diversity of the information available on the Internet are considered, since issues such as the value, reliability, impartiality, currency and applicability of the presented or acquired information constitute a question mark for the individuals, it is necessary to evaluate the web sites with a critical approach (Geçer, 2014; Yolal & Kozak 2008). As a matter of fact, the increase in the number of web pages on the Internet, which includes about 1.5 billion (anahaber.gen.tr, 2016) web sites based on 2015 data, resulted in disorientation (Ahuja & Webster, 2001), information overload and decrease in the quality of available information (Tu, Shih & Tsai, 2008). This makes it difficult to search for information on the Internet and individuals often get lost and do not know where they will go, where they are, and what they will do.
Previous studies have shown that individuals experience difficulties in customizing search terms, reasoning the search results, having a critical attitude towards the resource, and organizing the search process (Walraven, Brand-Gruwel & Boshuizen, 2008; Tsai, 2009). This fact demonstrates the significance of information searching strategies that individuals use when trying to access information on online media.

**Online Information Searching Strategy**

Cognitive strategies are significant for easy and rapid access of individuals to accurate and reliable information, and conducting various cognitive processes such as analysis, evaluation and decision-making during the process of access to information. Especially, it is important for the students to decide on the adequacy, reliability and relative quality of the acquired information, as well as the search and access of information on the Internet that they use as a primary source of information for their homework, projects and presentations. Du and Evans (2011) investigated how academic users search for information for their real-life research tasks with 11 PhD students. Interaction with multiple search systems, exploration of popular search engines, use of basic search function, construction of multiple search queries, multi-tasking reformulation, parallel reformulation, and recurrent reformulation were the searching strategies discovered as a result of the study. In fact, in a study conducted with high school students, it was concluded that the students’ awareness on the authenticity and reliability of the resources on the internet was inadequate (Esgin, Baba, Aytaç & Turan, 2011). Similarly, Lorenzen (2001) found that students used online environment as their primary source of information, however experienced problems in deciding whether the information they searched for and acquired was worth using in a study where the data was collected with interviews with high school students.

Hargittai (2012) studied the search for health information on the Internet via personal observations and interviews with a diverse group of 210 young adults about their experiences with looking for emergency contraception (EC) information on the Web. Results showed that one third of participants were unable to find any relevant information about EC and majority of the group could not identify the most efficient way to obtain EC in a time of need. It was stated that several individuals did not have necessary skills to navigate online content well with policy implications for educating people about informed and efficient Internet uses.

Wu and Tsai (2007), in a study they conducted to interpret the information searched on the Web and information searching strategies, collected data from 1220 students via the Web-based Information Search and Interpretation Strategies Scale developed by themselves and concluded that students’ information search-interpretation strategies significantly differed based on gender and grade level. Based on the data collected from 472 students in a study conducted to analyze web-based information search behavior of students by Kurulgan and Argan (2007), gender, department and internet proficiency level had a significant effect on the information search behavior of the students. Tsai and Tsai (2003) analyzed 73 college freshmen students’ information searching strategies in Web-based science learning activities of randomly selected eight subjects and examined the influence of students’ Internet self-efficacy on these strategies. It was reported that students with high Internet self-efficacy had better information searching strategies and learned better than those with low Internet self-efficacy in a Web-based learning task. Since online searching strategies are complex cognitive skills, they are influenced by diverse factors as well as self-efficacy (Tu, Shih & Tsai, 2008). It could be argued that one of these factors is the information pollution on the Internet.

**Information Pollution on the Internet**

In parallel with the development and penetration of the Internet, it became increasingly difficult for users to cope with this medium, which is created with the mass of information uploaded, edited and shared all over the world. A user who wants to access information on a certain subject often is faced with a lot of irrelevant, false and unreliable information on the search topic (Fırat & Kurt, 2015). This led to the birth of the concept of information pollution on the Internet, which was called “infollution” by Power (2015). In the study conducted by Firat and Kurt (2008), information pollution was defined by pre-service teachers as the presence of unnecessary, incorrect, out of date, unreliable, inconsistent, commercial information, which was not published by experts on the Internet in a disordered manner. As one of the consequences of information
pollution on the Internet, Hope (2008) stated that responses to fear of pollution and interpretative problems might result in banning the educational use of Internet at schools. Another disadvantage of information pollution on the Internet is the loss of time. As a matter of fact, time is one of the factors that explains cognitive absorption. This situation is expressed by the perception that we spend more than planned time or the perception that the time passes more rapidly when dealing with technologies (Koçak-Usluel & Kurt-Vural, 2009). Information pollution on the Internet could cause the individual to spend too much time while searching for accurate and reliable information, at least more than originally planned.

**Cognitive Absorption**

Cognitive absorption defined as “the condition of intense dependency on technological experiences” (Agarwal & Karahanna, 2000) and was explained by five elements: time, curiosity, focus of interest, pleasure and control (Koçak-Usluel & Kurt-Vural, 2009). The focus of interest is the condition where the attention is focused on the activity when interacting with technologies. However, Leong (2011) investigated the relationships between social presence, cognitive absorption, interest, and student satisfaction in online learning, and found no significant correlation between interest and cognitive absorption of the students. One of the sub-dimensions of the measurement tool, curiosity is the inquisitiveness of the individual while interacting with the technology, pleasure is the condition where the individual enjoys the interaction with the technology. Another sub-dimension of the measurement tool, time is the individual’s perception that the time runs more rapidly or the individual had spent more time than planned when interacting with technology, while control is the perception of the individual (Koçak-Usluel & Kurt-Vural, 2009). Agarwal and Karahanna (2000) described cognitive absorption on a multidimensional (temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity) construct with software involvement resulting in two important beliefs about technology use; perceived usefulness and perceived ease of use. It is proposed that the personal traits of playfulness and personal innovation are important determinants of cognitive absorption. Lin (2009) argued that cognitive absorption significantly affects behavioural intention through perceived usefulness and perceived ease of use of the virtual community. Both the perception of being in control when dealing with technologies and spending more time on the Internet due to Internet pollution could be related both to information pollution on the Internet and online information searching strategies.

Thus, the aim of the present study is to investigate students’ online information searching strategies, cognitive absorption levels and Internet information pollution levels based on different variables and to determine the correlations between these three variables. Based on the abovementioned general objective, the following research questions were identified.

1. How the students’ online information searching strategies, encountering information pollution on the Internet and cognitive absorption levels are distributed?
2. Is there a correlation between students’ online information searching strategies, encountering information pollution on the Internet and cognitive absorption levels and their 
   a. GPA?
   b. time spent on the Internet?
   c. frequency to connect to the Internet?

   Do the students’ online information searching strategies, encountering information pollution on the Internet and cognitive absorption levels significantly differ based on the common effect of the variables of
   a. gender?
   b. department?
   c. grade level?
METHOD

This section includes information on the research model, study group, data collection tools, and data analysis.

Research Model

The present study utilized the survey model, one of the quantitative research designs. Survey models aim to determine the attitudes, views, behavior, or characteristics of individuals (Cresswell, 2012).

Study Group

The study group included 198 students attending Computer Engineering and Computer and Instructional Technologies (CEIT) Departments of two universities located in two cities in the Central Anatolia Region during 2016-2017 academic year fall semester. However, since six of the students in the study group did not provide all information required in the data collection tools, these participants were excluded from the study and analyses were conducted with the data obtained from 192 students. Demographics of the study group is presented in Table 1.

Table 1. Demographics of the participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>f</th>
<th>%</th>
<th>Variable</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>192</td>
<td>100</td>
<td>Daily time spent on Internet</td>
<td>192</td>
<td>100</td>
</tr>
<tr>
<td>Female</td>
<td>85</td>
<td>44.3</td>
<td>1-2 hours</td>
<td>24</td>
<td>12.5</td>
</tr>
<tr>
<td>Male</td>
<td>107</td>
<td>55.7</td>
<td>3-4 hours</td>
<td>62</td>
<td>32.3</td>
</tr>
<tr>
<td>Department</td>
<td>192</td>
<td>100</td>
<td>5-6 hours</td>
<td>43</td>
<td>22.4</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>104</td>
<td>54.2</td>
<td>7-8 hours</td>
<td>23</td>
<td>12</td>
</tr>
<tr>
<td>CEIT</td>
<td>88</td>
<td>45.8</td>
<td>9-10 hours</td>
<td>16</td>
<td>8.3</td>
</tr>
<tr>
<td>Grade</td>
<td>186</td>
<td>100</td>
<td>11 hours or more</td>
<td>24</td>
<td>12.5</td>
</tr>
<tr>
<td>Junior</td>
<td>134</td>
<td>69.8</td>
<td>Frequency of Internet use</td>
<td>192</td>
<td>100</td>
</tr>
<tr>
<td>Senior</td>
<td>52</td>
<td>27.1</td>
<td>Once a day</td>
<td>17</td>
<td>8.9</td>
</tr>
<tr>
<td>GPA</td>
<td>125</td>
<td>100</td>
<td>A few times a day</td>
<td>164</td>
<td>85.4</td>
</tr>
<tr>
<td>1-1.99</td>
<td>39</td>
<td>31.2</td>
<td>Once a week</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>2-2.99</td>
<td>70</td>
<td>56</td>
<td>A few times a week</td>
<td>7</td>
<td>3.6</td>
</tr>
<tr>
<td>3-3.99</td>
<td>16</td>
<td>12.8</td>
<td></td>
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</tbody>
</table>

Table 1 demonstrates that 85 students who participated in the survey were female (44.3%) and 107 were male (55.6%). 104 participants were computer engineering students (54.2%), and 88 (45.8%) were CEIT department students, 134 (69.8%) were junior students and 52 (27.1%) were senior students. It was observed that more than half (56%) of the participants who reported a GPA had GPAs between 2-2.99, and that one third (32.3%) spent between 3-4 hours on the Internet per day. Furthermore, the majority (85.4%) of the students searched the Internet for information several times a day.

Data Collection Tools

**Online Information Searching Strategy Inventory (OISSI)**

"Online Information Searching Strategy Inventory" developed by Tsai (2009) and adapted to Turkish by Aşkar and Mazman (2013) was used to determine the online information searching strategies of the students. The Cronbach Alpha reliability coefficient of the scale 0.91 that includes 25 items and 7 factors, namely, "disorientation, evaluation, purposeful thinking, select main ideas, trial and error, control and problem solving". In the present study, the scale Cronbach α coefficient was calculated as .88. Since in the scale that was developed as a 6-point Likert type scale, the total score is calculated by the sum of the scores obtained from each item, the lowest possible score is 25 and the highest possible score is 150. A high score
indicates an advanced online information searching strategy. A high mean score on a sub-factor indicates that the strategy for that factor is advanced.

**Internet Information Pollution Scale (IIPS)**

"Internet Information Pollution Scale " developed by Firat and Kurt (2015) was used to measure the level of information pollution that students encountered while trying to access information on the Internet. The 5-point Likert-type 20-item scale includes two sub-factors; "problems originating from the environment" and "problems originating from the individual". Cronbach’s alpha internal consistency coefficient of the scale is .88. In the present study, the Cronbach α coefficient was calculated as .90. The lowest possible score in the scale is 20, and the highest possible score is 100.

**Cognitive Absorption Scale (CAS)**

"Cognitive Absorption Scale," developed by Agarwal and Karahanna (2000) and adapted to Turkish by Koçak-Usluel and Kurt-Vural (2009) was used to measure the cognitive absorption levels of the students. The 17-item scale includes four sub-factors, "time, curiosity, focus of interest and pleasure". The Cronbach alpha internal consistency coefficient of the scale is .92. The Cronbach α coefficient was measured the same also in this study. The lowest possible score that could be obtained in the 10-point Likert-type scale is 17, and the highest possible score is 170.

**Data Analysis**

Consistent with the objective of the study, the data collected with data collection tools were initially simplified by eliminating the incomplete forms and forms with extreme and outlier values. Then, the normal distribution of the total scores obtained with the data collection tools and calculated for each student was tested to utilize the parametric tests. According to Huck (2012), the skewness and kurtosis values must be between -1 and +1 to claim normal distribution of the data. It was observed that the scores obtained in all data collection tools confirmed the assumption of normal distribution (OISSI skewness = -0.532, kurtosis = -0.985, IIPS skewness = -0.398, kurtosis = -0.315, CAS skewness = -0.190, kurtosis=189).

To reach the sub-objectives of the study, correlation analysis was used to determine the correlation between the variables and a two-way analysis of variance was used to determine the effect of the common interactions of the independent variables on the dependent variables.

**FINDINGS**

In the study, initially, the distribution of the students based on online searching strategies, the information pollution on the Internet and cognitive absorption variables was examined. Descriptive statistics on the variables mentioned above based on the data obtained from the students are given in Table 2.

<table>
<thead>
<tr>
<th>Measurement Tools</th>
<th>n</th>
<th>x̄</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Information Searching Strategy Inventory (OISSI)</td>
<td>192</td>
<td>3.95</td>
<td>0.71</td>
</tr>
<tr>
<td>Disorientation</td>
<td>2.30</td>
<td></td>
<td>1.21</td>
</tr>
<tr>
<td>Evaluation</td>
<td>4.12</td>
<td></td>
<td>1.08</td>
</tr>
<tr>
<td>Purposeful Thinking</td>
<td>4.14</td>
<td></td>
<td>1.03</td>
</tr>
<tr>
<td>Trial and Error</td>
<td>3.17</td>
<td></td>
<td>3.15</td>
</tr>
<tr>
<td>Select Main Ideas</td>
<td>3.32</td>
<td></td>
<td>0.78</td>
</tr>
<tr>
<td>Control</td>
<td>4.53</td>
<td></td>
<td>1.06</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>4.07</td>
<td></td>
<td>0.96</td>
</tr>
<tr>
<td>Internet Information Pollution Scale (IIPS)</td>
<td>192</td>
<td>3.17</td>
<td>0.76</td>
</tr>
<tr>
<td>Environmental Characteristics</td>
<td>3.44</td>
<td></td>
<td>0.81</td>
</tr>
</tbody>
</table>
Measurement Tools

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>( \bar{x} )</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Characteristics</td>
<td>2.83</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Cognitive Absorption Scale (CAS)</td>
<td>192</td>
<td>7.08</td>
<td>1.51</td>
</tr>
<tr>
<td>Time</td>
<td>6.94</td>
<td>2.19</td>
<td></td>
</tr>
<tr>
<td>Curiosity</td>
<td>7.38</td>
<td>1.84</td>
<td></td>
</tr>
<tr>
<td>Focus of Interest</td>
<td>6.31</td>
<td>1.99</td>
<td></td>
</tr>
<tr>
<td>Pleasure</td>
<td>7.72</td>
<td>1.76</td>
<td></td>
</tr>
</tbody>
</table>

The average student score in OISSI was 3.95, which was above the average of 3.5 in the study. Students received the highest mean score in the control dimension in this instrument (\( \bar{x} = 4.53 \)). This was followed by purposeful thinking and evaluation sub-dimensions, respectively. The mean student score in IIPS was 3.17, which was higher than the mean score 2.5 in the study. Similarly, the mean student score in CAS was 7.08, well above the average 5.5, which is the possible mean score in the scale. The students received the highest scores in the "pleasure" dimension in this instrument (\( \bar{x} = 7.72 \)).

The Spearman correlation coefficient was used to determine the correlation between the students’ online information searching strategies, the level of information pollution and cognitive absorption and grade point averages, the time they spent daily on the Internet, and the frequency of their Internet use. Analysis results are given in Table 3.

### Table 3. Correlation analysis findings

<table>
<thead>
<tr>
<th></th>
<th>GPA</th>
<th>Daily Time Spent on Internet</th>
<th>Frequency of Internet Use</th>
<th>Cognitive Absorption</th>
<th>Internet Information Pollution</th>
<th>Online Information Searching Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>-</td>
<td>-.029</td>
<td>.008</td>
<td>-.010</td>
<td>.136</td>
<td>.126</td>
</tr>
<tr>
<td>Daily Time</td>
<td>-</td>
<td>.015</td>
<td>.219**</td>
<td>-.179*</td>
<td></td>
<td>.032</td>
</tr>
<tr>
<td>Spent on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absorption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Searching</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 3, there was a low level significant positive correlation between the time spent on the Internet daily and cognitive absorption (\( r = .219, p <.01 \)) and a low level significant negative correlation with information pollution on the Internet (\( r = -.179, p <.05 \)). There was a low level significant and positive correlation between cognitive absorption and information pollution on the Internet (\( r = 160, p <.05 \)). There was a low level significant positive correlation between online information searching strategies and cognitive absorption (\( r = .391, p <.01 \)), and a low level significant and positive correlation with Internet information pollution (\( r = .249, p <.05 \)).

Two-way analysis of variance was used to determine whether the students’ online information searching strategies, their encounter with information pollution on the Internet, and cognitive absorption...
levels differed significantly based on gender, department and grade level variables. The results for each dependent variable were tabulated separately. The ANOVA results for scores on online information searching strategies for students based on department, grade level and gender variables are presented in Table 4.

### Table 4. ANOVA results on students’ online information searching strategy scores based on department, gender and grade level

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td>528.427</td>
<td>1</td>
<td>528.427</td>
<td>1.780</td>
<td>.184</td>
</tr>
<tr>
<td>Grade Level</td>
<td>957.058</td>
<td>1</td>
<td>957.058</td>
<td>3.224</td>
<td>.074</td>
</tr>
<tr>
<td>Gender</td>
<td>1383.209</td>
<td>1</td>
<td>1383.209</td>
<td>4.660</td>
<td>.032</td>
</tr>
<tr>
<td>Department*Grade Level</td>
<td>192.206</td>
<td>1</td>
<td>192.206</td>
<td>.647</td>
<td>.422</td>
</tr>
<tr>
<td>Department*Gender</td>
<td>679.376</td>
<td>1</td>
<td>679.376</td>
<td>2.289</td>
<td>.132</td>
</tr>
<tr>
<td>Grade Level*Gender</td>
<td>318.068</td>
<td>1</td>
<td>318.068</td>
<td>1.071</td>
<td>.302</td>
</tr>
<tr>
<td>Department<em>Grade Level</em>Gender</td>
<td>93.034</td>
<td>1</td>
<td>93.034</td>
<td>.313</td>
<td>.576</td>
</tr>
<tr>
<td>Error</td>
<td>52838.264</td>
<td>178</td>
<td>296.844</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1881462.978</td>
<td>186</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The interaction effect of department, grade level, and gender variables on students' online information searching strategy scores was not statistically significant ($F_{(1,178)}=.313$, p>.05). Furthermore, the interaction effects between the independent variables (grade level *gender, department*gender, department * grade level) were also not statistically significant. However, online information searching strategy scores differed based on gender ($F_{(1,178)}=.032$, p<.05). The difference favored male students. In other words, the mean online information searching strategy score of male students ($\bar{x} = 100.7$) was higher than the mean online information searching strategy score of female students ($\bar{x} = 93.21$).

The ANOVA results for the students’ encounter with the information pollution on the Internet scores based on department, gender and grade level are presented in Table 5.

### Table 5. ANOVA results for the students’ encounter with the information pollution on the internet scores based on department, gender and grade level

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td>.728</td>
<td>1</td>
<td>.728</td>
<td>.003</td>
<td>.955</td>
</tr>
<tr>
<td>Grade Level</td>
<td>377.751</td>
<td>1</td>
<td>377.751</td>
<td>1.669</td>
<td>.198</td>
</tr>
<tr>
<td>Gender</td>
<td>.423</td>
<td>1</td>
<td>.423</td>
<td>.002</td>
<td>.966</td>
</tr>
<tr>
<td>Department*Grade Level</td>
<td>1296.071</td>
<td>1</td>
<td>1296.071</td>
<td>5.725</td>
<td>.018</td>
</tr>
<tr>
<td>Department*Gender</td>
<td>117.998</td>
<td>1</td>
<td>117.998</td>
<td>.521</td>
<td>.471</td>
</tr>
<tr>
<td>Grade Level*Gender</td>
<td>45.748</td>
<td>1</td>
<td>45.748</td>
<td>.202</td>
<td>.654</td>
</tr>
<tr>
<td>Department<em>Grade Level</em>Gender</td>
<td>6.868</td>
<td>1</td>
<td>6.868</td>
<td>.030</td>
<td>.862</td>
</tr>
<tr>
<td>Error</td>
<td>40293.986</td>
<td>178</td>
<td>226.371</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>784824.744</td>
<td>186</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The interaction effect of department, grade level, and gender variables and students’ scores on encounter with the information pollution on the Internet was not statistically significant ($F_{(1,178)}=.030$, p>.05). However, the interaction effect of department and grade level variables was significant ($F_{(1,178)}=.521$, p<.05). Descriptive statistics on information pollution on the Internet scores based on grade level and department variables are given in Table 6.
Table 6. Descriptive statistics on information pollution on the Internet scores based on grade level and department variables

<table>
<thead>
<tr>
<th>Department</th>
<th>Grade Level</th>
<th>( \bar{x} )</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIT</td>
<td>3</td>
<td>67.411</td>
<td>1.799</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>56.250</td>
<td>4.758</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>3</td>
<td>59.991</td>
<td>1.881</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>63.326</td>
<td>2.700</td>
</tr>
</tbody>
</table>

Based on the table, CEIT junior students’ level of encountering information pollution on the Internet (\( \bar{x} = 67.41 \)) was higher than that of the senior students in CEIT department and the juniors and seniors in Computer Engineering Department.

ANOVA results for cognitive absorbance scores of the students based on department, gender and grade level are given in Table 7.

Table 7. ANOVA results for cognitive absorption scores of the students based on department, gender and grade level

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td>2.459</td>
<td>1</td>
<td>2.459</td>
<td>.004</td>
<td>.951</td>
</tr>
<tr>
<td>Grade Level</td>
<td>131.608</td>
<td>1</td>
<td>131.608</td>
<td>.199</td>
<td>.656</td>
</tr>
<tr>
<td>Gender</td>
<td>792.681</td>
<td>1</td>
<td>792.681</td>
<td>1.198</td>
<td>.275</td>
</tr>
<tr>
<td>Department*Grade Level</td>
<td>1276.179</td>
<td>1</td>
<td>1276.179</td>
<td>1.929</td>
<td>.167</td>
</tr>
<tr>
<td>Department*Gender</td>
<td>.002</td>
<td>1</td>
<td>.002</td>
<td>.000</td>
<td>.999</td>
</tr>
<tr>
<td>Grade Level*Gender</td>
<td>311.597</td>
<td>1</td>
<td>311.597</td>
<td>.471</td>
<td>.493</td>
</tr>
<tr>
<td>Department<em>Grade Level</em>Gender</td>
<td>641.875</td>
<td>1</td>
<td>641.875</td>
<td>.970</td>
<td>.326</td>
</tr>
<tr>
<td>Error</td>
<td>117756.143</td>
<td>178</td>
<td>661.551</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2798512.608</td>
<td>186</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The interaction effect of department, grade level and gender variables on cognitive absorption scores of students was not significant (\( F(1,178) = .970, p > .05 \)). Furthermore, the interaction effect of the independent variables (grade level*gender, department*gender, department*grade level) and individual effects were not significant.

DISCUSSION AND CONCLUSIONS

In the study conducted with 192 CEIT and Computer Engineering students, the online information searching strategy scores of the students were found to be above the average value of 75. Students received the highest scores in Online Information Searching Strategy Inventory in the "control" sub-dimension. The fact that the average score for the control strategy was high indicated that the participants could effectively navigate the searches because the control sub-dimension includes the skills necessary to manipulate search applications on the Internet. In other words, connecting using URLs, using different web browsers, and knowing advanced search options. It is believed that the fact that participating students were computer engineering candidates and students in the CEIT department was the reason behind this finding. As a matter of fact, students exposed to content through which they could acquire these skills in different courses available in the curricula.
The students' Internet information pollution scale scores were above the average value of 50. The students who participated in the study indicated that encountering information pollution on the Internet was mostly just a characteristic of the medium. Students might encounter unnecessary, false, incomplete, advertising information on the Internet. In other words, students are confronted with information pollution originating from the environment rather than themselves. Today, it is increasingly difficult to choose the right information among the hordes of information available on the Web as the individuals become more producers than mere consumers. Today, the concept of trolling, in other words, consciously dissociative or aggressive behavior during the communication process using computers (Mercimek, Dulkadir-Yaman, Kelek & Odabaşi, 2016), is prominent, making it difficult for the individuals to reach the accurate information in Internet environment.

The students' cognitive absorption scale scores were above the average value as the other two scoring instruments. The students received the highest scores in the subscale of "pleasure" in the cognitive absorption scale. The pleasure dimension is related to the joy of interacting with technology, enjoying the pieces of technology and technology being an object of affection by itself. In other words, students enjoyed spending time with technology. This dimension was followed by the "curiosity" dimension. According to this dimension, while students spend time with technology, they have a more curious approach in their cognitive and emotional experiences and experience an emotional pleasure and joy. In other words, while students spend time with technology, the feelings of pleasure and curiosity are triggered. In a study conducted by Çuhadar (2013), these two dimensions are found to be the dimensions with the highest mean scores. This finding could also be due to the knowledge of the participant group included the content knowledge in the field of technology. Time, which is one of the sub-dimensions of cognitive absorption, is the state where one loses the count of time while interacting with technologies. In other words, when one is dealing with technology, one spends more time than planned or the time passes rapidly (Koçak-Usluel & Kurt-Vural, 2009). This is considered to be due to the fact that students could not use online information searching strategies efficiently and that they are exposed to information pollution on the Internet. As a matter of fact, there was a positive but low level significant correlation between the duration of daily Internet access time and cognitive absorption in the study (r = .219, p <.01). However, there was a negative but low level significant correlation between the duration of daily Internet access and information pollution on the Internet (r = -.179, p <.05). In other words, as the time the students accessed the Internet daily increased, exposure to Internet information pollution decreased. It is considered that this was due to the fact that the students were able to access the right information and spent more time on this information. In fact, in a study by Cevik (2015) conducted with college students, it was reported that web search experience was one of the best predictors of online information searching strategies.

In the study, low level significant and positive correlations were determined between students' cognitive absorption levels (r = .329, p <.01) and levels of exposure to Internet information pollution (r = .166, p <.05) and online information searching strategies. In other words, as students utilized online information searching strategies, their cognitive absorption levels increased. This could be explained by the fact that the students were searching for new information on the Web due to their curiosity, one of the sub-dimensions of cognitive absorption, even though they were target-oriented while browsing the Internet. Although the increase in use of online information strategies, as the level of exposure to Internet information pollution increases was not expected finding, it could be explained by the fact that individuals could be exposed to inaccurate and irrelevant information as explained in a study conducted by Kabakçı et al. (2010), where the authors analysed the views of 21 elementary school teachers about Internet searching strategies with the qualitative method of survey research. The findings revealed that internet searching strategies implemented by teachers differed between the inception and the development processes of the search. It was also stated that teachers experienced several problems such as irrelevant information, accessing insufficient information, accessing websites with virus threats while searching. One reason for this could be the fact that information is shared by everyone on the Internet and there is little control over it. As a matter of fact, in a study by Wang (2016), it was found that the teachers tended to believe that Internet contains certain and detailed specific information, and the online information should be justified.

In the study, it was found that the interaction effects of the department, grade level and gender
variables on the students’ online information searching strategy scores, and the paired interactions between the independent variables were no significant. However, based on gender, online information searching strategies scores differentiated. In other words, male students’ mean online information searching strategies scores were found to be higher than that of the female students. This result might be due to the fact that the students who participated in the study were not equally distributed based on gender and more than half of the students that participated in the study were computer engineering students, and the technical knowledge of these students was higher than that of CEIT students. The findings by Ay & Seferoğlu (2017), Li & Kirkup (2007), Tsai (2009), Tsai, Liang, Hou and Tsai (2012) were consistent with this finding. On the other hand, the results of the studies conducted by Sırakaya & Çakır (2014), Turan, Reisoğlu, Özçelik & Göktaş (2015) differed from the finding obtained in the present study. These different results could be related to the samples and data collection tools.

In the present study, the interaction effect of the department, grade level and gender variables did not have a significant impact on the Internet information pollution scores of the students, while the interaction effect of department and grade level variables had a statistically significant impact. In other words, the level of the CEIT department junior students in exposure to Internet information pollution was higher than that of the CEIT department seniors and junior and senior Computer Engineering students. This could be explained by the fact that junior students were less experienced than senior students. In fact, Fırat & Kurt (2015) concluded that CEIT department students were less affected by Internet information pollution when compared to preschool teaching students, and explained this finding with the higher experience of CEIT students in technology use. Furthermore, this finding could be explained by the fact that CEIT department students had lower level field knowledge compared to computer engineering department students based on the differences in the content of the related curricula.

In the study, although the students exhibited over the average levels in the use of online information searching strategies, encountering Internet information pollution and cognitive absorption, the students could be informed about the scrutinized variables. Exposure to Internet information pollution and cognitive absorption levels of students who use and do not use effective online searching strategies could be investigated. Especially, it could be argued that the prevalence of social media use is effective in the students’ cognitive absorption levels. Qualitative research on the causes of cognitive absorption could be designed in this context. It is also possible to investigate what the students in the sample group, who will be future role models for technology use, could do about Internet information pollution. Furthermore, similar studies could be designed with different sample groups.

REFERENCES


Investigating Student Attitudes toward Augmented Reality

Mustafa SIRAKAYA[1], Ebru KILIÇ ÇAKMAK [2]

ABSTRACT

This study aimed at identifying the attitudes of secondary school students toward AR applications and to investigate the change in these attitudes according to different variables. The study also aspired to determine the relationship between attitudes toward AR and achievement. The general survey model was used in the study. The study group was composed of 54 7th graders attending there separate classes of a state school. In order to determine student attitudes toward AR applications in educational environments, students were first provided with the experience for 4 weeks (16 lessons). Research findings show that students have positive attitudes towards AR applications. Gender, ownership of personal computers and mobile devices were not found to change attitudes toward AR applications. While daily Internet use was not found to affect AR attitudes, it was found that attitudes differed significantly according to frequency of playing computer games. Research findings show a meaningful relationship between AR attitudes and achievement.

Keywords: elementary education; media in education; virtual reality.

INTRODUCTION

Augmented Reality (AR) is defined as the technology in which virtual objects are interactively overlaid on real time images (Azuma, 1997, 1999). In a similar definition, Milgram and Kishino (1994) point to the fact that AR is an active and interactive environment generated by adding virtual data over real time images. As can be derived from these definitions, AR, in simple terms, is the synchronous overlay of real time images with virtual objects (Ibáñez, Serio, Villaran, & Delgado-Kloos, 2016; Sin & Zaman, 2010). Although these definitions may give the impression that it is an ordinary technology, AR has unique characteristics such as enriching or augmenting reality with the help of virtual objects. In this sense, it offers users a surreal environment which cannot be perceived by sensory organs (Sırakaya & Seferoğlu, 2016).

Definitions of AR have undergone changes along with the impact of advanced technology. First definitions in the field regard AR as a derivative of virtual reality and virtual environments (Azuma, 1997, 1999). In time, digital data such as videos, animations, 3D models and GPS (Delello, 2014; Perez-Lopez & Contero, 2013) are also added to elements such as text, sound and graphics to enhance the real time images. Although various similar definitions of AR exist, it is evident that the concept is still confused with the concept of virtual reality and sometimes AR is even used in place of virtual reality. Hence, it will be beneficial to explain what AR is not to present its difference from other concepts.

What Augmented Reality Is Not?

It is important to understand the concept of virtual reality in order to comprehend AR. Virtual reality is a simulation model that provides a sense of reality by allowing interactive communication between the user and the dynamic environment generated by computers (Bayraktar & Kaleli, 2007). Therefore, computer-generated 3D environments are found in virtual reality and its most characteristic feature is the simulation...
of the user’s physical presence in the environment. The user is in the virtual environment generated completely digitally and there is no interaction with the real world. This creates alienation and isolation for the user from reality. On the other hand, AR enhances the reality with the help of virtual data. It does not create an alternative real time but it uses the real time images as background and enhances it with the help of virtual images added on real time images (Billinghurst, 2002; Kerawalla, Luckin, Seljeflot, & Woolard, 2006; Sin & Zaman, 2010).

The features necessary for an application to be regarded as AR are: (1) it should connect the real and the virtual, (2) it should have simultaneous interaction, (3) it should be 3D (Azuma, 1997). The position of AR in the real-virtual continuum is depicted in Figure 1 by Milgram and Kishino (1994). It is the mixed reality environment.

**Figure 1. Reality-Virtuality Continuum (Milgram & Kishino, 1994)**

AR applications are basically categorized into two based on the technology being used: image based AR and location based ARAR (Cheng & Tsai, 2013). Virtual models are added over real time images in image based AR. Image based AR is differentiated as marker based and markerless AR based on the place where the model will be added. The place of the virtual model is defined by taking the position of the marker as reference in marker based AR. In markerless AR, where the virtual model will be added is not defined before. This study utilized marker based AR. Location based AR identifies the location of the user via various technologies and allows placement of virtual data over real time images.

**Augmented Reality in Education**

Recent advances in mobile technologies and widespread use of mobile devices have cleared the way to using AR technologies in different areas such as military, engineering, medicine, tourism and advertisement. With its advantages, AR has already attracted attention in educational spheres. It is observed in recent years that educational use of AR is on the rise (Wu, Lee, Chang, & Liang, 2013). Table 1 presents the findings of studies conducted on contributions of AR to educational environments.

**Table 1 Advantages of AR use in education**

<table>
<thead>
<tr>
<th>Pedagogic Benefits</th>
<th>Researcher(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>It attracts student attention to classes</td>
<td>Delello (2014), Tomi and Rambl (2013)</td>
</tr>
<tr>
<td>It increases motivation towards classes</td>
<td>Kerawalla et al. (2006), Perez-Lopez and Contero (2013)</td>
</tr>
<tr>
<td>It allows easy comprehension of complex topics</td>
<td>Kaufmann (2003), Núñez et al. (2008), Shelton and Hedley (2002), Yen, Tsai and Wu (2013)</td>
</tr>
<tr>
<td>It allows teaching of cases which would be impossible to generate in classroom environments</td>
<td>Kerawalla et al., (2006), Shelton and Hedley (2002), Yuen, Yaoyuneyong and Johnson (2011)</td>
</tr>
<tr>
<td>It ensures safe application of dangerous experiments</td>
<td>Wojciechowski and Cellary (2013)</td>
</tr>
<tr>
<td>It develops student imagination and creativity</td>
<td>Klopf and Yoon (2004)</td>
</tr>
<tr>
<td>It supports authentic learning</td>
<td>Wu et al. (2013), Yuen et al. (2011)</td>
</tr>
</tbody>
</table>
Table 1 presents many advantages of AR use in educational environments. Besides these advantages, AR has the potential to develop skills which are expected from today's learners, such as problem solving, group work, versatile assessment and understanding different perspectives (Schrier, 2006). As opposed to virtual environments, AR provides all these advantages without alienating students from classroom reality and therefore allows students to form natural interactions with virtual objects and physical environments around them (Matcha & Ramblı, 2013; Sin & Zaman, 2010).

Visualization opportunities presented to students by AR are especially noticeable in Table 1. Students find the opportunities to examine objects from all angles and in different locations with the help of 3D lesson materials developed with AR (Shelton & Hedley, 2002; Shelton & Stevens, 2004). Hence, abstract concepts that are difficult to visualize are learned more easily (Kaufmann, 2003; Núñez et al., 2008; Shelton & Hedley, 2002; Wu et al., 2013) by concretizing them (H. Cai, 2013; Shelton & Stevens, 2004). Also, superior to traditional tools, multimedia materials such as texts, pictures, audio, video and animations can be used (Wang, Kim, Love, & Kang, 2013). Hence, AR environments that can address more than one sense ensure that students actively participate in the process and acquire permanent learning (Dunleavy et al., 2009; Wojciechowski & Cellary, 2013; Wu et al., 2013). It can be argued that AR is an effective tool with this advantage that can be used to educate primary and secondary school students who have difficulty in comprehending abstract topics (Piaget, 1976) because of the cognitive stage they experience at those ages.

Literature review for this study presented various AR studies conducted on secondary school students. Table 2 presents these studies according to study topics.

**Table 2 AR Studies Conducted on Secondary School Students**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Subtopic</th>
<th>Researcher(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Geometric objects</td>
<td>İbili (2013)</td>
</tr>
<tr>
<td>education</td>
<td>Prisms</td>
<td>Gün (2014)</td>
</tr>
<tr>
<td></td>
<td>Geometric objects</td>
<td>İbili and Şahin (2013)</td>
</tr>
<tr>
<td></td>
<td>Geometric objects</td>
<td>Atasoy, Tosik-Gün and Kocaman-Karoğlu (2017)</td>
</tr>
<tr>
<td>Physics</td>
<td>Optical</td>
<td>Cai, Chiang and Wang (2013)</td>
</tr>
<tr>
<td>education</td>
<td>Electrostatic</td>
<td>Echeverría et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>Periodic table</td>
<td>Iordache, Pribeau and Balog (2012)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Chemical reactions</td>
<td>Wojciechowski and Cellary (2013)</td>
</tr>
<tr>
<td>Biology</td>
<td>Digestive system</td>
<td>Vilkoniene (2009)</td>
</tr>
<tr>
<td>education</td>
<td>Ecology</td>
<td>Huang, Chen and Chou (2016)</td>
</tr>
<tr>
<td></td>
<td>Water cycle</td>
<td>Kamarainen et al. (2013)</td>
</tr>
<tr>
<td>Astronomy</td>
<td>Solar system</td>
<td>Medicherla, Chang and Morreale (2010)</td>
</tr>
<tr>
<td>education</td>
<td>Solar system</td>
<td>Sirakaya (2015)</td>
</tr>
<tr>
<td>education</td>
<td>Museum education</td>
<td>Klopfer and Yoon (2004)</td>
</tr>
<tr>
<td></td>
<td>Art Museum</td>
<td>Damala, Cubaud, Batisiono, Houlier and Marchal (2008)</td>
</tr>
</tbody>
</table>
Table 2 shows that AR technologies are used in different classes in secondary education. It is evident that AR use in educational environments provides many benefits in the education and training process. It can be argued that using AR technologies in classroom environments is more effective in teaching objects and cases that are impossible to bring to classroom and in teaching abstract concepts and complex issues and topics (Walczak, Wojciechowski, & Cellary, 2006).

Since cognitive development in secondary school students follows a path from concrete to abstract, children in this age range learn things more easily when they see them concretely (Piaget, 1976). The AR environment facilitates teaching abstract concepts which are difficult to mentally visualize (Kaufmann, 2003; Núñez et al., 2008; Shelton & Hedley, 2002; Wu et al., 2013) with the help of multimedia elements such as texts, pictures, audio and video (Wang et al., 2013) and 3D models (Shelton & Stevens, 2004). In this sense, AR generates an alternative in teaching secondary school students who have difficulties in comprehending abstract concepts based on their current cognitive period. In line with the multitude of AR studies conducted on secondary school students (see Table 2), it is thought that AR applications will be more common and widespread in teaching secondary level students. Based on these reasons, this study was conducted on secondary school students experiencing concrete operations stage of their cognitive development.

Student attitudes toward AR will be important in ensuring the expected educational acquisitions and dissemination of AR practices in schools. Attitudes can be defined as individuals’ response toward objects and conditions that generate guiding and leading impact over situations (İnceoğlu, 1985). That is to say, attitudes are not behaviors but tendencies that steer individuals to certain behaviors. The Technology Acceptance Model (TAM) developed by Davis (1989) to present the factors that affect individuals in accepting technology also mentions the significance of attitudes. According to the TAM, attitudes shape the intent that is determinant in displaying the behaviors. Positive attitudes toward technology have direct bearing on its use. Individuals’ attitudes in accepting new technologies vary and as a result of this variance, the integration process may end in adaptation or refusal of these technologies (Akça & Özer, 2013). Student attitudes toward the new technology will influence its effective and productive use in the classroom. Thus, it can be argued that identifying student attitudes towards AR applications is crucial to ensure successful integration of AR technology into educational settings. However, the scarce number of previous AR studies conducted to present student attitudes to AR applications is noteworthy. This study is believed to contribute to literature in this respect.

Besides determining student attitudes toward AR applications, it is important to understand the change of direction in these attitudes. Knowing what situations cause change in AR attitudes may play a significant role in achieving success in integrating AR technologies into instructional settings. Limited number of studies in this field has shown that students’ demographic characteristics were not examined during these studies. Considering that today’s students use technology effectively in every stage of their lives, it can be argued that differences in levels of technology use may change their AR attitudes. Based on the rationale presented here, this study intended to identify secondary school students’ attitudes toward AR applications and examine the issue in terms of different variables. It is believed that findings of this study will be benefit researchers in developing and integrating AR applications which will be widely used in future educational
settings. The research question and sub problems related to the research question are as follows:

Research question:

• What are the attitudes of secondary school students towards augmented reality applications?

Sub problems:

• Do secondary school students’ attitudes towards augmented reality applications differ according to gender?
• Do secondary school students’ attitudes towards augmented reality applications differ according to personal computer ownership?
• Do secondary school students’ attitudes towards augmented reality applications differ according to mobile device ownership?
• Do secondary school students’ attitudes towards augmented reality applications differ according to period of daily Internet use?
• Do secondary school students’ attitudes towards augmented reality applications differ according to frequency of playing computer games?
• Is there a relationship between secondary school students’ attitudes towards augmented reality applications and their achievement?

METHOD

Research Design

Survey model was used in the study. Survey studies determine characteristics such as views, attitudes and abilities (Fraenkel & Wallen, 2006). Survey studies aim at presenting the case which is related to the topic of the study as is (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2008). Hence, survey studies aim at determining the attitudes, beliefs, thoughts, expectations, and demeanors characteristic of a group (Creswell, 2012).

Study Group

The study group was composed of 54 7th graders attending separate classes of a state school. Since the students in the study group were required to have AR supported instructional experiences, purposive sampling method was used in identifying the group. In purposive sampling, the researchers determine the sample themselves based on the purpose of the study (Fraenkel & Wallen, 2006). In this study, experience in AR supported instruction was used as a criterion in determining the study group. The students were taught the 4-week “Solar System” Unit via SpaceAR application. Students were divided into groups of four and were distributed tablets with SpaceAR application. The teacher kept the markers necessary to activate AR activities and gave the markers relevant to specific AR activities to student groups in order to activate related AR activities. The requirement of previous involvement with AR learning materials in classes in order to be able to identify attitudes toward AR limited the study group in terms of number. Table 3 presents the demographic information of the study group.
## Table 3 Demographic Information for the Study Group

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>30</td>
<td>55.6</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>24</td>
<td>44.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>54</td>
<td>100</td>
</tr>
<tr>
<td><strong>Ownership of personal computer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>31</td>
<td>58.5</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>22</td>
<td>41.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>53</td>
<td>100</td>
</tr>
<tr>
<td><strong>Ownership of mobile devices</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>32</td>
<td>59.3</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>22</td>
<td>40.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>54</td>
<td>100</td>
</tr>
</tbody>
</table>

### AR Learning Material

In order to determine student attitudes towards AP applications in educational environments, students were first provided with the experience for 4 weeks (16 lessons). With this aim in mind, marker based AR application (SpaceAR) developed by Sırakaya (2015) was used. The main goal of SpaceAR is to provide for students and teachers with 3D displays of the space environment and the events in this environment which are difficult to visualize or monitor due to lack of various means under real time conditions. SpaceAR was developed by taking the acquisitions and activities of the “Solar System” unit included in the 7th grade Science and Technology Class and includes 22 AR activities (celestial bodies, stars, Solar System, planets, spacecraft etc.) based on the activities in the textbook. Views of 2 field experts, 2 teachers and 3 technical experts were taken into consideration during the development process. Figure 2 provides screenshots of SpaceAR.

![Figure 2. SpaceAR application screenshots.](image)

### Data Collection Tools

The Personal Information Form, Achievement Test and Augmented Reality Applications Attitude Scale in Secondary Schools were used in the study as data collection tools.

**Personal Information Form**: We developed the form to collect data related to participants’ demographic information and level of technology use (gender, ownership of personal computers, ownership of mobile devices, period of daily internet use, frequency of playing computer games). Similar studies in the literature were used when developing the personal information form (Atasoy, Tosik-Gün, & Kocaman-Karoğlu, 2017; Korucu et al., 2016).
**Augmented Reality Applications Attitude Scale:** The scale developed by Küçük, Yılmaz, Bayda, and Göktaş (2014) has three factors (satisfaction from use, anxiety to use, willingness to use) and 15 items. The scale developed to ensure content and face validity was checked by 4 field experts and 1 language expert and revised as necessary. The lowest and highest scores possible from the 5-point Likert type scale are 15 and 75 respectively. High scores point to positive attitudes towards AR applications. Internal consistency for the whole scale (1. factor $\alpha = .862$; 2. factor $\alpha = .828$; 3. factor $\alpha = .644$) was found as (Cronbach alpha) $\alpha = .835$. Internal consistency reliability coefficient for the scale was calculated as .91 in this study. The obtained values show that the scale is a valid and reliable tool to assess secondary school students’ attitudes towards AR applications.

**Achievement Test:** Achievement test developed by Sırakaya (2015) was used to determine students’ knowledge levels and to test their achievement. KR -20 reliability coefficient of the test with 27 multiple-choice questions was found to be .75. The lowest score that can be obtained from the achievement test is 0 and the highest score is 27 when the students answer all questions correctly. Analyses pointed that 3 questions were at simple level, 17 at medium-difficulty level and 7 questions were difficult. In order to provide easy interpretations of test scores, necessary inversions were made and the test can be scored over 100. Internal consistency reliability coefficient for the scale was calculated as .80 in this study.

**RESULTS**

**What are the attitudes of secondary school students towards augmented reality applications?**

Attitudes of students who used AR applications in classes were identified in the framework of the study. Findings are provided in Table 4.

**Table 4 Student Attitudes towards AR Applications**

<table>
<thead>
<tr>
<th>N</th>
<th>$\bar{X}$</th>
<th>sd</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>62.94</td>
<td>12.87</td>
<td>32</td>
<td>75</td>
</tr>
</tbody>
</table>

Table 4 shows that students who used AR applications in lessons had positive attitudes towards AR ($\bar{X}$ =62.94).

**Do secondary school students’ attitudes towards augmented reality applications differ according to gender?**

The study also examined whether students’ AR attitudes changed according to gender. The findings are presented in Table 5.

**Table 5 Change in attitudes towards AR applications based on gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>S</th>
<th>sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>30</td>
<td>61.97</td>
<td>13.82</td>
<td>52</td>
<td>-.620</td>
<td>.538</td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
<td>64.17</td>
<td>11.75</td>
<td>52</td>
<td>-.620</td>
<td>.538</td>
</tr>
</tbody>
</table>

Table 5 presents that while male students’ attitudes towards AR applications ($\bar{X}$ = 64.17) were more positive compared to those of female students ($\bar{X}$=61.97); the difference was not statistically significant ($t_{[52]} = -.620, p >.05$).
Do secondary school students’ attitudes towards augmented reality applications differ according to personal computer ownership?

The study also examined whether students’ AR attitudes changed according to ownership of personal computers. The findings are presented in Table 6.

Table 6 Change in attitudes towards AR applications based on ownership of personal computers (PC)

<table>
<thead>
<tr>
<th>Ownership of PC</th>
<th>N</th>
<th>X</th>
<th>S</th>
<th>sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>31</td>
<td>63.80</td>
<td>13.51</td>
<td>51</td>
<td>.496</td>
<td>.622</td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>62</td>
<td>12.39</td>
<td>52</td>
<td>-1.215</td>
<td>.230</td>
</tr>
</tbody>
</table>

Table 6 shows that while the AR attitudes of students who owned personal computers ($\bar{X}=63.80$) were more positive compared to students who did not own PCs ($\bar{X}=62$) the difference was not found to be statistically significant ($t_{(51)}=.496$, $p>.05$).

Do secondary school students’ attitudes towards augmented reality applications differ according to mobile device ownership?

The study also examined whether students’ AR attitudes changed according to ownership of mobile devices. The findings are presented in Table 7.

Table 7 Change in attitudes towards AR applications based on ownership of mobile devices

<table>
<thead>
<tr>
<th>Ownership of mobile device</th>
<th>N</th>
<th>X</th>
<th>S</th>
<th>sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>32</td>
<td>61.19</td>
<td>13.87</td>
<td>52</td>
<td>-1.215</td>
<td>.230</td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>65.5</td>
<td>11.07</td>
<td>52</td>
<td>-1.215</td>
<td>.230</td>
</tr>
</tbody>
</table>

Table 7 shows that while the AR attitudes of students who did not own mobile devices ($\bar{X}=65.5$) were more positive compared to students who owned mobile devices ($\bar{X}=61.19$) the difference was not found to be statistically significant ($t_{(52)}=-1.215$, $p>.05$).

Do secondary school students’ attitudes towards augmented reality applications differ according to period of daily Internet use?

The study investigated whether AR attitudes of students who were taught with AR applications differed according to students’ daily internet use. Table 8 presents AR attitude averages according to daily internet use.

Table 8 AR Attitude Means According to Daily Internet Use

<table>
<thead>
<tr>
<th>Daily Internet use</th>
<th>n</th>
<th>X</th>
<th>sd</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 hour</td>
<td>35</td>
<td>47.11</td>
<td>8.141</td>
<td>.236</td>
<td>.871</td>
</tr>
<tr>
<td>Between 1-4 hours</td>
<td>15</td>
<td>48.20</td>
<td>6.837</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between 4-8 hours</td>
<td>2</td>
<td>45.00</td>
<td>11.314</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 8 hours</td>
<td>2</td>
<td>50.50</td>
<td>.707</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>47.70</td>
<td>6.817</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 8 shows that the group with the highest level of attitude towards AR applications is composed of students who used internet for more than 8 hours a day ($X = 50.5$) while the lowest means were found in the group of students who used internet daily between 4-8 hours ($X = 45.00$). Analysis of variance shows that students’ AR attitudes did not present significant differences according to their daily use of internet ($F_{(3, 50)} = .236; p > .05$).

**Do secondary school students’ attitudes towards augmented reality applications differ according to frequency of playing computer games?**

The study examined whether AR attitudes differed according to frequency of playing computer games. Table 9 presents mean AR attitudes based on playing computer games.

### Table 9 Mean AR Attitudes Based on Frequency of Computer Game Playing

<table>
<thead>
<tr>
<th>Frequency of playing computer games</th>
<th>n</th>
<th>$\bar{X}$</th>
<th>sd</th>
<th>$F$</th>
<th>$p$</th>
<th>Significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>I play frequently PC games</td>
<td>11</td>
<td>54.09</td>
<td>15.267</td>
<td></td>
<td></td>
<td>3.002 .039 1-3</td>
</tr>
<tr>
<td>I sometimes play PC games</td>
<td>13</td>
<td>63.07</td>
<td>10.515</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I rarely play PC games</td>
<td>24</td>
<td>67.33</td>
<td>10.869</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I never play PC games</td>
<td>6</td>
<td>61.33</td>
<td>14.610</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>62.94</td>
<td>12.872</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9 shows that the highest AR attitudes were found in the group who rarely played computer games ($\bar{X} = 67.33$) while the lowest AR attitudes were found for the group who frequently played computer games ($\bar{X} = 54.09$). Results of analysis of variance show that students’ AR attitudes significantly differed according to frequency of playing computer games ($F_{(3, 50)} = 3.002; p < .05$). Results of the Tukey test conducted to determine the source of difference presented that students who rarely played computer games had more significantly positive attitudes towards AR applications compared to students who played computer games frequently.

**Is there a relationship between secondary school students’ attitudes towards augmented reality applications and their achievement?**

Pearson Correlation analysis was conducted to determine whether there was a significant relationship between students’ AR attitudes and their achievement. Table 10 presents the findings of this analysis.

### Table 10 Descriptive Statistics for AR Attitudes and Achievement and Results of Pearson Correlation Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>$r$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR Attitude</td>
<td>54</td>
<td>62.94</td>
<td>12.87</td>
<td>.458</td>
<td>.000</td>
</tr>
<tr>
<td>Achievement</td>
<td>60</td>
<td>60.36</td>
<td>18.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10 shows a statistically significant medium level positive relationship between AR attitudes and achievement ($r = .458, p < .05$).

**DISCUSSION AND CONCLUSION**

This study was conducted to investigate secondary school students’ AR attitudes based on different variables and to determine the relationship between AR attitudes and achievement was undertaken with the participation of 54 7th graders attending a state school. SpaceAR teaching material used in the framework of the study was developed under the supervision of field experts, technical experts and teachers. Before data collection, students were taught the Solar System Unit in the Science and Technology Class for four weeks.
with the help of SpaceAR application. Therefore, students were provided a learning experience using AR.

Research findings show that students have positive attitudes toward AR applications. This finding is supported by studies that pointed to secondary school students' positive attitudes towards AR applications (Atasoy, Tosik-Gün, & Kocaman-Karoğlu 2017; Küçük, Yılmaz, & Göktaş, 2014). It is believed that this result is related to advantages of AR applications in educational environments. Previous studies also pointed that AR attracted student interest towards the lesson (Delello, 2014; İbili & Şahin, 2013; Perez-Lopez & Contero, 2013; Yen, Tsai, & Wang, 2012) and increased their motivations (Delello, 2014; İbili & Şahin, 2013; Taşkıran, Koral, & Bozkurt, 2015). It is also known that AR use helps students develop positive thoughts and attitudes toward classes (Gün, 2014; İbili, 2013). Positive attitudes towards AR can be explained with the increased interest and motivation generated by AR use. It can also be argued that positive attitudes towards AR applications are related to provision of active and interactive learning environments via enhancement of reality. It is believed that AR supported classroom environments that are different from the use of traditional materials and environments create positive impact on student attitudes.

According to another finding of this study, AR attitudes do not differ based on gender. This finding is supported by the studies which found that male and female students’ AR attitudes were highly similar and there were no significant differences in AR attitudes based on gender. (Atasoy, Tosik-Gün, & Kocaman-Karoğlu 2017; Korucu et al., 2016). Many studies conducted on AR point to the fact that AR technology is utilized by students with great ease (Özarslan, 2013; Sırakaya, 2015; Sin & Zaman, 2010; Taşkıran et al., 2015; Tian, Endo, Urata, Mouri, & Yasuda, 2014; Tomi & Rambli, 2013). It is believed that no gender differences in AR attitudes may be related to ease of use by all participants without any problems. Previous studies also reported ease of use as an important factor that affected AR attitudes (Ibanez et al., 2016; Wojciechowski & Cellary, 2013). According to the TAM, ease of use in a technology and perceptions that the technology is beneficial positively contribute to individuals’ attitudes towards the relevant technology (Davis, 1989). In this context, it can be argued that ease of use in AR technology was effective hence the finding that secondary school students had positive attitudes towards AR applications regardless of gender.

Ownership of personal computers and mobile devices was not found to change attitudes toward AR applications. While students who owned personal computers or mobile devices were found to have more positive attitudes towards AR applications, the difference was not statistically significant. Today’s students who were born and raised in a digital age are in a special generation called Z generation. Z generation students who effectively use technology in all domains of their lives can use digital tools in the classroom without any prior training. In his interviews with secondary school students, Sırakaya (2015) found that they did not need any prior training for AR applications and that they already knew how to use these tools. The finding that ownership of personal computers and mobile devices did not affect AR attitudes may be related to self-confidence of Z generation in this area and the fact that they regarded themselves as competent in using technology.

It was found that daily internet use did not change the attitudes toward AR applications. Finding a similar result, Atasoy, Tosik-Gün, and Kocaman-Karoğlu (2017) reported that while duration of internet use did not have significant effect on attitudes towards AR; individuals that often use internet had lower attitude scores. This finding may be related to the fact that students who use technology less may perceive it as more attractive. Students who use technological tools more may have come across settings similar to AR environments previously. Therefore, this application may have lost its innovative aspect for these students and is not regarded as innovative as it could have been otherwise. Wojciechowski and Cellary (2013) who emphasized a similar situation and reported that students’ positive attitudes toward AR applications may have decreased over time.

Another result obtained in this study shows that AR attitudes significantly differ according to frequency of playing computer games. Compared to students who frequently played computer games, student who rarely played computer games had significantly more positive AR attitudes. This finding may be related to the realistic graphics presented in computer games. Computer games open the realistic virtual games and interaction to their players. AR applications present realistic 3D models as well and therefore students who frequently play computer games may have been less affected by these environments. However, students
who rarely played computer games may have been more affected by the space environment designed very similarly to the real space environment and therefore they may have developed more positive attitudes. Students today expect to be taught by using technology since they are accustomed to computer environments. In this context, AR can be used as an effective tool to increase student interest towards school. Also, students’ familiarity with 3D computer games may provide the necessary foundation to implement the AR technology to wider audiences (Wojciechowski & Cellary, 2013).

Research findings show a meaningful relationship between AR attitudes and achievement. Therefore, it can be argued that having that more positive attitudes will ensure achievement. It is believed that this finding will contribute to literature. Küçük et al. (2014), who reports a similar finding, states that successful students have more positive attitudes towards AR applications and emphasizes the positive relationship between achievement and AR attitudes. Traditional learning methods and environments are not sufficient anymore to attract student interest in lessons (Somyürek, 2014). With its advantages and its features, AR is an important tool that can meet the needs of today’s students (Wojciechowski & Cellary, 2013). Indeed, many studies in the literature reported that AR use increased student achievement (Abdüsselam & Karal, 2012; Korucu et al., 2016; Özarslan, 2013; Shelton & Hedley, 2002; Sirakaya, 2015; Vilkoniene, 2009). Based on this, it can be argued that AR technology is a tool that can be used to increase student achievement.

In general, research results show that students displayed positive attitudes toward AR applications and that these attitudes did not significantly differ according to the variables investigated in this study. The fact that positive attitudes were not dependent on the investigated variables shows that AR applications can be effectively used in educational settings with various student groups. This result shows that AR applications can be used easily even in heterogeneous classrooms.

REFERENCES


Modelling The Happiness Classification Of Addicted, Addiction Risk, Threshold And Non-Addicted Groups On Internet Usage

Fatma Sapmaz [1], Tarık Totan [2]

ABSTRACT

The aim of this study is to model the happiness classification of university students – grouped as addicted, addiction risk, threshold and non-addicted to internet usage – with compatibility analysis on a map as happiness, average and unhappiness. The participants in this study were 400 university students from Turkey. According to the results of two-step cluster analysis, it was found that 21.10% of participants are in the ‘addiction group’, 26.60% participants are in the ‘addiction risk group’, 26.60% participants are in the ‘threshold group’ which is between the ‘risk’ and ‘non-addicted’ groups, and 25.80% participants are in the ‘non-addicted group’. Additionally, two-step cluster analysis for happiness research showed that 15.90% of participants are in the ‘happiness group’, 43.20% belong to the ‘average group’ and 40.90% fall into the ‘unhappiness group’. Correspondence analysis between internet addiction groups and happiness status suggested a significant and justifiable relationship between the two variables. Consequently, taking the findings of this study and of the limited research addressing different concepts of positive psychology such as internet addiction and happiness (e.g., satisfaction of needs, psychological strength etc.) together, these research findings are thought to contribute to the literature.

Keywords: Internet addiction, happiness, correspondence analysis

INTRODUCTION

Nowadays, internet access and usage are increasingly rising in Turkey, just as they are in other countries around the world. The fact that the Turkish internet economy is growing, and this growth is expected to achieve 19% by the year 2017, is underlined in the “Turkey Internet Economy Report” (The Boston Consulting Group, BCG, 2013), which can be considered as one of the most in-depth and detailed studies published, regarding the local and global effects of the internet. The data from the Turkish Statistical Institute (TurkStat) that is presented in the report, prepared by The Boston Consulting Group (BCG, 2013), shows that the number of internet users has jumped from 21 million to 36 million between the years 2007 and 2012. As a result of the Household Information Technologies Usage research conducted in 2013, it is established that the computer and internet usage ratio of individuals in the 16-74 age group are respectively 49.9% and 48.9% while the percentage of households that have access to the internet is reported to have risen to 49,1% (TurkStat, 2013). According to the statistics given by Internet World Stats (2013) regarding internet usage, internet users in Turkey were around 2 million in the year 2000, 5.5 million in 2004, over 10 million in 2006 and around 38 million in 2013. These numbers show that the internet usage ratio of the total population of the country was 3% in the year 2000 and 46.3% in the year 2013. The fact that internet use has increased rapidly within this period is a sign that the use of the internet has become a widespread popular activity throughout these years, and the increase of this tendency in internet usage will reflect on the risky internet use rate.

The supreme reason behind the internet becoming an important and indispensable part of our lives can be explained by the fact that it is simplifying life for us. People are able to access information swiftly and
easily with the help of the internet, follow social and political news, satisfy their needs and do their shopping without leaving the house, and furthermore even entertain themselves in the comfort of their homes. In particular, the fact that it allows people to communicate without any borderlines has made the internet become something that many people demand (Mestçi, 2007). In addition, the fact that the internet became widespread and got accepted so quickly has brought some consequences of its own. One of the main consequences is the habit of internet use becoming a pathological condition and resulting in internet addiction. The prevalence and increase of cyber bullying in the international findings on children in puberty (Siomos, Dafouli, Braimiotis, Mouzas, & Angeloulou, 2008; Cao & Su, 2001) shows that this issue will increase even further and become a threat for coming generations.

Internet addiction can be classified as using the internet out of its purpose and as an addiction that is characterized with exaggerated internet use (Young, 2007; Block, 2008) When the literature of “internet addiction”, which term was used by Goldberg (1996) for the first time, is analyzed, it is seen that it is also referred to as pathological internet use (Morahan-Martin & Schumacker, 2000; Durkee et al., 2012), problematic or uncontrolled internet use (Liu & Potenza, 2010; Aboujaoude, 2010), internet addictive Young, 1996) internet addiction disorder (Goldberg, 1996; Siomos & Angelopoulos, 2008), internet dependency (Wang, 2001; te Wildt, Putzig, Zedler, & Ohlmeier, 2007), pathological internet use (Morshan-Martin & Schumacker, 2000) or problematic internet use (Davis, Flett, & Besser, 2002). In addition to these, internet addiction can also be described as “net addiction”, “net compulsion” and “internet dependency syndrome” (Petersen, Weymann, Schelb, Thiel, & Thomasius, 2009). In order to exemplify descriptions regarding internet addiction, it can be mentioned that according to Young (2007) internet addiction is a new and usually unrecognized clinical disorder that can cause the user to lose the ability to control their online activities and that will have such an effect on their social and occupational lives as to cause them problems. Suler (2004) has identified internet addiction as being dysfunctionsally busy in any activity performed with the computer. According to the symptoms shown by patients that suffer from internet addiction, it is an irresistible urge to be online, which is a kind of an urge that may cause psychobiological damage and lead them to addictive behavior (Wölfing, Müller, & Beutel, 2012). The common point between this and other addictions that are taken into consideration differently is that the user cannot resist the urge to use the internet and this fact affects their functionality in various areas of their lives. As a matter of fact, while there are different views on when internet use is unhealthy or what the description of internet addiction is, the common point of these views can be stated as the time spent on the internet disrupting peoples’ functionality. Moreover, it is defined in DSM-5 (2013) as the individual indulging in increasing use that will lead them to feel deprivation of excessive gaming, sexual preoccupations and e-mail/text messaging dimensions, this use affecting their lives negatively in a somewhat undesirable manner (Block, 2008). Internet gaming disorder is the title of future studies aimed to improve the DSM, which have taken their place in DSM-5 (2013).

Internet addiction, which has been presented as having connections to many negative psychological patterns (Kim et al., 2006; te Wildt, Putzig, Zedler, & Ohlmeir, 2001) is expected to be also related to a pattern such as happiness, that is directing the daily life of the individual in emotional and behavioral dimensions. As one of the main notions of positive psychology, happiness -- which is also referred to as subjective well being -- is described as the evaluation of life from the cognitive and affective aspects and as having high satisfaction from life (Diener, 1984; Myers, & Diener, 1995). In this regard, there are two main aspects to subjective well being: positive-negative affectivity and life satisfaction. While positive and negative affectivity includes the evaluation of life from the affective aspect, life satisfaction involves cognitive evaluation (Diener, 1984; Myers, & Diener, 1995). It is emphasized that in recent years many studies have researched the factors that affect the subjective well-being of individuals and what increases happiness, due to the fact that it represents the positive aspect of mental health. In these studies, it is seen that many factors affect happiness, such as heritage (Lu, 2001), exercising (Veenhoven, 2008), taking part in religious activities (Lewis, Cruise, 2006), positive thinking (Caprara & Steca, 2005), being helpful to society and to other individuals (Borgonovi, 2008), being in close social relations (Cheng & Furnham, 2002; Litwin, Shiovitz-E Ezra, 2011), or establishing online social networks (Bollen, Gonçalves, Ruan, & Mao, 2011; Dodds, Harris, Kloumann, Bliss, & Danforth, 2011). Although they may seem very different from one another, almost all of the factors apart from genetic are under the individual’s control and the common point of most of them is that the aim may be described as performing purposeful activities and improving social relations (Doğan, Spmaz, Çọtok, 2013; Lyubomirsky,
For example, in a meta-analysis study conducted by Lyubomirsky, Sheldon and Schkade (2005) with the aim of examining the determiners of happiness, it was found that purposeful activities affect happiness at a rate of 40%. Positive thinking, fulfilling religious necessities, exercising, doing favours (altruism), and improving social relations can be listed as purposeful activities. Similarly, Buss (2000) emphasized that activities such as getting socially closer with relatives or friends and forming strong friendships are among the strategies of increasing subjective well-being. In this regard, every planned activity that directs the individual to action, (exercising, doing something helpful to the society etc.), and notably social relations, can be accepted as a factor that contributes to subjective well-being. In the light of these findings related to ensuring or improving subjective well-being, the kind of a relationship that exists between internet addiction and subjective well-being is the starting point of this study. This is because there are findings that suggest the withdrawal of the individual from communication in real life conditions due to characterized internet addiction, and moreover the time spent in front of the computer brings some physical problems with it. Although there are studies suggesting that individuals who struggle with social communication are forming new friendships in the cyber environment with the help of internet use, and are able to open up to people they do not know, it can be stated that this does not reflect their real life conditions. As a matter of fact, when Davis listed the elements that contribute to pathological internet use, these underlined the social relations of the individual with regard to their real life and emphasized that those who lacked social support from family or friends or lived in social isolation were drawn towards pathological internet use. Similarly many studies regarding problematic internet use point out that loneliness is one of the main factors with respect to disruption in interpersonal relations, which is among the negative results of internet use (Caplan, 2002; Caplan, 2003). In spite of this, some studies emphasize that internet use improves communication with family and friends, contributes to the recognition of the individual, presents them with the opportunity of spending their spare time with entertainment, and in a nutshell, increases the life satisfaction of the person (Papacharissi & Rubin, 2000). This and similar situations can be described as opportunities that internet use brings to the individual. However the important issue is internet use becoming pathological, and beyond daily ordinary use. In addition, even in the studies related to internet use improving life satisfaction and social relationships, the aim of internet use and the level of the individual’s social abilities are debated. It is clear that internet use has no effect on the life satisfaction of people with strong social relationships and efficient interpersonal relations (Papacharissi & Rubin, 2000). However when the internet is used in order to easily reach information or to simplify tasks rather than to form social relationships, it is evident that internet use contributes to life satisfaction. As a result, when studies related to both problematic internet usage and subjective well being are evaluated as a whole, it is seen that with its life-simplifying features, internet use can have a positive effect on the subjective well being of the person as well as a negative effect with its aspects of social relations and limitations on purposeful activities. This situation seems to be closely related to the social abilities of the individuals in daily life and the support they receive from their surroundings (friends/family etc.), as well as their purpose and level of using the internet. This situation seems to be becoming a vicious circle where everything affects everything else. This study has the aim of answering the question of whether there is a relation between problematic internet use and subjective well being regardless of the purpose of using the internet, and if there is a relation, what the direction of that relation is. With this aim, the happiness levels of the students within the space between normal internet use and addictive internet use were investigated in this study.

METHODS

Participants

The participants of this study consisted of 400 university students (62.80% female [n=251] and 37.30% male [n=149]) studying at the Faculty of Education of Sakarya University, located in the northwest area of Turkey, in the academic year 2011-2012. The age group of the participants was between 18-26, and the average age of the participants was 20 years and 8 months. While the participants were chosen through the use of easy sampling using improbability sampling methods, the students were required to have taken
undergraduate classes regarding the use of computer and information technologies in order to be accepted as participants.

**Data collections tools**

*Internet Addiction Scale (IAS):* The scale was developed by Günüç and Kayri (2010). IAS is a 35-item measurement tool with a self-reporting style, including options that vary between totally not applicable and totally applicable in a 5-point Likert type scale. The scale consists of four sub-factors: “Deprivation”, “Control Difficulty”, “Functionality Impairment” and “Social Isolation”. The factors explain 47.46% of the total variance. As a result of confirmatory factor analysis, the goodness of fit indexes regarding the four-factor structure was stated to be at a sufficient level ($\chi^2/df= 2.14$, RMSEA= .039, CFI= .87). The internal consistency reliability parameters regarding the sub dimensions of the scale were reported to be .88, .86, .83 and .79, in that respective order. The high scores on the scale point to abusive use of the internet.

*Oxford Happiness Scale-Short Form (OHS-S):* The scale was developed by Hills and Argyle (2002). The original scale consists of 8 items in 5-point Likert style with options varying between strongly disagree and strongly agree. A Turkish adaptation of OHS-S was conducted by Doğan and Çötok (2011). In this regard, as a result of the exploratory factor analysis, a one-factor structure consisting of 7 items with an eigenvalue of 2.78 and explaining 39.74% of the total variance was acquired. The one factor structure of OHS-S was examined with confirmatory factor analysis and the goodness of fit indexes were found to be ($\chi^2/df= 2.77$, AGFI= .93, CFI= .97, NFI= .92, IFI= .95, RMSEA= .074). Internal consistency parameters of OHS-S regarding the reliability were found as .74 and the test reliability parameters as .85.

**Process and Methods of Analysis**

In the developmental process of the internet addiction scale, the four categories identified by Günüç and Kayri (2010) -- addicted group, addiction risk group, threshold group, non-addicted group -- alongside the three categories identified by Diener and Seligman (2002) for happiness -- very happy, average and unhappy -- were specified with Two-Step Cluster Analysis. Two-stage grouping analysis and compatibility analysis were used in the modeling process of internet addiction and happiness statuses in the research analyses. SPSS and R softwares were used in the statistical process.

**FINDINGS**

The data collected from the university students within the scope of this study are the continuous variables that were collected from the internet addiction and happiness measurement tools. In the developmental process of the internet addiction scale, the four categories identified by Günüç and Kayri (2010) -- addicted group, addiction risk group, threshold group, non-addicted group -- alongside the three categories identified by Diener and Seligman (2002) for happiness -- very happy, average and unhappy -- were specified with Two-Step Cluster Analysis.

### Table 1. Internet Addiction And Happiness Sub-Clusters As A Result Of The Two-Step Cluster Analysis.

<table>
<thead>
<tr>
<th>Internet dependency</th>
<th>$n$</th>
<th>%</th>
<th>Cumulative %</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addicted group</td>
<td>81</td>
<td>21.10</td>
<td>21.10</td>
<td>82.00</td>
<td>120.49</td>
<td>91.43</td>
<td>8.24</td>
</tr>
<tr>
<td>Addiction risk group</td>
<td>102</td>
<td>26.60</td>
<td>47.70</td>
<td>68.00</td>
<td>81.40</td>
<td>74.01</td>
<td>3.81</td>
</tr>
<tr>
<td>Threshold group</td>
<td>102</td>
<td>26.60</td>
<td>74.20</td>
<td>53.56</td>
<td>67.40</td>
<td>61.04</td>
<td>4.08</td>
</tr>
<tr>
<td>Non-addicted group</td>
<td>99</td>
<td>25.80</td>
<td>100.00</td>
<td>35.00</td>
<td>53.00</td>
<td>45.53</td>
<td>5.04</td>
</tr>
<tr>
<td>Very happy</td>
<td>61</td>
<td>15.90</td>
<td>15.90</td>
<td>13.00</td>
<td>20.00</td>
<td>18.16</td>
<td>1.87</td>
</tr>
<tr>
<td>Average</td>
<td>166</td>
<td>43.20</td>
<td>59.10</td>
<td>21.00</td>
<td>25.00</td>
<td>23.41</td>
<td>1.45</td>
</tr>
<tr>
<td>Unhappy</td>
<td>157</td>
<td>40.90</td>
<td>100.00</td>
<td>26.00</td>
<td>35.00</td>
<td>28.46</td>
<td>2.25</td>
</tr>
</tbody>
</table>
As a result of the two-step cluster analysis, the distribution identified 21.10% of the users to be addicted to the internet, 26.60% to be in the addiction risk group, 26.60% to be in the threshold group between the risk group and the non-addicted group, and 25.80% to be in the non-addicted group. This indicates that slightly more than one fifth of the university students in the research group can be identified as internet addicted and slightly more than a quarter of them can be identified as in no danger of becoming addicted to the internet. On the other hand, it was determined that almost half of the research group (47.70%) carry the risk of becoming internet addicted or are considered to be in the internet addicted group, or in other words that they are in a sensitive position regarding internet addiction. As a result of the two-step cluster analysis that was carried out for happiness, the statistics show that 15.90% of the participants are in the group that can be considered as being happy, while 43.20% are in the average group and 40.90% are in the unhappy group. Thus, while one seventh of the participants can be labeled as happy, almost half of them can be labeled as feeling unhappy. The relations between internet addiction and happiness status was examined with correspondence analysis.

Table 2. Correspondence Table And Row/Columns Profiles

<table>
<thead>
<tr>
<th>Internet dependency</th>
<th>Happiness</th>
<th></th>
<th></th>
<th>Active Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unhappy</td>
<td>Average</td>
<td>Very happy</td>
<td>Mass</td>
</tr>
<tr>
<td>Addicted group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row profiles</td>
<td>.21</td>
<td>.37</td>
<td>.23</td>
<td></td>
</tr>
<tr>
<td>Column profiles</td>
<td>.349</td>
<td>.457</td>
<td>.284</td>
<td></td>
</tr>
<tr>
<td>Addiction risk group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row profiles</td>
<td>.206</td>
<td>.480</td>
<td>.314</td>
<td></td>
</tr>
<tr>
<td>Column profiles</td>
<td>.295</td>
<td>.295</td>
<td>.204</td>
<td></td>
</tr>
<tr>
<td>Threshold group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row profiles</td>
<td>.180</td>
<td>.500</td>
<td>.392</td>
<td></td>
</tr>
<tr>
<td>Column profiles</td>
<td>.307</td>
<td>.255</td>
<td>.266</td>
<td></td>
</tr>
<tr>
<td>Non-addicted group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row profiles</td>
<td>.081</td>
<td>.293</td>
<td>.62</td>
<td></td>
</tr>
<tr>
<td>Column profiles</td>
<td>.175</td>
<td>.395</td>
<td>.258</td>
<td></td>
</tr>
<tr>
<td>Active Margin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>.159</td>
<td>.432</td>
<td>.409</td>
<td></td>
</tr>
<tr>
<td>Active margin</td>
<td>.100</td>
<td>.100</td>
<td>.100</td>
<td></td>
</tr>
</tbody>
</table>

As a result of the correspondence analysis, when the cross-tabulations of the row and column variables were examined, the load value for happiness statuses for the row profile in the addiction group varied between .26-.46, while varying between .21-.48 for the addiction risk group, .11-.50 for the threshold group, and .08-.63 for the non-addicted group. As for the column profile, the load value for the happiness statuses for the addicted group varied between .15-.34, while varying between .21-.48 for the addiction group, .11-.50 for the threshold group and .13-.40 for the non-addicted group. When the mass values were examined, the findings showed unhappy to be .16, average .43, very happy .41, addicted group .21, addiction risk group .27, threshold group .27, and non-addicted group to be .26.
According to the correspondence analysis between the internet addiction groups and happiness statuses, there is a justifying and significant relation between the two variables ($\chi^2 = 35.078, p = .000$). The total variance explained in accordance with the total inertia value is 9%. The first dimension contributes at the 8% level to the explained variance and the second dimension contributes at the 1% level. According to proportion of inertia, 88% of the 9% explained variance is caused by the first dimension and 13% is caused by the second dimension. Maximum canonical correlation was calculated as .28 for the variables in the first dimension and .11 in the second dimension. In accordance with the inertia results in the overview row points outcomes, the load value was .022 for the addicted group, .011 for the addiction risk group, .007 for the threshold group, .051 for the addicted group, and on the other hand, in accordance with the inertia results in the overview column points outcomes, the load value was .031 for unhappy, .016 for average and .044 for very happy.

Diagram 1. The Biplot Correspondence Map For Happiness Statuses And Internet Addiction.
and very happy. Internet dependency groups are shown as blue dots and happiness statuses as red dots on the map. In accordance with the results, it is observed that happy individuals (Score\textsubscript{dimension1} = 0.612, Score\textsubscript{dimension2} = 0.113) are more likely to be non-addicted (Score\textsubscript{dimension1} = 0.828, Score\textsubscript{dimension2} = 0.220), while unhappy (Score\textsubscript{dimension1} = -0.751, Score\textsubscript{dimension2} = 0.594) individuals are internet addicted (Score\textsubscript{dimension1} = -0.564, Score\textsubscript{dimension2} = 0.352). Individuals in the average (Score\textsubscript{dimension1} = -0.303, Score\textsubscript{dimension2} = -0.325) status are observed to score between addiction risk (Score\textsubscript{dimension1} = -0.383, Score\textsubscript{dimension2} = 0.015) and threshold (Score\textsubscript{dimension1} = -0.027, Score\textsubscript{dimension2} = -0.507). As this result shows, the total amount of explained variance of this model equals 9%, and the individuals with an increasing tendency to become internet addicted become unhappy while on the contrary individuals become happier with the decrease of a tendency to internet addiction.

DISCUSSION AND CONCLUSIONS

The aim of this study was to develop a compatibility modeling through the happiness categories of the student participants within the field extending from normal internet use to addictive internet use. In the light of this aim, cluster analysis was used to categorize the participants as internet addicts. According to the results, slightly more than one fifth of the participants fall into the internet-addicted group. Meanwhile, youngsters falling into the addiction risk and threshold groups with similar rates were specified. Johansson and Götestam (2004) also stated in a similar study that problematic internet use is around a rate of one third in teenagers and youngsters. Whang, Lee and Chang (2003) specified the internet addicts and addiction risk group participants to be at similar levels.

In accordance with the first and second dimension coordinates acquired from the compatibility analysis, unhappy individuals were discovered to be in close proximity with internet addiction, and happy individuals with non-internet addiction. Hence, in the examination of the literature it was noted that the several devastating effects of internet addiction on the individuals emphasize that this is an undesirable obsession. This emphasis is also reflected in definitions regarding internet addiction. For example, Young (2007) describes internet addiction as a new and usually unknown clinic disorder that can affect the individual to such an extent as to cause social, professional and associational problems and also issues in online use and control abilities of the individual (Young, 2007). Results of numerous studies on internet addiction and its effects on mental health are in support of the emphasis in Young’s (2007) definition. For example, a close relation between internet addiction and numerous psychological problems such as depression (Morrison & Gore, 2010; Young & Rogers, 1998), anxiety and stress (Whang, Lee, Chang, 2003; Iksender & Akın, 2011) and social anxiety (Shepherd & Edelmann, 2005; Caplan, 2006) was found in previous studies. Cao and Su (2006) determined the hyperactivity, conduct problems, psychoticism and neuroticism averages of the internet-addicted teenagers to be higher, and their levels of the effective use of time, i.e., self-sufficiency levels, to be low. In the light of these studies and the findings of our study, it can be stated that there is a negative relationship between internet addiction and the mental health of the individuals. However, this does not mean that non-internet addiction will have a positive relationship to happiness.

As regards the studies of the relationship between internet addiction and mental health problems, the studies regarding internet addiction within the framework of positive psychology are of a more limited number (Whang, Lee, & Chang, 2003; Iksender & Akın, 2011). When the results of studies investigating internet addiction within the scope of positive psychology were examined, the amount of differing results stands out. In some of the studies a positive relation exists among positive psychology notions such as internet addiction, psychological well-being, life satisfaction and happiness (Pénard, Poussing, & Suire, 2013) and a negative relation in the rest (Akın, 2012). This difference, which is already reflected in the results, seems to be caused by the fact that it falls at the point between daily internet use and internet addiction, or the purposes of the individuals using the internet. In other words, in cases where the internet use takes a problematic or pathological shape at the beginning, it can affect the mental health of the individuals negatively. When Suler (2004) defined the difference between healthy and pathological internet use, he emphasized that cyber life becomes an issue in the case of the individual disconnecting from real life. Individuals can disconnect from their daily life and find a different life in the cyber world, thus becoming
addicted, and this situation cannot be considered as equal to daily internet use. On the other hand, internet use can affect the mental health of the individual according to the source of the user’s motivation. For example, individuals with weak friend and family relationships, low self-esteem and lack of social support in their daily lives are able to compensate for the aforementioned deficiencies through using the internet. In the short term, this helps them to feel better. Research conducted by Westlund, Norlander & Archer (2001) emphasised the fact that shy and introverted individuals use the internet for interaction and this increases their online social interaction, thereby increasing the well-being of the individual. However, another subject of concern is to what degree and how the social interaction brought or improved by internet use is transferred to daily life. This is due to the fact that individuals with strong social support and relationships in real life do not get any contribution to their degree of life satisfaction from internet use (Papacharissi & Rubin, 2000), but interaction in the cyber world increases the loneliness of individuals who already feel themselves alone in real life, thus affecting their life-satisfaction levels and well-being.

Whether there is an interaction between subjective well-being and internet addiction, regardless of the purpose of internet use, was examined in this study, but this investigation did not take into consideration various pathological states such as depression, loneliness or social anxiety. This was simply due to the fact that the aforementioned psychological symptoms or disorders are usually the driving factor in studies done in the framework of internet addiction and positive psychology. However not suffering from depression cannot be seen as a guarantee of feeling great life satisfaction or happiness (Sapmaz & Temizel, 2013). In conclusion, the results of this study are considered to be possible contributors to the literature of psychological counseling and guidance, along with the relevant field(s), due to the findings, and to the current limitations on the studies where different notions (such as satisfying the need, psychological robustness etc.) in the framework of positive psychology, such as internet addiction and happiness, are handled together.

REFERENCES


Self-Disclosure and Internet Addiction

Nihan Arslan [1], Aydin Kiper [2]

ABSTRACT

The aim of study is to investigate the relationship between self-disclosure and internet addiction. Self-Disclosure Scale and Internet Addiction Scale were applied to students. Results indicated a negative correlation between self-disclosure and internet addiction. Self-disclosure was negative predicted by internet addiction in the structural equation model. Fit indices obtained from the structural equation model established to determine the level of clarification of internet addiction by the level of self-disclosure indicates that the model fits well.

Keywords: Self-Disclosure, Disclosure, Internet Addiction.

INTRODUCTION

Self-disclosure is a process in which the individual reveals his/her own emotions, thoughts, beliefs and attitudes (Vogel & Wester, 2003). Emotional self-disclosure can be considered as an oral form of an emotional expression, and this emotional experience is put into words and then transmitted to other people through oral or written channels (Kahn & Garrison, 2009). Self-disclosure lessens prejudices. If the individual expresses his/her thoughts and emotions, s/he can get more positive evaluations from the opponents and be approached with empathy (Turner, Hewstone & Voci, 2007). One of the determiner motivation factors in terms of emotional sharing may be the individual’s personal attitudes, and this is a belief about a specific topic that includes affective and cognitive evaluations (Bergman, 1998). On the other hand, personal attitudes affect the individual’s behavior differently depending on the features, status and manners of that individual and they are about certain beliefs in terms of agreeing with certain behaviors that are oriented toward an individual or situation (Horne & Johnson, 2017).

Gender difference is a significant topic in self-disclosure researches. If men express themselves less than women they will be more prone to psychological problems. Nearly most of the therapy approaches
emphasize the importance of self-disclosure in the treatment of psychological problems. Hence if men express themselves less than women, counselling and psychotherapy could be less effective for men as compared to women. In this regard, gender differences are important in terms of self-disclosure because it may affect woman-man relationship differently (Jourard, 1971).

Self-disclosure desire is related to attachment styles (secure attachment) and personality traits (high self-respect). Indeed, people who attach securely and have high self-respect, have positive attitudes to both themselves and the person that they attach, and also, they value and trust both themselves and the person that they are in relationship. In this context people who attach securely and have high self-respect show more self-disclosure (Mikulincer & Nachshon, 1991; Sprecher & Hendrick, 2004; Horne and Johnson, 2017). Self-disclosure is positively related to marital satisfaction (Laurenceau, Barrett, & Rovine, 2005), stable relationship (Marshall, 2008), love and intimacy feelings (Sprecher & Hendrick, 2004) and decreased stress (Ditzen, Hoppmann, & Klumb, 2008).

Lonely individuals are less likely to disclose themselves (Berg and Peplau, 1982). These people have weak social skills, they experience problems in terms of making friends, initiating social activities and participating to groups, and also their self-respect is low (Burger, 1997). Thus, self-enclosed individuals who do not express their feelings tend to have lots of bad habits. One of these bad habits is internet addiction. Researches show that lonely individuals who do not express their feelings use more internet (Morahan-Martin, 1999; Morahan, Martin & Schumacher, 2003). Internet provides an ideal social environment for those people to form an interaction. At the same time, even if it is partially, it can be considered as a means of escape in order to tolerate negative emotions (Morahan, Martin & Schumacher, 2003). As long as the time of internet use increases people, using the internet, communicate with others less in their social life and this leads to social isolation. Studies indicate that people who experience loneliness use internet to provide their loneliness and problematic internet use makes them isolated over time (Pratarelli, Browne & Jhonson, 1999; Davis, 2001; Çağır & Gürgan, 2010). On the other hand, self-disclosure improves new friendships, affects communication positively, and decreases loneliness feeling and depression (Wei, Russell & Zakallik, 2005).

**Internet Addiction**

Internet addiction was regarded under the title of compulsive-impulsive spectrum disorders like alcohol and drug dependence by referring to social and academic researches (Block, 2008). People with internet addiction cannot manage their lives, and they are online users who lose their impulse control. Despite these problems, people with internet addiction cannot give up internet and they put the internet in the first place in their relationships. Young (1998) and Greenfield and Sutker (1999) describe internet addict people as users who spend 40 to 80 hours per week on the internet even sometimes in one sitting spend 20 hours on the internet per day. Researches point out that internet addiction is related to depression, anxiety, loneliness, shyness and low social support (Kutlu, Savcı, Demir & Aysan, 2016).

Young classified internet addiction in three headings. These are playing game, sexual occupation and texting. Playing game on the internet can be discriminated into two categories namely online gambling and online games. Both of them have progressively increased frequency of use. Among young users, online gaming is more common. 24 hours accessibility, the easiness of creating online account, and different kinds of websites from traditional betting to gambling and lottery make online gambling attractive (Petry, 2006). Excessive drive for playing game based on increased satisfaction, and computer game addiction are considered under the skin of negative effects that are caused by playing game (Horzum, Ayas and Balta, 2008). Computer game addiction can be described as user’s being not able to get out the game, thinking about the game all the time and continuously being interested in the game (Horzum, 2011). Multiuser online role-playing games are one of the fastest-growing kind of internet addiction among children and youths. In fact, in 2016, online games were spent 99.6 billion dollars and the 37% of this payment was made to mobile games (Newzoo Web Site, 2016). Players can pioneer groups, guilds and wars and they can win a war in virtual world. In fact, many users regard it as an income resource; they fight on behalf of others or they can sell or rent a character to others online. Websites for adults address different kind of sexual domains and constitute the largest part of developed and electronic commerce. For those who were treated from a sexual addiction before, internet may become a different way of actualizing sexual harassment. Similarly, people
with sexual addiction can find a way to maintain their sexual behaviors without going to different kind of clubs. Internet addicted people detect the difference between online and offline feelings. When they are offline they may experience disappointment, anxiety, anger, concern and trouble (Young, 2009). On the other hand, when they are online, they feel themselves as excited, unobstructed, attractive, supported and more desirable. These strong positive emotions strengthen compulsive behaviors (Orzack, 1999, as cited as Young, 2009). Mobile devices, PDAs, smart phones and tablets have internet connection and this leads to problematic mobile phone use among youths and rising generation. (Bianchi and Phillips, 2005). Time spent for texting on the internet, e-mail, and instant messaging services (WhatsApp, snapchat etc.) may weaken social relationships. As long as the time spent for checking e-mail and messages increases the time spent with family and friends decreases (Young, 2009). For all this reason, the aim of study is to investigate the relationship between self-disclosure and internet addiction.

METHOD

Participants

Convenience sampling method was used in the selection of students. Research was conducted on 312 high school students. 312 students, of whom 174 (56 %) were female and 138 (44%) were male.

Measures

Distress Disclosure Index (DDI) developed by Kahn and Hessling (2001) consists of twelve items. DDI is a 5-point rating scale, with the end points labeled “Strongly disagree” and “Strongly agree”. Factor loadings for the one-factor model were approximately. Analysis showed that model was well fit ($x^2=116.05$, $sd=50$, $p=0.00$, RMSEA=.063, NFI=.97, NNFI=.97, CFI=.98, IFI=.98, RFI=.95, GFI=.94, and SRMR=.45). Reliability of the Distress Disclosure Index was .86 (Arslan, 2017).

Young’s Internet Addiction Test-Short Form Scale (YIAT-SF) developed by Young consists of twelve items (Pawlikowski, Altstötter-Gleich & Brand, 2013). YIAT-SF DDI is a 5-point rating scale, with the end points labeled “Never” and “Always”. Factor loadings for the one-factor model were approximately. Analysis showed that model was well fit ($x^2=173.58$, $sd=53$, CFI=0.95, SRMR=0.064 ve RMSEA=0.079). Reliability of the Distress Disclosure Index was .85 (Kutlu, Savcı, Demir & Aysan, 2016).

RESULTS

Table 1: Demonstrates the descriptive statistics of the variables used.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Distress Disclosure Index</th>
<th>Young’s Internet Addiction Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distress Disclosure Index</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Young’s Internet Addiction Scale</td>
<td>-.25**</td>
<td>1</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>35.8(8.8)</td>
<td>27.05 (8.8)</td>
</tr>
</tbody>
</table>

**p<.01

Table 1 shows that there is negative significant a relation between the distress disclosure and internet addiction. Correlation coefficient was -.25** for distress disclosure and internet addiction.
SEM was analyzed to determine whether the Internet addiction predict distress disclosure; $\chi^2=580.40$, df =251, p=0.00, NFI=.90, NNFI=.93, CFI=.94, IFI=.94, SRMR=.063, RMSEA = 0.065. It can be seen that internet addiction has significant effects on self-disclosure.

DISCUSSION

Findings of the present study indicate that there is a negative correlation between self-disclosure level and internet addiction. In other words, as long as students’ internet addiction level increases their self-disclosure level decreases. According to the information received from the literature there is no study which investigates to what extent internet addiction affects self-disclosure level. However, studies focused on to what extent individuals disclose themselves on the internet and to what extent they give information about themselves to other people. In addition, there are some studies which examine to what extent shyness and loneliness affect internet addiction and whether or not internet addiction causes loneliness. Researches indicate that individuals who have low self-disclosure level tend to loneliness and shyness and have low self-respect (Mikulincer & Nachshon, 1991; Sprecher & Hendrick, 2004; Berg & Peplau, 1982). Self-disclosure increases social self-efficacy level, and decreases loneliness and depression symptoms. Furthermore, self-disclosure improves not only social skills but also interpersonal relationships (Wei, Russell & Zakalik, 2005). Studies show that as long as the loneliness level increases the internet addiction also increases (Morahan-Martin & Schumacher 2003; Pratarelli, Browne & Jhonson, 1999; Davis, 2001; Çağır & Gürgan, 2010; Engelberg and Sjöberg, 2004).

Some studies indicate that there is a positive relationship between internet addiction and shyness; and shyness predicts internet addiction significantly (Chak & Leung, 2004; Ebeling, Frank & Lester, 2007). Studies that examine the relationship between shyness and internet addiction point out that shy people are more prone to be internet addicted, and problematic internet use is related to shyness (Caplan 2002; Chak ve Leung 2004). It is thought that less social skills (Engelberg and Sjöberg 2004, Harman, Hansen, Cochran & Lindsey, 2005) and low self-respect (Niemz, Griffiths & Banyard, 2005; Young and Rodgers, 1998) which are seen among people who use internet more frequently may lead to an increase in shyness. Studies point out that
people can use the internet to decrease loneliness feeling, depression and stress symptoms. Introversion as a personality trait and neuroticism are related to internet addiction positively (Witte, Frank & Lester, 2007).

Internet addiction makes children be isolated from other people and causes antisocial behaviors. Moreover, excessive internet use affects communication negatively and weakens family bonds (Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay & Scherlis, 1998; Tsai & Lin, 2003). It was found that excessive internet users are more sensitive to disappointments in their interpersonal relationships. When these people communicate with others their anxiety levels increase. Therefore, these people either less disclose themselves or do not disclose at all to other people (Whang, Lee & Chang, 2003). Such findings in the literature that show the positive relationship between internet addiction and shyness, loneliness and introversion support the results of the current study.

According to the findings of the current study, internet addiction poses a risk for self-disclosure level. In this regard, families and teachers should take precautions for students’ internet use. Furthermore, school psychological counsellors should conduct group guidance activities that aim to prevent and intervene internet addiction. In fact, school psychological counsellors may address especially shy and lonely students, and should conduct individual or group psychological guidance activities. In addition, psychological counsellors should help students and families in terms of orienting students to social environments in which they are able to provide their social and emotional need especially at the beginning of adolescence period. Adolescents’ spending more time in social environments may decrease their time on the internet.

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Suggestopedia Based Storytelling Teaching Model for Primary Students in Salatiga


ABSTRACT

Teaching and learning speaking skills should be able to engage students in a creative process. Students have to be able to speak in front of the class, create a dialogue, tell a story, and produce the language creatively. The teaching and learning of the speaking skill focusing on story telling ability can work well when supported by the appropriate choice of teaching method. This study attempts to: 1) identify the list of things needed by teachers of primary schools to teach Bahasa Indonesia in fun and creative ways, 2) design a prototype of suggestopedia based storytelling learning model to teach Bahasa Indonesia in primary schools, 3) develop the prototype into a suggestopedia based storytelling learning model to teach Bahasa Indonesia in primary schools, 4) determine the effectiveness of the application of suggestopedia based storytelling learning model to teach Bahasa Indonesia in primary schools. This research is a model development study based on the procedures by Borg and Gall. This study demonstrated that a teaching model is created through the following steps: 1) identifying and analyzing the needs of the students and teachers, 2) designing and evaluating the model, 3) developing and testing the model. The effectiveness test showed a significant increase of 3.03 or 8.11% in the experimental group’s mean score, from 18.94 in the pretest to 21.97 in the posttest. Meanwhile, the control group only experienced a 2.51 or 6.36 % in the mean score, from 18.50 in the pretest to 21.05 in the posttest. Hence, it can be concluded that the students’ story telling skill in the experiment class using the teaching method developed in this study was higher than in the control class. The result implied that the teaching model prototype can be further developed to increase the primary students’ story telling skill in Salatiga.

Keywords: storytelling teaching model, Bahasa Indonesia teaching and learning, suggestopedia approach.

INTRODUCTION

Brown (2007:20) argued that one of language activities that can bring students closer to the authentic context is speaking. Storytelling, as a part of the speaking skill, is essential both in the classroom context and in the daily activities. Hence, the mastery of the skill is necessary due to its fundamental role in oral communication, including in a lecture, discussion, and seminar. Yet, the biggest challenge to apply this skill is the lack of courage to communicate clearly, spontaneously, and meaningfully.

Due to its importance, speaking skill must be taught as an integral part of language skills in primary schools. As a consequence, the mastery of the skill is compulsory for primary school students. This is closely related to the advantages of speaking skill for students, especially primary students, which include improving students’ communication skills, developing virtuous characters, giving a humane touch in education, and developing students’ language skills (BSNP, 2007).

Unfortunately, a preliminary observation in a fifth grade classroom showed that the teaching model used in Bahasa Indonesia lesson was still traditional. The teaching and learning activities was still teacher centered, and did not actively engage students. As a result, students tended to passively wait for the teacher’s
instructions. In addition, they were not enthusiastic nor creative, and mostly silent throughout the lesson. Consequently, the condition did not optimally provide authentic learning experiences for the students, whereby the lesson became less meaningful and less exciting.

Based on the preliminary result, it can be concluded that teachers need a new teaching model to solve the problem. The address the issue, first of all, a need analysis should be done. According to Dick, Walter; Carey, Lou & Carey, James O. (2009: 17-33) a need analysis can be administered based on the front-end analysis, which involves analyses at the beginning and at the end of the lesson to decide the appropriate steps needed to address particular issues. Dick, Walter; Carey, Lou & Carey, James O. (2009:22) outlined three steps to analyze the teaching and learning needs including: 1) set the standards and goals of the teaching and learning as a reference of expected status, 2) determine the actual status of the expected teaching and learning process, and 3) identify the gap between the expected status and the real condition. The gap, consequently, reflects the problems and needs concerning the education system that need to be solved.

Observing the phenomenon, the writer set out to design an alternative teaching model for the benefit of both the teachers and the students. This is relevant with Tucker & Stronge (2005) who believed that teachers need to develop a more effective teaching model. Thus, teachers should be skillful in choosing the right model. The alternative model developed in this study is suggestopedia based storytelling model, whereby each student has to work in groups designed accordingly to ensure that all students participate actively and effectively in the lesson.

The teaching model developed in this study is essential for teachers, students, and policy makers. For teachers, the teaching model guides the active, creative and meaningful learning. For students, it can encourage students to actively perform. Also, this can encourage the students to perform actively in the lesson as well as to train students to work together as team while creating a competitive learning atmosphere. For the policy maker, this model can hopefully stimulate teachers to develop their own simple teaching models.

The study applied the suggestopedia teaching model prototype. Tembang dolanan , i.e. Javanese nursery rhymes, were used in the model. Some suggestive sentences were inserted in the rhymes to produce relaxing, motivating and entertaining effects, expected to be a means for effective and stimulating lesson.

Based on the background, the research was aimed to address the following issues: (a) how was the current teaching practice used in Bahasa Indonesia lessons, and what did the students and teachers need to include in a suggestopedia based storytelling method in primary schools in Salatiga?; (b) how was the preliminary draft of the suggestopedia based storytelling method used to teach Bahasa Indonesia in primary schools in Salatiga?; (c) how was the teaching model prototype developed into the suggestopedia based storytelling method to teach Bahasa Indonesia in primary school?; and (d) how effective was the suggestopedia based storytelling method to teach Bahasa Indonesia in primary schools?

TEACHING MODEL

Bruce Joyce and Marsha Weil (2009:7) defined teaching model as a tool used by teachers to help students get information, ideas, skills, values, point of view, and purpose to express themselves. Meanwhile, Chauhan in Wahab (2008:52) explained that “model of teaching can be defined as an instructional design which describes the process of specifying and producing particular environmental situations which cause the students to interact in such a way that specific change occurs in their behavior”. However, unlike the previous definition, Wahab (2009:52) pointed that a teaching model developed by teachers is aimed at helping teachers to increase their competence to recognize students and create a more stimulating learning environment needed to improve the learning process. The expected final result is students’ increased ability to learn more effectively, whereby they become more adept to master new knowledge, skills, and content of the lesson.

Furthermore, a teaching model development is needed in an educational process. Reizer (2007:4-7)
pointed out that teaching model development is an analysis, design, construction, implementation, evaluation, and the management of teaching and non-teaching process, including the resources needed to improve performance in various situations, educational institutions, and locations. Iskandarwassid (2010:40-41) noted that various teaching models had been developed, ranging from the simplest to the sophisticated ones. A model is considered sophisticated when it needs a lot of teaching aids in the implementation. Janali in Wahyo (2007:25) explained three types of model development, including (1) theoretical model, i.e. a model that describes the framework based on relevant theories and empirical data; (2) an analytic conceptual model, which lists the product components and shows the relations between each component with the other; and (3) a procedural model, which consists of steps should be taken in order to get maximum result.

Out of the three models, the current study used the procedural model. This type describes the system to organize learning experiences through learning steps in order to meet the expected learning objectives. Therefore, the learning steps were set as a guideline for the teachers to teach the lesson.

Therefore, in this study, teaching method is defined as a systematic procedure to organize learning experiences in order to meet learning objectives. In general, a teaching model include approaches, methods, and techniques as an integral unit. Regarding the suggestopedia based storytelling model, teaching scenarios have to be executed by teachers according to the prescribed procedures.

Gibbs (2002) holds that an effective teachers can survive threats and challenges of various teaching situations. Not only can an effective teacher cope with the difficulties, but he can successfully deliver the lesson. An effective teacher is always ready to find new solutions and try new teaching techniques, and is willing to take risk to try new alternatives.

According to Anthony (1963), a procedural teaching model should include approaches, methods, and techniques. He defined approach as a set of correlative assumption concerning the nature of language teaching and learning. Meanwhile, Brown (2001:14) defined language teaching approach as a set of basic assumptions of basic definitions regarding language, learning and teaching, which are correlated into a basic definition of language teaching and learning. Next, Anthony (1963) defined a method as an overall plan on how to deliver language learning materials in sequential order, in which there is no contradicting part, based on a certain approach. Similarly, Brown (2001:14) explained that language teaching method is a language teaching plan. Regarding the technique, Anthony (1963) defined it as specific ways taken in the classroom to implement a certain method, which is in sync with a certain approach. In the same light, Brown (2001:14) defined a technique as a specific and concrete activity manifested in a language learning pattern according to certain method and approach. Overall, Richard and Rodgers (1986:16) pointed out that hierarchically the order from the highest to the lowest will be approach, design, and procedure.

During the lesson, the model is combined with background music with suggestive lyrics called suggestopedia. Suggestopedia is a strategy developed by Lozanov, a Bulgarian psychologist. Lozanov (1978:2-5) argued that the main factor that hindered the students’ learning, including learning language and literature, is the psychological hindrance. He believed that a successful lesson should be able to touch students’ subconscious level. Fortunately, thehindrance can be eliminated by incorporating drama, physical activities, and music in the lesson. Next, he maintained that relaxation and concentration techniques should help students to open their sub consciousness and help them master more new vocabularies as well as other structures.

Norland & Pruett-Said (2006:15) explained that the use of music in the classroom was proven to create relaxing ambience which improved students’ ability to absorb more information. The suggestopedia method is also known as suggestive-accelerative learning and teaching or the Lozanov method (Meier, 2002:49).

Scovel (1979: 258) proposed several techniques to give positive suggestive effects to students, including making them sit comfortably, playing background music during a lesson, using dim light, increasing individual participation, using posters as informational media, and providing teachers who are trained in suggestive teaching arts. Bancroft (2005) added that a relaxing teaching atmosphere is necessary.
Furthermore, a fun learning environment is a prerequisite of this strategy. Therefore, creating a safe and fun learning experience which is appropriate with the students’ development level is an essential thing to do.

According to Murray & Christison (2011:74), characteristically, primary school students of third to fifth grades start to build their understanding about numerous things outside of themselves, and started to cooperate with others. In this stage, they will benefit more when working in a creative and imaginative environment. One way to stimulate the environment is by using songs and stories. Kelly in Hayes (2007:14) urged the importance of nurturing students’ imagination to increase their enthusiasm to learn their surroundings.

In this study, suggestive songs and stories used in the storytelling lesson are several tembang dolanan, or Javanese nursery rhymes. Students living in countries throughout Java are mostly familiar with tembang dolanan. Moreover, tembang dolanan is also included in Bahasa Indonesia national curriculum as a part of ‘local poetry’ material (BSNP, 2007). Hence, tembang dolanan can be used as an instrument to encourage students to tell stories.

Further, Waluya (2008:14) explained that tembang dolanan is actually a form of Javanese poetries. In a tembang, physical and emotional structures synergize. To compose a tembang, rules concerning the physical and emotional structures have to be followed. Thus, the physical structure by itself is not sufficient, as a prescribed emotional structure should also be met. As a result, tembang dolanan becomes a refined literary art. Tembang dolanan can be classified as old poems. Michell (2003:150) called this type of old poems that has become a part of oral tradition known as nursery rhymes.

According to Nurgiyantoro (2010: 106), there is no precise information on when tembang dolanan was composed. One thing for sure, tembang dolanan is always simple, and commonly sung by children in the rural areas. Nurgiyantoro (2010:110) identified several messages embodied in tembang dolanan, including: traditions, virtues, politeness, moral lessons, ironies, hygiene, environmental issues, health and religiosity. In general, the prominent parts of tembang dolanan are the fun, playful and humorous elements that invite both the singers and the listeners to laugh. According Ras (1982:314), children generally sing tembang dolanan while playing along with their friends. Then, they can learn more about animals, plants, and their natural as well as social environment through the song. Thus, despite its simple and playful nature, tembang dolanan is rich of meaningful lessons for life.

A teaching model for primary school students should incorporate the learning-while-playing principle. Roopnarine and James E Johnson (2011:45) stated that students of primary school move from understanding the world through kinesthetic and physical tests to the conceptual and abstract understanding of the world. As a consequence, teaching in primary school should incorporate physical activities through play. Roopnarine and James E Johnson (2011:425) added that teachers should provide physical and psychological spaces to stimulate children to create.

RESEARCH METHOD

This is a developmental research based on Borg and Gall theory (2003:570). Borg and Gall’s model prescribes several steps, i.e.: 1) research and data gathering, 2) planning, 3) developing an early prototype, 4) preliminary field study, 5) main product revision, 6) main field test, 7) operational product revision, 8) operational field test, 9) final product revision, and 10) dissemination and implementation. The sequences were modified by Joko Nurkamto into four stages, i.e. 1) preliminary research and needs analysis, 2) design and development of the model prototype, 3) limited and general trial, and 4) effectiveness test.

A preliminary research and need analysis were conducted by researching relevant theories, observing schools, interviewing teachers and students in order to identify the problems as well as the teachers’ and students’ needs regarding the research objectives. The instrument used in this preliminary stage was questionnaires. Next, a categorical descriptive technique was used to analyze the data.

In the second stage, a prototype and the development plans were designed. The design of the model was developed based on the hypothetical model. The prototype of the teaching model, then, was discussed
with primary school teachers in a focus group discussion forum. Next, the result was consulted to an expert in teaching and learning model of Bahasa Indonesia. Slameto, an expert in teaching approaches, assessed the prototype of storytelling model. Thirteen aspects of the model teaching book were assessed, and some suggestions, i.e. to include a language cognitive test in the model, to provide instruments to evaluate students’ character, and to add a process evaluation, were given.

Teguh Suharto, another expert of teaching and learning Bahasa Indonesia, considered that the results of the questionnaires and the interviews could be summarized into the following points: (1) the suggestopedia approach was useful to guide, give a sense of fun and directed, and encourage students to concentrate on the learning; (2) the learning activities using tembang dolanan based on the audio visual input can stimulate students to think critically when developing their stories; (3) the discussion activity to compose a story, the socio-drama play, and the performance can stimulate students to tell stories, applying their intellectual abilities in turns in a sustainable flow. Finally, Teguh assessed that the overall model was quite good, and ready to be tried out with minor revision.

The effectiveness test stage was done to test whether the developed model positively affected the users. In this stage, the effectiveness of the developed model was compared with the already available models. Experimental method was used in this phase, and was conducted in four primary schools in Salatiga, i.e. SDN Kutowinangun 01 and SDN Mangunsari 01 as the control group, and SD Kristen Satya Wacana as well as SDN Ledok 2 as the experimental group.

The data analysis was done by testing the students’ story telling scores. The normality was tested using Liliefors (Lo) technique with the significance level of α= 0.05 (Sudjana, 1996: 466-468). The criteria used was as follow: if Lo<Lo, the data was assumed to have a normal distribution (H0 was accepted). On the contrary, if Lo > Lo, the data distribution was not normal (H0 was rejected), assuming that H0: the sample was taken from a normally distributed population, and H1: the sample was not taken from a normally distribution population.

The homogeneity was tested by comparing the variances of the two groups using Bartlett test with the significance level α = 0.05 (Sudjana, 1996: 261-265). The testing criteria used is if the value of counted \( \chi^2 \) is less than the \( \chi^2 \) table at the significance level α=0.05, the data was considered homogenous.

The data analysis used to test the effectiveness of the suggestopedia based story telling teaching model was the independent t-test to compare the means of the two groups, which was grouped based on the test types and teaching model.

THE RESULT

The result of the preliminary research was developed into a teaching model prototype, which was validated by an expert team using a validation checklist. The assessment of the experts in the form of input, suggestions, opinions, and comments was used to revise the prototype, which resulted in a ready-to-test prototype.

The result of the limited trial in SDN Mangunsari 06 showed an increase in the test mean score, from 13.62 in the pre-test to 21.67 in the post-test. Similarly, the trial in SDN Tegalrejo 05 also showed an increase in the mean score, from 16.27 in the pre-test to 19.77 in the post-test. Based on the tests, it could be inferred that the pre-test score averages were lower than the post-test score average. This showed that based on the limited test, the teaching model prototype increased the students’ story-telling ability. Next, based on the limited trial, the model was then refined before tested to a larger sample.

The results of the large scale trial of the story telling based teaching model were as follows: in SDN Tegalrejo 04, the pretest mean score was 17.81 and the posttest average was 21.90, in SDN Sidorejo Lor 02, the pretest mean score was 17.57 and the posttest mean score was 19.59. Then, all the data were averaged and resulted on the pretest mean score of 16.17 and posttest mean score of 20.63. Therefore, there was an increase of 4.46 points from pretest to posttest. Thus, based on the comparison, students’ who got the
treatment of storytelling based teaching model showed an increased abilities in storytelling.

Table 1. The comparison of the large scale pretest and posttest mean score in four primary schools

<table>
<thead>
<tr>
<th>Schools</th>
<th>Number of students (N)</th>
<th>Pretest mean score</th>
<th>Posttest mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salatiga 06</td>
<td>26</td>
<td>17.961</td>
<td>21.730</td>
</tr>
<tr>
<td>Sidorejo Lor 02</td>
<td>27</td>
<td>18.925</td>
<td>21.481</td>
</tr>
<tr>
<td>Kutowinangun 09</td>
<td>22</td>
<td>17.000</td>
<td>19.954</td>
</tr>
<tr>
<td>Tegalrejo 04</td>
<td>27</td>
<td>17.000</td>
<td>19.037</td>
</tr>
<tr>
<td>Total Number of students</td>
<td>102</td>
<td>16.17</td>
<td>20.63</td>
</tr>
</tbody>
</table>

Figure 1.1. The chart showing the comparison of the large scale pretest and posttest average scores in four primary schools

The figure depicts an increase of the fifth graders’ storytelling skill after given the treatment of suggestopedia based storytelling teaching model. All subjects in the four schools used in the large scale trial demonstrated the same trend, whereby the posttest score was higher than the pretest score. Therefore, it was assumed that the effectiveness of suggestopedia based storytelling teaching method could be further tested.

The effectiveness test was used to determine whether the teaching model could significantly improve the primary school students’ ability in storytelling. The control group consisted of fifth graders of two schools, i.e. 38 fifth graders of SDN Kutowinangun 01 and 32 fifth graders of SN Mangunsari 01. Meanwhile, the experimental group consisted of 35 fifth graders of SDN Ledok 02, and 27 fifth graders of SD Kristen Satya Wacana Salatiga.

Subsequent to the data gathering, a non-independent t-test was run to analyze the data. Prior to the test, a linearity test as a prerequisite of t-test was conducted. In addition, the required normality as well as homogeneity tests were also done.

A Kolmogorov-Smirnov test with significance level $\alpha = 0.05$ was used to test the normality (Sudjana, 1996: 466-468). The criterion used was if $L_0 < L_1$, the data was assumed to have a normal distribution. The result of the pretest, which was $0.1263 < 0.1401$, and the result of the posttest, which was $0.1279 < 0.1401$,
indicated that the p-values of both the pretest and posttest were more than \( \alpha = 0.05 \). Thus, it was assumed that the pretest and posttest data were taken from a normally distributed population.

To test the variance homogeneity of the population, a Bartlett test was conducted. The significance level was set at \( \alpha=0.05 \) (Sudjana, 1996: 261-265). The test criterion used was if \( \chi^2 \) count was smaller than the \( \chi^2 \) value in the table at the significance level (\( \alpha \)) 0.05, it could be assumed that the data were homogenous. Based on homogeneity test for the pre-test scores, the variance of the population showed a smaller counted \( \chi^2 \) than the \( \chi^2 \) value in the table (\( \chi^2 \) count< \( \chi^2 \) table) at the significance level \( \alpha=0.5 \). Thus, it can be assumed that the data set was homogenous.

Table 2. The mean difference of the pretest and posttest storytelling skill score in the control and experimental groups.

<table>
<thead>
<tr>
<th>Independent variable: Storytelling skill</th>
<th>Storytelling teaching model</th>
<th>N</th>
<th>Mean Pretest</th>
<th>Mean Postest</th>
<th>difference</th>
<th>increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suggestopedia based (experimental)</td>
<td>62</td>
<td>18.9355</td>
<td>21.9677</td>
<td>3.0322</td>
<td>8.11%</td>
<td></td>
</tr>
<tr>
<td>Conventional (control)</td>
<td>70</td>
<td>18.5000</td>
<td>21.0143</td>
<td>2.5143</td>
<td>6.36%</td>
<td></td>
</tr>
</tbody>
</table>

Source: analyzed primary data

The table shows the mean differences of the students’ storytelling skill scores in the pretest and posttest, both for the control and experimental groups. The differences between the experimental and control groups can be clearly observed in the following figure.

Figure 1. The histogram of the means differences of pretest and posttest storytelling scores in the control and experimental groups

Both the table and the figure showed the mean differences of students’ storytelling scores in the pretest is quite similar for both the control and experimental groups, i.e. 18.5000 for the control group and 18.9355 for the experimental group. There was only 0.4355 difference between the two groups, which showed that the storytelling skill of the two groups was relatively similar before the experiment.

After the experiment, an increase of mean score was observable. The control group experienced an increase of 21.0143 in the score average, and the experimental group had a 21.9677 increase in the score average. In other words, the score average increased as much as 6.36% for the control group, and 8.11% for the experimental group. Therefore, from the data, it can be concluded that the increase of storytelling skill was higher in the experimental group. In sum, the teaching model can be developed to improve the storytelling skill of primary students in Salatiga.
DISCUSSION

Uno (2008:18) argued that professional teachers must have the competence to deliver the lessons successfully. Hence, the currently developed model can hopefully provide a guideline for teachers to conduct the lessons according to the students’ and teachers’ needs. The student centered learning requires teachers to simultaneously be a planner, facilitator, motivator, mediator, and evaluator in order to create interesting and supporting learning environment. This becomes the key component to ensure the success of the storytelling teaching model to improve students’ storytelling skill.

A group learning must be meaningful for students. Therefore, in this research, lessons were planned using an approach that emphasizes on students’ skills to solve problems, think creatively, be proactive, and able to self-evaluate their own products. Along with this, Covey (1997:179) claimed that to help students master the skills, lessons should be planned based on four pillars of learning process, which are: (1) learning to know; (2) leaning to do; (3) learning to be; and (4) learning to live together.

A meaningful lesson should be started since the first minute the teacher entered the class. As Einstein in Chatib (2013:78) once put it, “if the idea at first is not crazy, then there is no hope for it.” When related to learning process, this means that the first minutes of a lesson are critical for the next one hour. Hence, Meier (2001:111) stated that teachers’ first task is encourage students and make them ready to learn. To do so, teachers can give positive suggestions to remove learning obstacles. These hindrances, among others, may include: (1) students’ fear of failure or public humiliation; (2) a sense that they do not benefit anything from learning; (3) boredom; (4) lack of challenges in learning; (5) teachers’ statement that may sound, “There are too many materials to learn within limited time. This material is very complex and difficult. If you cannot understand this, then you won’t be able to get any job.” All the hindrances should be replaced by positive suggestion by playing instrumental music with motivating stories or sentences at the beginning of the lessons.

The currently developed model can create a learning environment, which optimalizes students’ storytelling skill. This is relevant with Iskandarwassid’s and Dadang’s (2011:27) statement that a well-planned lesson that is applied in the classroom can maximize students’ potentials. In addition, Suwandi (2011:21) explained that lesson planning determines what, when and how the lesson will be conducted. Therefore, an appropriate planning will ensure a maximal result.

The result of the storytelling lesson should be observable in each student. Therefore, this model should be equipped with an assessment rubric to grade the students’ performance. Suwandi (2011:45) stated that a storytelling assessment can be done through intensive observation on students’ performance during the lesson, especially while they interact, discuss, and perform in front of the class.

Nurgiyantoro (2012:406) holds that a performance assessment must be able to reveal information on students’ storytelling competence in an accurate and concrete way, instead of merely predicting the students’ performance. In this research, the assessment was done through observing students while they had a discussion, interacted and performed the story in front of the class. The assessment was based on the students’ activities so that the result would be able to describe students’ overall competence. This means that the leaning process strongly determines the success of the lesson. Therefore, learning process should be interestingly and meaningfully designed.

A storytelling lesson will be more easily understood when students are equipped with strategies to apply their skill according to their level of competence and needs. Concerning with the story telling skill, Nurgiantoro (2005:42) claimed that a skill course is relatively more difficult to deliver, especially to the beginners. In this study, students need to make a conversation based on the appropriate word choices, grammatical rules, correct pronunciation, fluent flow, appropriate expression, and right comprehension of the story they tell to others.

Piaget in Brown (2007:13) explained that students should learn using all of their senses and bodies. Therefore, learning as a development process should involve changes, identity revealing, and construction,
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which are built on previous learning experiences. Furthermore, Jensen & Nickelsen (2011: 35-37) stated that all instruments of a lesson should be related with students’ learning types, i.e. visual, auditory and kinesthetic. Visual learners study through what they see, while the auditory learners study more effectively through what they listen, and kinesthetic learners study through what they do and touch. Thus, in this research, the suggestopedia approach was used to accommodate all learning types through the use of tembang dolanan as both the suggestive media and the game.

Losanov (1978:1) stated that playing music during a lesson could increase the level of students’ self-control and attention. Meanwhile, in this study, tembang dolanan was used to stimulate students to move, sing and play roles according to the lyric of the rhyme. The application of the approach supported by the use of media in the lesson changed the teacher’s role, from being the center of the lesson to being the facilitator). In that, teachers should be able to base and function various available teaching approaches, media, and methods optimally to create fun, passionate, and impressive learning experiences. This is in line with Chatif’s (2013:75) statement that a facilitator should be able to build students’ experiences. Metaphorically, a facilitator should be like a farmer with a bucket full of water used to water the plants. Students are like plants, which will thrive and grow when watered, nurtured, and fertilized.

Teachers’ role in the learning process is combining various available sources and facilities to help students learn something. According to Hattie (2012:23), a powerful, passionate, and accomplished teacher must be able to help student focus themselves to study, develop their thinking and problem solving skills, appreciate new knowledge, comprehend learning objectives, and become empathetic. The currently developed teaching model is expected to help teachers do those things.

The results of the trial and the experiment of the storytelling model consistently showed an increase in students’ learning and storytelling skills. This study proved that even since the limited and large-scale trials, the students’ storytelling skill had increased. Further, the experiment demonstrated that before the study the control and the experimental group had relatively similar academic performance. This was shown by the almost similar pretest score average of the two groups, which was 17.96 for the control group and 17.76 for the control group. The posttest, on the other hand, showed a significant performance difference in the score averages of two groups, which was 20.74 for the experimental group and 19.99 for the control group. Teachers’ role and effort to help students master the learning materials required by the essential and basic competences in the curriculum were more prominent. As a result, students’ role in the experimental group was more dominant. Consequently, besides increasing the storytelling skill, this teaching model also improving self-confidence, which according to Muijs and David Reynold (2008:226) contributes to the students’ performance.

The result of the study showed that the suggestopedia based teaching model using authentic themes taken from students’ actual experiences were more relevant to the students’ conditions, needs, interests, and abilities. As a result, the learning was more interesting and meaningful. Consequently, this learning environment encouraged students to learn and improve their skills, which resulted in the higher performance in the experimental group.

The finding was in line with other studies conducted by Trianto (2005), Subyantoro (2007), and Andayani (2008) who reported that teaching models developed as a form of innovative learning could increase the targeted skills and potentials.

CONCLUSION

This study produced a teaching model. The steps used to design the storytelling teaching model were 1) exploration and library study, 2) designing a prototype of storytelling teaching model, 3) developing a prototype using limited and large-scale trials, and 4) testing the effectiveness of the teaching model.

In the effectiveness test phase, the pretest score average was 18.94 for the experimental group, and 18.50 for the control group. There was only 0.44 difference between the two groups. Thus, it could be interpreted that the two groups were not significantly different. On the contrary, the posttest score average
was 21.97 for the experimental group and 21.01 for the control group, which showed a 0.96 difference between the two groups. Thus, the difference in the posttest was significant.

The analysis of the effectiveness test showed that the mean increase in the experimental group, from 18.94 in the pretest and 21.97 in the posttest indicated a significant increase of 3.03 or 8.11%. Whereas, the control group only experienced a 2.51 or 6.36% increase, from 18.50 in the pretest and 21.05 in the posttest. From the result, it can be concluded that the storytelling skill in the experimental group was higher than in the control group. This means that the teaching model can be further developed to increase the storytelling skill of primary school students in Salatiga.

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The Effect of a Flipped Classroom Model on Academic Achievement, Self-Directed Learning Readiness, Motivation And Retention*

Didem ALSANÇAK SIRAKAYA [1], Selçuk ÖZDEMİR [2]

ABSTRACT

This study examined the effect of a flipped classroom model on students' academic achievement, self-directed learning readiness and motivation. The participants of this study were a total of 66 students who took the "Scientific Research Methods" course and were studying in two different classes in the Faculty of Education at Ahi Evran University in the fall term of the 2014 – 2015 academic year. One class was designated as an experimental group and the other one was the control group. We applied the flipped classroom model to the experimental group while a classical blended learning method was applied to the control group. An achievement test, a self-directed learning readiness scale and a motivation scale were used as data collection tools. To analyze the collected data, this study used the t-test, MANOVA and ANCOVA analyses. Study findings showed that there was a significant difference between groups in terms of academic achievement, motivation and retention. However, no significant difference between the experimental and control groups in terms of self directed learning readiness was found.

Keywords: Flipped classroom, academic achievement, self-directed learning readiness, motivation, retention

INTRODUCTION

Changes in information and communication technologies have also changed the qualifications and abilities expected from people in the current information age. In the 21st century, named as the information age with changes encountered in science and technology, people are expected to be active in creating and interpreting knowledge rather than directly obtaining information presented and needing to be directed. It is quite important for people to acquire these abilities named as 21st century skills (Romiszowski, 1996). Now, educational institutions also attempt to encourage individuals to think, criticize, know how to acquire knowledge, and have these skills, and thus develop curricula in this respect (Seferoglu & Akbiyik, 2006). In the curricula, which are changed accordingly, teacher and student roles have also changed to promote the learning of these 21st century skills. Students actively participate in the knowledge acquisition process rather than being passive listeners; teachers take a counselor role and direct students in this process.

As a result of the changes in teacher and student roles, the teacher-centered approach has given way to the student-centered approach which requires students to take responsibility for their own learning, to actively participate in learning processes, to control their own learning processes and create the environment where students play a central role. Among these abilities expressed as the 21st century skills, problem solving, critical thinking, communication, creativity, information and media literacy, cooperation and self-direction skills are included. Self-directed learning is an important skill for students who are expected to take an active role in creating and interpreting knowledge.

Self-direction is important in that students themselves can take responsibility for their own learning in the student-centered educational process. Knowles (1975) defined self-directed learning as a process
By taking the initiative with or without receiving support, diagnosing their learning needs, formulating learning goals, determining human and material resources for learning, choosing and implementing an appropriate learning strategy for the knowledge to be learned, and evaluating learning outcomes. In the self-directed learning process, individuals set their learning goals, make their own decisions to acquire knowledge, use information acquisition methods actively and fulfill and evaluate learning on their own (Salas, 2010).

Although different definitions for self-directed learning exist, Caffarella (2000) indicated the common points of these definitions as that individuals take responsibility for their own learning, plan for the learning process and fulfill and evaluate their learning. In the current information age, picking the necessary information out of the ever-increasing knowledge stack, formulating appropriate strategies and being able to manage their own learning process are important for educational process effectiveness. Therefore, acquiring these skills has become a necessity. Acquiring these skills so important in the educational process can be possible in the educational environment especially when teachers use information and communication technology in creating student-centered educational environments. Because of the ever-increasing technological developments and the fact that students use technology and the Internet extensively in their daily lives, use of the most recent technologies in education has become inevitable.

The distance learning process which started with correspondence courses has continuously changed to satisfy different needs and limitations. The flipped classroom model has become one of the latest learning methods in recent years and it requires technology use. Although the flipped classroom (FC) model is not a new educational method, it has gained popularity with technology use in education (Jensen, Kummer, & Godoy, 2015). The FC method gives students the opportunity to learn course concepts outside the classroom environment with online educational materials such as video, film and voice so that classroom time is used for active learning such as problem solving and practical applications (Bergmann & Sams, 2012). This method, whereby students learn the theoretical part of the course at home before class, allocates classroom time for active learning practices such as question-answer, discussion and problem solving. In the FC model, students take responsibility for their own learning and progress at their own speed (Davies, Dean, & Ball, 2013). Students fulfill independent and active learning by accessing the learning environments presented through the Internet whenever and wherever they want (Baker, 2000). The assessment of this model in terms of Bloom’s taxonomy steps showed that students fulfill learning with regard to knowledge and comprehension by watching videos before class and they fulfill learning with regard to application, analysis, synthesis and evaluation by participating in classroom activities (Rutkowski & Moscinska, 2013). With the characteristics of the flipped classroom model where the learning environments provide a personal learning experience (Hamdan, McKnight, McKnight, & Arfstrom, 2013), teachers take on the counselor role and students are active participants (Halili & Zainuddin, 2015; King, 1993), students take on the learning responsibility and progress at their own speed (Davies et al., 2013).

Self-direction skills are quite important for online learning media where students have more control, independence and responsibility in personal learning processes in comparison with face-to-face learning environments (Kocdar, 2015). Online learning has an effect on self-direction (Song & Hill, 2007); studies have shown that a relationship exists between self-directed learning and achievement. Students having higher levels of self-directed learning skills also have higher levels of achievement with knowledge acquisition and management (Merriam & Caffarella, 1991). Similarly, Salas (2010) reported that online courses in higher education and distance learning programs are considered among important steps that support self-learning. The flipped learning which requires students to take more control over their learning with its dimension that is fulfilled on the Internet (Gunawardena & McIssac, 2003) can ensure that students engage in self-directed learning more effectively by providing them independence and flexibility (Sahin, 2010).

On the other hand, the flipped classroom model requires students to manage and maintain motivation for both implementing self-directed learning and enabling students to manage their own learning processes. Student motivation is an important prerequisite for managing their learning process (Boevé et al., 2016). Song and Hill (2007) defined one of the three main characteristics of self-directed students as motivation. Motivation is the reason people make an effort (Kurt, 2005), and self-directed students should make an
effort for their learning process. Therefore, motivation is a prerequisite for self-directed learning. Students having higher motivation also have higher levels of self-directed learning skills (Candy, 1991). Hence, in the learning environment, motivation is a dimension that should be taken into consideration (Dede & Argun, 2004). Learning environments that set students in motion, in which students have adequate capabilities, reveal their own values and can experience achievement and failure, can affect motivation (Unsal, 2012). In recent years, it has been reported that student motivation is an important factor in terms of increasing achievement in educational environments which have been differentiated with technological developments (Deveci-Topal, 2013). Studies have concluded that web-based learning, online learning, and blended learning environments, which became part of the educational process along with technology, influence student motivation (Acar, 2009; Deveci-Topal, 2013; Unsal, 2012).

This study aimed at examining the effect of the flipped classroom model on individuals' self-directed learning skills and motivation. It was thought that the flipped classroom model may have an effect on self-directed learning and motivation in the light of its characteristics as mentioned before. Therefore, this study aimed at examining the effect of the flipped classroom model on self-directed learning readiness, achievement and motivation. While the flipped classroom model is compared with the traditional learning environment in existing studies, this study compared FC with the classical blended learning method. For this reason, it is thought to contribute to the literature. These are the research questions to be answered in line with this purpose:

1. Is there a significant difference between the experimental and control groups in terms of academic achievement scores?
2. Is there a significant difference between the experimental and control groups in terms of self-directed learning readiness levels?
3. Is there a significant difference between the experimental and control groups in terms of motivation levels?
4. Is there a significant difference between the experimental and control groups in terms of retention scores?

METHOD

Research Design: This was a quasi-experimental pre-test–post-test study with a control group. This design unbiasedly assigns groups not to be changed as an experimental and a control group. Groups were measured using a pre-test before the study and measured twice using a post-test after the study (Buyukozturk, Kilic-Cakmak, Akgun, Karadeniz, & Demirel, 2008).

The Sample: The sample of this study included a total of 66 students, in two branches with 32 and 34 individuals, respectively, in each class, who took the "Scientific Research Methods" course in the Department of Psychological Counseling and Guidance, Faculty of Education at Ahi Evran University in the spring term of the 2014 – 2015 academic year. Existing groups were assigned randomly as an experimental and a control group.

Data Collection Tools: Within the scope of this study, motivation and learning strategies scales, a self-directed learning readiness scale and an academic achievement test were used as data collection tools.

General Academic Achievement: To determine student academic achievement in the "Scientific Research Methods" course, this study used an achievement test, weekly quizzes and activities for higher-order learning. The total academic achievement score was calculated as 40% from the achievement test, 20% from weekly quizzes and 40% from the higher-order learning activities.

Achievement test: This study used the achievement test developed by the researcher. The validity and reliability analyses of this test were also performed by the researcher. The achievement test was created in
accordance with the table of specifications prepared in the light of acquisitions specified for the course. Firstly, expert opinions on the achievement test were noted and necessary changes were made according to the opinions. Some items have been revised or removed. After the implemented changes, test item analysis was performed. The item analysis of this achievement test was performed with 252 students from the Departments of Primary School Teaching, Science Teaching and Turkish Language Teaching at Ahi Evran University and Niğde University; they had taken the "Scientific Research Methods" course and were not part of the actual study. After the item analysis, the items with a discrimination less than 0.30 (16 items) were removed from the test and a final test consisting of 40 questions was made. The Kuder-Richardson-20 (KR-20) reliability coefficient of the final form of the 40-item multiple choice achievement test was found to be 0.80.

**Weekly quizzes:** Weekly quizzes were developed to test for subject content. These quizzes included multiple choice questions. Firstly, expert opinions on the prepared items were noted. As a result of the pre-application made after necessary changes were implemented, item analysis was performed, and the items with a discriminatory power below 0.30 were excluded from the quizzes. The remaining questions were used as weekly quizzes on the subject of the week. After item analysis, a total of 30 questions remained to be used in the weekly quizzes. Moreover, some questions of the achievement test, which was developed by Olpak (2013) for the “Scientific Research Methods” course, and of which the KR-20 reliability coefficient was 0.90, were used in the weekly quizzes.

**Activities for higher-order learning:** The researcher developed activities at the levels of analysis, evaluation and creation according to Bloom’s taxonomy. For the activities, opinions from six experts were collected and necessary changes were made. All group members achieved the same scores on group work activities. Activities were assessed out of 100 in the light of the specified answer key. In the application process, the researcher and the subject matter expert separately scored the first two activities, and it was shown that there was a high-level positive correlation between the respective scores (r1 = .91, p = 0.00 < 0.01 and r2 = .96, p = 0.00 < 0.01). To provide feedback on activities to students during course hours, the researcher, who was also the course teacher, did the scoring for the other activities.

**Self-directed Learning Readiness Scale (SDLRS):** To determine students’ self-directed learning readiness levels, this study used the Self-directed Learning Readiness Scale (SDLRS) developed by Fisher et al. (2001) and adapted in Turkish by Sahin and Erden (2009). This scale included three sub-factors: self-direction, willingness to learn and self-control abilities. This is a 5-point Likert-type grading scale which was structured as strongly disagree (1), disagree (2), partially agree (3), agree (4), and strongly agree (5). This study found the Cronbach’s alpha coefficient to be .93 for the entire scale, .87 for the self-direction subdimension, .86 for the willingness to learn subdimension, and .79 for the self-control abilities subdimension.

**Motivation and Learning Strategies Scale (MLSS):** The MLSS scale developed by Pintrich, Smith, Garcia, and McKeachie (1991) was adapted into Turkish by Buyukozturk, Akgun, Ozkahveci, and Demirel (2004). This scale consists of two main parts: a “motivation scale” comprising 6 factors and a “learning strategies scale” comprising 9 factors. This is a 7-point Likert-type grading scale varying between “Definitely wrong for me” (1) and “Definitely right for me” (7). To determine student’ motivation levels within the scope of this study, intrinsic goal orientation (4-item), extrinsic goal orientation (4-item), task value (5-item), control of learning beliefs (4-item), self-efficacy for learning and performance (4-item), and test anxiety (5-item) factors of the “motivation scale” dimension of the scale were examined.

**Learning Environment:** The online learning environment used in this study was created taking the characteristics of the target group and design principles into consideration. This study had consulted four experts in the Computer and Instructional Technologies Teaching field about the developed learning environment and necessary changes were made. Moreover, the field experts had also examined the content, and in the light of criticisms, it was revised.

To test the learning environment performance, this study administered a pre-application test on a group consisting of 10 third year students from the Department of Computer and Instructional Technologies Teaching, Faculty of Education at Ahi Evran University. In the pre-application process, this study ensured that
students logged into the site simultaneously and determined the current technical problems by accessing the content, watching videos, answering questions, discussing among themselves on forums and sending private messages. Therefore, the problems encountered by users in the application process were eliminated before the process began. After the test, semi-structured interviews were administered to the students; they had positive opinions on the system, showing that the problems had been solved. We then began the experimental method after the web environment was appropriate and ready.

Students in both groups logged into the learning environment with their user names and passwords. They logged into the system using the same screen; however, they were directed to different pages and content according to their groups. The learning environment included a home page, teaching plan, forum, announcement and contact pages. It was possible to access menus and the content from the home page. The curriculum and weekly schedules were presented on the teaching plan page. Students directed their questions to the course teacher and other students using the forum page. They could create a new question and respond to or display the existing questions. Course teachers could share their announcements on the announcement page. Furthermore, there was a Submit Assignments menu for the control group, and students could submit their weekly homework using this menu.

**Experimental Procedure:** In the application process, this study administered the flipped classroom model to one group and a classical blended learning method to the other one. Students in both groups used the learning environment developed by the researcher as a system. Both groups receive lectures from the same teacher. Only registered users could access the online content. Students in the experimental group learned the theoretical part of the course at home before class by watching content-oriented videos and then taking weekly quizzes at the end of the videos within the scope of the flipped classroom model. Thus, in course time spent in the classroom, they participated in active learning activities in the form of question-answer and discussion. These students also did higher-order learning-oriented activities, which were developed by the researcher, in the classroom environment. However, within the scope of the classical blended learning method, students in the control group learned the theoretical part of the course in the classroom and then they answered the same questions that the other group responded to at the end of the videos in the online classroom environment. They did higher-order learning-oriented activities as homework and submitted it through the system. The experimental group learned lessons at home and did homework in school while the control group did just the opposite. In out-of-school time, students in both groups could ask their questions to the course teacher and other students via the forum.

**Data Analysis:** In the data analysis period, this study performed an independent sample *t*-test, MANOVA analysis and ANCOVA analysis to examine the effect of the implemented educational method on academic achievement and self-directed learning readiness, on motivation, and on retention, respectively.

**RESULTS AND DISCUSSION**

Before the analyses, it was checked whether the parametric test assumptions were met. For *t*-test, normality and homogeneity of variance assumptions were tested. For MANOVA, sample size, normality, linearity, homogeneity of variance-convergence matrix and multicollinearity (Field, 2009) assumptions were checked. According to these results *t*-test, Mann Whitney *U* and MANOVA test were used in the data analysis.

**Pretest Analyses**

Before the data analysis, to examine whether the experimental and control groups were equal, the groups were compared in terms of academic achievement, self-directed learning readiness and motivation. This study used an independent sample *t*-test to compare academic achievement and motivation of the groups and performed a Mann Whitney *U* analysis to compare self-directed learning readiness. Mann Whitney *U* test was used to compare the self-directed learning readiness pre-test averages of the groups, because self-directed learning readiness pre-test scores were not normally distributed. The analysis results are illustrated in Table 1.
Table 1. Independent Sample ‑ test results for pre‑test Scores of the Experimental and Control Group on Academic Achievement, Motivation and Self‑directed Learning Readiness

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>$\bar{x}$</th>
<th>S</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic achievement</td>
<td>32</td>
<td>61.8</td>
<td>10.4</td>
<td>64</td>
<td>1.7</td>
<td>0.09</td>
</tr>
<tr>
<td>Control Group</td>
<td>34</td>
<td>57.2</td>
<td>11.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>$\bar{x}$</th>
<th>S</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>32</td>
<td>4.5</td>
<td>0.6</td>
<td>64</td>
<td>0.3</td>
<td>0.72</td>
</tr>
<tr>
<td>Control Group</td>
<td>34</td>
<td>4.4</td>
<td>0.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Experimental Group: The group that experienced the flipped classroom model
Control Group: The group that underwent the classical blended learning method

Table 2. Mann Whitney ‑ analysis results for pre‑test Scores of the Experimental and Control Group on Self‑directed Learning Readiness

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
<th>Mann Whitney U</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self‑directed Learning Readiness</td>
<td>Experimental Group</td>
<td>32</td>
<td>31.56</td>
<td>1010</td>
<td>482</td>
<td>-0.604</td>
</tr>
<tr>
<td>Control Group</td>
<td>34</td>
<td>34.39</td>
<td>1135</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Experimental Group: The group that experienced the flipped classroom model
Control Group: The group that underwent the classical blended learning method

This study found no significant difference between mean scores of the groups in terms of achievement [$t(64) = 1.7$, $p > 0.05$], motivation [$t(64) = -0.3$, $p > 0.05$], and self‑directed learning readiness [$z = -0.604$, $p > 0.05$]. According to these findings, it can be concluded that both the experimental and control groups were equal in terms of achievement, motivation and self‑directed learning levels.

The effect of the implemented educational method on general academic achievement

This study performed an independent sample ‑ test to analyze the difference between general academic achievement scores which were calculated using weekly quiz scores, higher‑order learning activities scores and achievement test scores of the students in both the experimental and control groups. The findings of the mean scores of groups are shown in Table 3.

Table 3. Independent Sample ‑ test results for academic achievement scores of the experimental and control groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>$\bar{x}$</th>
<th>S</th>
<th>SD</th>
<th>t</th>
<th>p</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Academic Achievement</td>
<td>Experimental Group</td>
<td>32</td>
<td>79.41</td>
<td>7.35</td>
<td>64</td>
<td>3.47</td>
<td>0.00</td>
</tr>
<tr>
<td>Control Group</td>
<td>34</td>
<td>72.04</td>
<td>9.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Experimental Group: The group that experienced the flipped classroom model
Control Group: The group that underwent the classical blended learning method
Table 3 showed that there was a significant difference between post-test mean scores of the experimental and control groups on general academic achievement \[ t_{(64)} = 3.47, \ p < 0.05 \]. This finding indicated that the flipped classroom model has the effect of increasing students' achievement. As a result of the analysis, this study found the effect size to be \( \eta^2 = 0.159 \). This value indicated a high-level of effect power.

In terms of academic achievement, scores of the students who used the flipped classroom model were higher than scores of those who used the classical blended learning method. This result showed that students using the FC model were more successful. This can be the result of the fact that because students learn the theoretical part before the class in the FC model, they can ask their questions in the classroom, receive immediate feedback and also interact with the course teacher during the lesson. The characteristics of the flipped classroom model such as students can come to class prepared in advance (Halili & Zainuddin, 2015; Zappe, Leicht, Messner, Litzinger, & Lee, 2009), increased student-teacher interaction (Arshad & Imran, 2013; Bergmann, Overmyer, & Wilie, 2013; Bergmann & Sams, 2012; Halili & Zainuddin, 2015; Kim, Patrick, Srivastava, & Fellow, 2014; Rutkowski & Moscinska, 2013) and students have opportunity to receive immediate feedback (Arshad & Imran, 2013; McGivney-Burelle & Xue, 2013; McLaughlin et al., 2014; Milman, 2012) explained the students' achievement increase. Baepler, Walker, and Driessen (2014) reported that interacting with the course teacher, asking questions and receiving answers have a positive effect on student achievement. Furthermore, this study also found that student motivation in the experimental group was higher than that in the control group. It is likely that the higher motivation level caused higher achievement in the experimental group.

Motivation is an important factor in increasing achievement (Deveci-Topal, 2013). Kettle (2013) found that students with higher motivation had higher achievement levels. The findings of studies in the literature that the flipped classroom model has increased student achievement (Boyraz, 2014; Chao, Chen, & Chuang, 2015; Cook, 2013; Day & Foley, 2006; Hung, 2015; Kim, Patrick, Srivastava, & Fellow, 2014; Lemley et al., 2013; Love Hodge, Grandgenett, & Swift, 2014; Mason, Shuman, & Cook, 2013; Pierce & Fox, 2012; Street, Gilliland, McNeil, & Royal, 2015; Tune, Sturek, & Basile, 2013; Turan, 2015; Wiginton, 2013) are aligned with the findings of this study. Although many studies in the literature have supported the findings of this study, some studies found that the flipped classroom model has no positive effect on achievement (Davies et al., 2013; Findlay-Thompson & Mombourquette, 2014; McLaughlin et al., 2013; Overmyer, 2014). In other words, results have differed in studies examining the effect of the flipped classroom model on student achievement. This difference can be attributed to the different processes, materials and environments used in applying the FC model. The effect of this model on student achievement showed a difference because different materials were used during different lessons. The types of materials used and the surrounding learning environment can affect achievement. Moreover, educationists managing the process plan it in different ways and do different classroom activities. These differences in activities probably generated different results.

The effect of the implemented educational method on self-directed learning readiness

To analyze whether there was a significant difference between self-directed learning readiness sub-factors and total scores of students in the FC group and students in the classical blended learning group, this study performed an independent sample t-test. The findings of the self-directed learning scores of the groups are shown in the following Table 4.
Table 4. Independent Sample t-test results for self-directed learning readiness and post-test scores of the experimental and control groups

<table>
<thead>
<tr>
<th>Scores</th>
<th>Groups</th>
<th>N</th>
<th>x</th>
<th>S</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-direction</td>
<td>Experimental</td>
<td>32</td>
<td>4.21</td>
<td>0.32</td>
<td>64</td>
<td>1.55</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>34</td>
<td>4</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Willingness to learn</td>
<td>Experimental</td>
<td>32</td>
<td>4.10</td>
<td>0.37</td>
<td>64</td>
<td>0.75</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>34</td>
<td>4</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-control abilities</td>
<td>Experimental</td>
<td>32</td>
<td>3.93</td>
<td>0.46</td>
<td>64</td>
<td>0.36</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>34</td>
<td>3.88</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-directed Learning Readiness</td>
<td>Experimental</td>
<td>32</td>
<td>4.05</td>
<td>0.30</td>
<td>64</td>
<td>0.64</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>34</td>
<td>3.97</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Experimental Group: The flipped classroom group
Control Group: The classical blended learning method group

Table 4 showed that no significant difference existed between both self-direction \( t(64)= 1.55, p > 0.05 \), willingness to learn \( t(64)= 0.75, p > 0.05 \) and self-control abilities \( t(64)= 0.36, p > 0.05 \) subdimensions of self-directed learning readiness total scores \( t(64)= 0.64, p > 0.05 \) according to the study environment of students. In other words, students' scores on self-directed learning readiness and sub-factor scores did not change according to the learning environment.

This study found no difference between self-directed learning readiness levels of students under the flipped classroom model and those using the classical blended learning method. Although it was reported in the literature that the FC learning environment can have a positive effect on self-directed learning (Rutkowski & Moscinska, 2013), studies examining this effect cannot be found. The self-directed learning process is a variable that has been examined for the effectiveness of the process in the studies which have been conducted in the blended and online learning environments, which are not flipped classroom models, but where students still take on responsibility for their own learning, and technology is used. Among these studies, Zizan-Sasa (2011) stated that blended learning has a positive effect on self-directed learning. Ayan (2010) reported that information and communications technology tools can indirectly develop self-directed learning skill. However, this study concluded that the flipped classroom model has no effect on students' self-directed learning readiness. The reason for no difference between the experimental and control group students' self-directed learning readiness levels can be due to sample characteristics. Analysis of the pre-test results showed that students' levels of self-directed learning readiness were already high. High learning readiness levels could account for the fact that there was no significant increase in self-directed learning readiness after the application. Also, the application process might not be enough to cause a change in this characteristic. This study measured the self-directed learning readiness using a self-response measurement tool; maybe the students did not give true answers. It is possible to perform different measurements and obtain different results measuring the self-directed learning readiness by observing or by monitoring activities done in the process. Moreover, strategies and tools such as feedback, discussion forums, blogs, wikis, games, hints and adaptable decreasing support enable the development of self-directed learning (Koçdar, 2015). This study only used feedback and discussion forums for both groups. The fact that no difference between groups was noted in terms of self-directed learning skills can be attributed to this. Different results might have been obtained using other strategies together.

The effect of the implemented educational method on motivation

To analyze whether there was a difference between post-application motivation general score and sub-factor scores of students in the flipped classroom group and students in the classical blended learning group, a MANOVA test was performed. There are some assumptions for the MANOVA test, namely sample size, normality, linearity, homogeneity of the variance-covariance matrix, and multicollinearity (Kalayci,
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Analysis results showed that these assumptions for MANOVA were met. Findings of the MANOVA test are shown in Table 5.

Table 5. Results of Multi-factor Variance Analysis for General Motivation and Sub-factor Score Differences of the Experimental and Control Groups

<table>
<thead>
<tr>
<th>Variance Resource</th>
<th>Dependent Variable</th>
<th>Sum of Squares</th>
<th>SD</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Intrinsic Goal Orientation</td>
<td>9.25</td>
<td>1</td>
<td>9.25</td>
<td>5.84</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Extrinsic Goal Orientation</td>
<td>0.21</td>
<td>1</td>
<td>0.21</td>
<td>0.12</td>
<td>0.73</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Task Value</td>
<td>9.45</td>
<td>1</td>
<td>9.45</td>
<td>7.83</td>
<td>0.01</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>Control of learning beliefs</td>
<td>7.62</td>
<td>1</td>
<td>7.62</td>
<td>8.96</td>
<td>0.00</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy for learning and performance</td>
<td>2.998</td>
<td>1</td>
<td>2.998</td>
<td>2.85</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Test Anxiety</td>
<td>0.054</td>
<td>1</td>
<td>0.05</td>
<td>0.04</td>
<td>0.85</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>General Motivation</td>
<td>3.057</td>
<td>1</td>
<td>3.06</td>
<td>5.15</td>
<td>0.03</td>
<td>0.07</td>
</tr>
</tbody>
</table>

(Wilks’ Lambda = 0.790, F(2,101) = 2.197, p <= 0.05)

The one-way MANOVA test used to determine the effect of education with the flipped classroom model on motivation and its sub-factors showed a significant difference existed between the experimental and control groups in terms of motivation total scores and its sub-factors (Wilks’ Lambda = 0.790, F(2,101) = 2.197, p = 0.048 < 0.05).

According to the examination of the results of multi-way variance analysis in Table 5, intrinsic goal orientation (F(1,64) = 5.84; p = 0.02 < 0.05), task value (F(1,64) = 7.83; p = 0.01 < 0.05), control of learning beliefs (F(1,64) = 8.96; p = 0.00 < 0.05), and general motivation (F(1,64)= 5.15; p = 0.03 < 0.05) scores of the groups showed a significant difference in favor of the experimental group; there was no significant difference on extrinsic goal orientation (F(1,64) = 0.12; p = 0.73 > 0.05), self-efficacy for learning and performance (F(1,64) = 2.85; p = 0.01 > 0.05), and test anxiety (F(1,64) = 0.04; p = 0.85 > 0.05).

The motivation levels of students using the flipped classroom model were higher than those in the classical blended learning group. This result shows a similarity with other study results in the literature (Chao et al., 2015; Davies et al., 2013; Turan, 2015). It is thought that the basic characteristics of the flipped classroom model account for this result. It is known that the flipped classroom model has advantages such as allocating time spent in the classroom to interactive activities (Zappe et al., 2009), presenting different types of materials to students and addressing students with different characteristics (Lage, Platt, & Treglia, 2000; Mason et al., 2013), increasing students’ interest and participation (Enfield, 2012; Nat, 2015), ensuring students take responsibility for their own learning (Thoms, 2012). Higher motivation levels of the experimental group students could be attributed to these advantages of the FC model.

Higher motivation levels could also result from active learning activities done in the classroom. Active learning is one of the effective ways to increase motivation (Day & Foley, 2006). Students accessed learning resources whenever they wanted and progressed at their own pace; this may ensure students remain motivated. This is supported by other studies having similar results in the literature (Arshad & Imran, 2013; Boyraz, 2014; Chao et al., 2015; Davies et al., 2013; Strayer, 2012; Turan, 2015). Moreover, Hamdan et al. (2013) emphasized that because students prepare before the lesson outside the class environment in the flipped classroom model, they are more motivated and feel secure in the classroom. Trucker (2012) did not present measurable data but argued that the FC model provides more motivation in higher education. Abeysekera and Dawson (2015) developed a model offering definitions and logical explanations for the
flipped classroom model and hypothesized that this model would increase motivation. The reported study results and opinions are in line with the findings of the experimental group’s high motivation level.

The effect of the implemented educational method on retention

To analyze the change in post- and pre-test scores of students in the experimental FC group and students in the control group undergoing classical blended learning method, this study performed the one-way analysis of covariance (ANCOVA).

The retention means which were adjusted after the experimental operation was completed according to academic achievement post-test scores of the students in both the experimental and control groups are given in Table 6.

Table 6. Descriptive Statistics of Retention Scores by Groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>32</td>
<td>81.88</td>
<td>80.94</td>
</tr>
<tr>
<td>Control Group</td>
<td>34</td>
<td>72.21</td>
<td>73.09</td>
</tr>
</tbody>
</table>

Experimental Group: The group applying flipped classroom model

Control Group: The group applying the classical blended learning method

According to Table 6, the mean of the retention test which was administered 5 weeks after the application was 81.88 for students in the experimental group and 72.21 for the control group. This study found that the experimental group students’ retention mean score adjusted according to post-test was 80.94, and the control group students’ retention mean score adjusted according to post-test was 73.09.

The results of ANCOVA conducted to determine whether the difference between groups’ adjusted retention mean scores was significant are shown in Table 7.

Table 7. Results of ANCOVA on retention scores adjusted according to post-test by groups

<table>
<thead>
<tr>
<th>Resource of Variance</th>
<th>Sum of Squares</th>
<th>SD</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test (Reg.)</td>
<td>1194.55</td>
<td>1</td>
<td>1194.55</td>
<td>6.46</td>
<td>0.01</td>
<td>0.11</td>
</tr>
<tr>
<td>Group</td>
<td>972.49</td>
<td>1</td>
<td>972.49</td>
<td>5.26</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>11652.50</td>
<td>63</td>
<td>184.96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14388</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7 showed that between the groups to which different educational methods were applied, there was a significant difference in terms of retention scores adjusted according to post-test scores (F_{1,63} = 5.26, p < .05). In other words, students' retention scores adjusted according to post-test scores changed with the applied educational method. The retention levels of students in the FC group were higher than those in the classical blended learning group. As a result of the analysis, this study found the effect size to be η² = 0.11, indicating a high effect size.

The retention levels of students using the flipped classroom model were higher than those in the classical blended learning group. Learning materials used in the flipped classroom model appeal to many different sensory organs, and this can be effective in ensuring more permanent learning for students in the flipped classroom. Among these learning materials, especially video which enables students to both listen and watch and appeals to different sensory organs could make learning more permanent. The more sensory organs the learning environment appeals to, the more permanent the learning is (Nalçıcar & Erçoşkun, 2005; Yalin, 2006). Dale’s Cone of Experience reported that the least permanent learning is by receiving information.
presented passively through verbal symbols, while the most permanent learning is through learning activities involving active student participation (Dale, 1969). Videos used in this model take place in the middle of Dale's Cone of Experience. In this respect, videos ensure more permanent learning in comparison with verbal expression; as stated in Dale's Cone of Experience, things students learn on their own rather than while receiving support from others are more permanent (Dale, 1969). However, the flipped classroom method is also a learning model that fulfills active learning processes for students (Baker, 2000; Bergmann & Sams, 2012; Demetry, 2010; Hamdan et al., 2013; Shimamoto, 2012). In this model, students are active participants rather than a passive listeners in the learning process (King, 1993). Fulfilling active learning in the flipped classroom model can be reported as a reason for more permanent learning in the experimental group. In studies supporting this finding, students stated that they fulfilled more effective learning with class activities (Frydenberg, 2013; Zappe et al., 2009). Analysis of studies in the literature showed that very few studies have examined the effect of the flipped classroom model on retention, and the limited number of studies have shown similarity with the findings of this study. A study by Boyraz (2014) compared retention scores of both groups who received traditional education and flipped education and found that the flipped education had a positive effect on academic achievement and retention. Similarly, Kim et al. (2014) concluded that the flipped education had a positive effect on retention and that FC students' retention scores were higher than those who used the traditional education method.

SUGGESTIONS

Suggestions for Application

Firstly, educationists who plan to use the flipped classroom model should have the necessary skills. This is important for ensuring process efficiency. Therefore, training programs can be provided to educationists to acquire the skills necessary for applying this model. In the flipped learning process, it is important to ensure that students watch the videos before coming to class. In further studies, students can be encouraged to watch the videos before class by using methods such as answering questions, summarizing the video and discussing open-ended questions about the videos on the forums. This study allowed students to ask their questions on the forums. To establish synchronous communication, further studies can allow students to discuss their questions with all students and the course teacher in virtual meetings scheduled at a particular time.

Suggestions for Further Studies

This study was carried out with 66 students who took the "Scientific Research Methods" course and were studying in the Department of Psychological Counseling and Guidance. Further studies can be conducted with different sample groups in different courses. The effect of the flipped classroom model on different theoretical courses and applied courses can be examined in further studies. These studies can also examine the effect of the FC model on self-directed learning by using strategies and tools for improving self-direction skills. Moreover, this study was conducted at the level of higher education, and further studies can include primary and secondary school students.

Educationists can structure the flipped classroom model differently. Materials used, components of the online learning environment, and classroom activities can be varied. Further studies can examine the effect of different materials, environments and activities on the process.
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The Effect of Dynamic Web Technologies on Student Academic Achievement in Problem-Based Collaborative Learning Environment*

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ABSTRACT

Some of the 21st century proficiencies expected from people are determined as collaborative working and problem solving. One way to gain these proficiencies is by using collaborative problem solving based on social constructivism theory. Collaborative problem solving is one of the methods allowing for social constructivism in the class. In education systems where constructivist education programs are common, dynamic Web technologies which support teachers and students in the teaching and learning processes have an important contribution to the IT integration process. In this study, the “Semi-Experimental Design model with Pre-test-Post-test Control group” was used. The research aimed at determining the effect of dynamic web technologies on academic achievement in the problem-based collaborative learning environment. In the research, the “Academic Success Test” was applied as pre test-post test as a data collecting tool. This research was conducted during the application period of 8 weeks in 2012-2013. The working group of the research was formed from 104 teacher candidates, 53 of whom were in second teaching (evening classes) and 51 of whom were in first teaching (day-time classes) in the 3rd class of the Education Faculty Computer and Teaching Technologies Teaching department of a state university located in a metropolitan city. The results suggest that students who learned with dynamic web technologies are more successful.

Keywords: ICT Integration, Collaborative Learning, Technology-Supported Collaborative Learning, Dynamic Web Technologies and Interaction, Academic Achievement, Online Learning

INTRODUCTION

Changes in information technologies are transforming education. In many countries, innovations in education and integration of educational technology are defined as necessary reforms (Demetriadiasa et al., 2003; Lim & Hang, 2003; VanBraak, 2001). These technology developments demand individuals who can think analytically, can detect and resolve problems, who can relate existing situations in real life easily, have cooperative problem solving skills, are inquisitive and creative and maintain active participation (Akkan & Çakıroğlu, 2011; Baki & Çelik, 2005).

According to the EnGauge report (2003, p. 15), in the 21st century, as society changes, individual skills for dealing with life complexities are changing. In the early 1900s, a person with basic reading, writing and computation skills was considered as literate; in the 21st century, students need knowledge and proficiency in science, technology and culture (Pink, 2005). The common denominators of adequacy in the 21st century are defined as: critical thinking, creativity / innovation, information literacy, problem solving, decision making, adaptability; learning to learn, research and investigation, communication, entrepreneurship and self-orientation, productivity, time management, leadership and responsibility, cooperation and active participation, information technology operations and concepts, digital citizenship as well as digital and media literacy (EnGauge, 2003; Finegold & Notabartolo, 2010; Mishra & Kereluik, 2011; Otten & Ohana, 2009; ).
The constructivist learning theory in which individuals digest and interpret information was introduced by the Ministry of Education in Turkey in 2005 (MEB, 2006). Constructivist learning is the construction of knowledge by learners participating in the process actively rather than passive knowledge transfer from teacher to learner. The constructivist learning process means not just transmitting knowledge but instead it implies knowledge construction (Duffy & Cunningham, 1996).

The constructivist approach as an educational process has two different perspectives; cognitive constructivism as pioneered by Piaget and Bruner and social constructivism pioneered by Vygotsky (Özden, 2003). According to Hickey and McCaslin (2001), social constructivism is defined as a development process taking place in the individual’s cultural and social environment. In social constructivism, the individual and community complete each other. Therefore, in the constructivism process, the social aspects are very important. According to social constructivists, the basic knowledge process is based on social interaction with community members. In other words, information regarding the environment is bound to personal experience and it is created by mutual interaction or communication (Vygotsky, 1987). Thus, according to social constructivists, learning is an active process involving other individuals.

Certain teaching-learning methods are based on constructivist theory. One of these methods is problem-based learning (PBL) where students are directed to think, question and explore (Mayer, 1999; Wilkie & Burns, 2003). In perceiving knowledge methods of students who have higher level thinking skills specified as 21st century proficiencies and who participate in the learning process actively and evaluate knowledge, collaborate and solve problems, teaching how to use this information has great importance (Kaptan & Korkmaz, 2001; Kılınç, 2007). Analytical thinking and interpersonal communication skills which are 21st century skills are essential in order for students to apply the collaborative problem-solving method (Finegold & Notabartolo, 2010).

Jonassen and Kwon (2001) highlight the importance of problem solving skill which is one of the most basic skills needed by students. PBL as a learning-teaching method requires students’ active participation (Khoo, 2003), in which teachers guide students (Maudsley, 1999), which give comprehension skills about the ability to transfer and adapt the knowledge and experience acquired by students to new situations and to reach the information to solve the problems they encounter in daily life and how to apply existing knowledge to solve problems (Chrispeels, 2004, in Balım, Inel, & Evrekli, 2007). Chickering and Gamson (1987) emphasize the importance of effective communication and interaction in instruction for increasing student achievement and commitment to studies. Effective communication and interaction -- defined as 21st century proficiencies -- are important for educational outcomes such as achievement, dealing with problems, attitudes, and problem solving skills.

Collaborative learning has a social constructivist philosophical background. It defines learning as constructing knowledge in a social environment. According to Vygotsky (1987), learning in social circumstances involves knowledge construction which supports interaction, inquiry and discussion, and provides enhanced learning with active participation. According to Slavin (1996) collaborative learning uses social interaction in constructing knowledge; it does not depend on ideas put forward by others previously but instead involves learning by interacting with each other as a group in order to solve problems. By interacting, individuals work together to maximize not only their own learning but also other group members’ learning. Johnson, Johnson, and Smith (1991) define collaborative learning as a process requiring people working together on one task, sharing their knowledge and supporting each other in completing tasks. Johnson and Johnson (1990) emphasize that individuals working in a collaborative environment have higher academic achievement than those working individually.

Whether or not a student undergoing a planned educational process gains the demanded level of skills and accomplishments is determined by the student’s academic achievement level. Student academic achievement is measured by the grades, scores or both grades and scores obtained through applying developed or existing measurement tools. Academic achievement involves demonstrating gains and accomplishments, achievement of the desired result, achieving the desired at an adequate level and also the level of determined skills or gained knowledge. According to many studies in the literature, the more students deal with school tasks and take part in learning activities, in other words, the more they engage academically,
the higher their academic achievement level (Garfield, 1995; Kuh, Kinzie, Cruse, Shoup, & Gonyea, 2006; Oncu, 2007).

In collaborative learning, knowledge is formed as a result of sharing information and experiences with other students, the environment and the teacher. Student-environment-teacher interaction occurs in various forms. To illustrate, students can get information by reading (the environment), by discussing with friends or by guidance of teachers who have the knowledge and experience and by feedback teachers give; learning can occur as a result of these interactions (Çakir, Uluyol, & Karadeniz, 2007). Developing environments where new technologies are used is important for delivering 21st century proficiencies and supporting knowledge sharing. Hence, the teacher-student-environment interaction is extremely important. In these environments, interactions can occur synchronously (via dynamic web technologies) and asynchronously.

Dynamic web technologies allow dynamic content production and can be sorted into the following main headings: social network sites, open source video sharing sites, instant messaging programs, virtual museums and google earth, podcasts, wikis, blogs and RSS (Çoklar & Korucu, 2011; Horzum, 2010; Karaman, Yildirim & Kaban, 2008).

Online computer assisted learning environment developed by dynamic web technologies provide enormous opportunities and facilities for enhancing student-student, student-teacher and teacher-environment interaction and acquiring 21st century skills such as collaborative work, effective communication, and collaborative problem solving (Newman, Webb, & Cochrane, 1995). Collaborative learning environments developed by web technologies facilitate collaborative work by giving students opportunities for sharing information, promoting their knowledge and participating actively, developing creativity and providing joint construction of knowledge (Aydin, 2009; Cress & Kimmerle, 2008; Ekinci, 2005).

Vygotsky (1987) emphasized that learning occurs as a result of interaction between individuals and their social environment with media presence; and interaction has a large impact on learning. In acquiring these competencies, social constructivism gains great importance. Cooperative problem solving method is important because it is one way of providing social constructivism with students in the classroom. The basic philosophy of dynamic web technologies also supports this theory. Students can be involved in the knowledge formation and sharing process using dynamic web technology (DWT) applications. In this context, DWTs are important in contributing to developing constructivist learning environments and these teaching-learning technology applications enhance collaborative learning. Slavin (1996) also stated that collaborative learning method in learning environments developed by web-based technologies support students’ complex thinking skills.

In addition, dynamic web technology applications are quickly replacing traditional web technology in all spheres of life. This is mainly because DWT applications provide high interaction between web applications and users, high interaction between users, support for cooperative activities and easy access and sharing of information in accurate and reliable ways on the Internet. Minoche and Roberts (2008) state that the educational support from DWT applications involves sharing and transferring the student produced content that students can improve either by themselves or with team mates through co-operation freely and easily in the Internet environment. Therefore, DWTs are very powerful tools for regulating, distributing and presenting information and creating online collaborative environments. The constructivist approach has shortcomings in existing learning strategies to create technology supported collaborative problem-based learning environments. Teachers and students in educational systems where constructivist educational programs are aligned with problem-based collaborative working environments supported by DWT think that integrating DWT offers many advantages.

Hence, the purpose of this study is to examine the effect of dynamic web technologies on pre-service teachers’ academic achievement in a problem-based collaborative learning environment.

In this context, the research question and sub-research questions guiding this research are as follows:

Is there a significant difference between "Course Achievement Scores" of students who use problem-
Based collaborative learning environments developed with dynamic web-based technologies support and the ones who do not use them?

a. Is there a significant difference between "Pre-Test – Post-Test Course Achievement Scores" of students who use problem-based collaborative learning environment developed with dynamic web-based technologies?

b. Is there a significant difference between "Pre-Test – Post-Test Course Achievement Scores" of students who do not use problem-based collaborative learning environment developed with dynamic web-based technologies?

c. Is there a significant difference between "Post-Test Course Achievement Scores" of students who use problem-based collaborative learning environment developed with dynamic web-based technologies support and the ones who do not use it?

**METHOD**

Quantitative research approach is used to answer the research questions. "Pre-test – post-test with Control Group Semi-Experimental Design Model" is determined as the quantitative research approach. This research method is used as a semi-experimental design with pre-test post-test control group. In such studies research is applied through testing the subjects both before and after research application related to the dependent variable. Research participants are divided into the experimental and control groups (Karasar, 1999). In addition, pre-test – post-test control group semi-experimental design rather than neutral assigning, two of available groups are tried to be paired on specific variables. There are two groups formed by random assignment; one is used as the experimental group, the other group is used as a control group. Both groups are measured in the same way before and after the experiment (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2012). Academic achievement pre-test scores and academic achievement scores which are composed of quantitative data of experimental and control group students are used. In order to determine the academic achievement scores "Academic achievement test post-test score (50%) + Project score (45%) + Attendance score (5%)" are calculated.

Student teachers in primary education and student teachers in secondary education in the referred department are randomly assigned as the experimental group, and control group respectively. While the application course of experimental group is processed by problem-based collaborative learning environment developed in the scope of research supported by dynamic web technologies, face-to-face problem-based collaborative learning approach is used for the control group course. The independent variables of this research are problem-based collaborative approach supported with face-to-face communication and problem-based collaborative learning approach supported with dynamic web technologies and face-to-face communication. The dependent variable is academic achievement.

The experimental design used in this research is illustrated in Table 1.
Table 1. Pre-Test – Post-Test Control Group Semi Experimental Design Table Related To Research Model

<table>
<thead>
<tr>
<th>Assign</th>
<th>Group</th>
<th>Pretest</th>
<th>Method</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>G_D</td>
<td>O_1</td>
<td>X_{İÖ}</td>
<td>O_2</td>
</tr>
<tr>
<td>M</td>
<td>G_K</td>
<td>O_1</td>
<td>X_{YYÖ}</td>
<td>O_2</td>
</tr>
</tbody>
</table>

GD = Experimental Group  
GK = Control Group  
M = Paired Sample (Group randomly assigned)  
X_{İÖ} = Dynamic web technologies supported problem-based collaborative learning environment  
X_{YYÖ} = Face to face learning environment  
O_1 = Experimental and control group academic achievement pre test application  
O_2 = Experimental and control group academic achievement post test application

Research Group

The research group selected for this study is composed of N = 104 pre-service ICT teachers from two groups who are primary education teachers (experimental group) (N = 51) and secondary education teachers (control group) (n = 53) studying in the 3rd stage of the Computer Education and Instructional Technology Department in the Faculty of Education. The Computer and Instructional Technology Department was chosen because this department guides other branches in using technology in education. The demographic characteristics, general average academic achievement scores and the findings related to pre-application motivation scale analysis of the research group and technological facilities presented for research group students are given in this section. The distribution table related to gender variable of experimental and control groups is shown in Table 2.

Table 2. Experimental-Control And Both Groups Gender Variable Distribution Table

<table>
<thead>
<tr>
<th>Gender</th>
<th>Experimental Group</th>
<th>Control Group</th>
<th>Experimental and Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
<td>47.1</td>
<td>28</td>
</tr>
<tr>
<td>Female</td>
<td>27</td>
<td>52.9</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
<td>53</td>
</tr>
</tbody>
</table>

In Table 2 the similarities related to the gender distribution of students in the experimental and control group are shown. It is observed that groups are similar to each other in the gender distribution of students in the experimental and control groups.

The comparison result (independent t-test) of academic achievement test results (pre-tests) applied before the application to the experimental and control group is given in Table 3.

Table 3. Intergroups (Experimental-Control) Academic Achievement Pre-Test Comparison (t - Test) Analysis Results

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>ŝ</th>
<th>Ss</th>
<th>Sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental group</td>
<td>51</td>
<td>29.13</td>
<td>5.07</td>
<td>102</td>
<td>1.115</td>
<td>.268*</td>
</tr>
<tr>
<td>Control group</td>
<td>53</td>
<td>28.01</td>
<td>5.14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.05

Pre-tests applied prior to the research to the experiment and control group (experimental group pre-
test mean $\bar{X} = 29.13$; control group pre-test mean $\bar{X} = 28.01$) show that the differences in mean are not significant due to $0.05 < p$ for the $*p < .05$ significance level. As a result of these statistics tests, it is determined that, prior to intervention, both groups are equivalent (Table 3). Between groups (experiment - control group) pre-test comparison ($t$-test) analysis has also concluded that the groups are equivalent.

Pre-test results for the motivation scale analysis applied to the experiment and control group are given in Table 4.

Table 4. Experimental and Control Group Motivation Scale Responses Pre-Test Analysis Results

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>Sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group (1)</td>
<td>51</td>
<td>389.41</td>
<td>50.51</td>
<td></td>
<td>102</td>
<td>1.082</td>
</tr>
<tr>
<td>Control Group (2)</td>
<td>53</td>
<td>378.20</td>
<td>54.90</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.05$

According to the motivation scale response analysis results (Table. 4) of the experimental and control groups, there is no significant difference between motivation levels of groups (experimental group motivation test mean $\bar{X} = 389.41$; control group pre-test mean $\bar{X} = 378.20$) at the beginning of the research by $p < .282$ for the $*p < .05$ significance level. Experimental and control groups are determined to be equivalent to each other in terms of student motivation.

Table 5. Experimental and Control Group General Academic Mean t-Test Analysis Results

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>Sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group (1)</td>
<td>51</td>
<td>2.92</td>
<td>0.35</td>
<td></td>
<td>102</td>
<td>0.946</td>
</tr>
<tr>
<td>Control Group (2)</td>
<td>53</td>
<td>2.98</td>
<td>0.34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.05$

The comparison results of experimental and control groups in overall academic average are given in Table 5. It is determined that there is no significant difference in general academic achievement levels (experimental group general academic mean $\bar{X} = 2.92$; control group general academic mean $\bar{X} = 2.98$) of experimental and control groups because of $p < .346$ for $*p < .05$ significance level. Experimental and control groups are determined to be equivalent to each other; in short, they are similar to each other in terms of general academic means.

According to the abovementioned analysis and information, it is determined that demographic characteristics, general academic means and motivation levels of the students in experimental and control groups are equivalent prior to the intervention; it is concluded that both groups are homogeneous and similar to each other.

There are 125 computers in total available for the experimental and control group students in 5 computer laboratories in the institution. Windows 7 is installed as the operating system and Office 2010 is installed as office programs on computers. A 106 screen LCD television and a projector are available in each laboratory. Some 85 of these computers have the i3 processor with 500 GB Harddisk, 4 GB RAM, 40 of them...
have i5 processor with 750 GB Harddisk and 4 GB RAM. All computers have Internet connection and download/upload speed is given as 10 Mbps. In addition, wireless network and 10 network access points with usable RJ45 connectors are available in each laboratory enabling students to connect to the Internet and school’s network with their own personal computers. There are two 60-people classrooms and one meeting room for students’ extracurricular study.

The research group students have received computer software and hardware education through "Information Technology in Education I-II" and "Computer, Computer Hardware" courses. Moreover, they have taken information about dynamic web technology use and other Internet tools from the computer department instructors. Therefore, it is considered that research group students have adequate technological knowledge and experience with technological infrastructure about the environment which will be used in the application process and the dynamic web technologies available in the environment.

**Application Process**

For developing problem-based collaborative learning environment with dynamic web technologies, Nelson’s (2009) collaborative problem solving method is determined as the teaching method. Web assisted online collaborative environment which will be used in the research is formed by dynamic web technologies. During the process of environment design where application will be conducted, experts’ views were considered and the environment design was developed in accordance with these opinions. The determined content prepared by the experts was applied with the help of dynamic web technologies such as Google+ Circle, Google Chat, Google+ Documents, Mind 42 (for creating online concept maps), Google+, Blogger, Google Hangouts (for verbal, written and visual calls) Google+ Homepage (sharing the video records), Google Calendar, and Google+, Drive (Survey) for the experimental group.

For control group students instruction was applied in the face-to-face collaborative environment. In technology-assisted and face-to-face collaborative environments, the study is conducted in the 8-week period. Research group students save the analysis, information they shared, feedback, comments and evaluations about each other which they made in the process of solving real designed problems weekly. While the experimental group students save their work in weekly blogs which they use in dynamic web technologies and in Google Drive, control group students save theirs in project files created on desktop because they study in a face-to-face collaborative environment. In addition, the data collected from research group students were analyzed with the necessary statistical methods and content analysis method and the results are put forward at the end of the application.

How the academic achievement test was applied to the experimental and control group students in the application process and comparison of the application are shown in Fig. 1.

![Fig. 1. The application and comparison of academic achievement score.](image)

As shown in Figure 1, the academic achievement test was applied to experimental and control group students as both pre-test and post-test and the first research question is answered through the evaluation and comparison of the responses students gave as a result of these applications.
Data Collection Tools

At the beginning and end of the application process, the pre-test and post-test were performed using the "Academic Achievement Test" developed by the researcher; in determining the academic achievement score, the Academic Achievement test post test score (50%) + Project score (45%) + Attendance score (5%) total was calculated.

The researcher developed academic achievement test consists of 65 multiple choice questions. The test questions were prepared according to the steps in Bloom's Taxonomy as knowledge questions, comprehension questions and conceptual questions (analysis - synthesis questions). Each question has 4 alternatives and after forming an indicator chart consisting of lesson objectives before the application, these questions were created aiming at measuring research group students’ achievements in accordance with each learning objective about each subject located in the indicator chart. The test was examined by 5 experts in the field and applied to the research group after revision according to experts’ views. After the application, statistical analysis was made by scoring correct answers as 1 and wrong answers as 0; the Academic Achievement Test Item Discrimination Power and Academic Achievement Test Reliability Value were determined.

In the item analysis, reliability was determined by the Kuder-Richardson-20 (KR-20) technique. Each test item’s compatibility with other items was determined by the KR-20 test. The determined reliability coefficient proximity to +1.00 indicates high reliability.

Table 6. Academic Achievement Test Reliability Value

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Kr-20 test value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Achievement Test</td>
<td>65</td>
<td>.735</td>
</tr>
</tbody>
</table>

Internal consistency reliability test of the academic achievement test was calculated as **Kr-20 test-value = .735** from Table 6. According to this result, it can be said that the scale is highly reliable.

In order to test reliability and validity of the "Project Evaluation Scale" prepared by the researcher to evaluate the project received at the end of the application process, randomly selected 5 projects assessed by the researcher were evaluated by one field expert independently. The consistency between the project assessment scores given by the researcher and field expert were analyzed by non parametric (because 5 projects are assessed) Kruskal-Wallis test and the results of this analysis are given in Table 7.

Table 7. Project Evaluation Scale Evaluation Scores Reliability and Validity Analysis Results

<table>
<thead>
<tr>
<th>People</th>
<th>N</th>
<th>Ord. Num.</th>
<th>sd</th>
<th>X²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researcher</td>
<td>5</td>
<td>5.80</td>
<td>1</td>
<td>0.110</td>
<td>0.740</td>
</tr>
<tr>
<td>Field expert</td>
<td>5</td>
<td>5.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.05

The results of analysis have shown that according to the Kruskal-Wallis test which determines consistency situation of project evaluation scale assessment scores, there is no significant difference. In accordance with *p < .05 level of significance X² (sd = 1, n = 10) = 0.110, p < 0.740 is found (Table 7). This finding suggest that the project evaluation scores given by the researcher and the scores given by the expert for the randomly selected projects are equivalent. Therefore, a reliable and valid assessment has been made in evaluating the project.

In the validity analysis carried out based on the lower-upper groups, to remove questions whose significance level is higher than p is suitable due to the significance level of *p < .05. However, in view of five
different field experts, as the questions that will be removed measure different objectives from the indicator chart, meet different goals and behaviors, and no other questions in the test measure these gains it was concluded that these questions should remain in the academic achievement test. Therefore, content validity of the academic achievement test is provided by expert opinion.

Achievement tests difficulty analysis results varies between 0 and 1. The 0 indicates that the test is very easy and 1 indicates that test is very difficult. The 0.5 result indicates that the test difficulty is at a normal level. The difficulty test of academic achievement test used as a pre-test and post-test in research is found as 0.464. This result has shown that difficulty level of the academic achievement test used in the research is at normal difficulty level.

Data Analysis

Demographics and the educational use levels of technology tools of the research group students are described by descriptive statistics such as frequency, percentage, arithmetic mean and standard deviation.

In the quantitative dimension of the research, the statistical software package SPSS (Statistical Packages for the Social Sciences) program version 19.0 was used to analyze the quantitative data collected after the experimental procedure. After the analysis of the data collected in SPSS 19.0 software, the effect on participant pre-service teachers’ academic achievement of course, in which research is applied,

Independent sample t-test and Kruskal-Wallis tests are used for determining the differences between the experimental and control groups in data analysis after the experimental process. Moreover, Kruskal-Wallis test was used for determining the similarities or differences between gender distributions to the experimental and control groups.

Paired samples t-test was used to compare data collected from pre-test applied before the application and post-test after the application of students who go through experimental process. Independent samples t-test was used to test whether a significant difference existed between the two unbound sample means (Büyüköztürk, 2011). Kruskal-Wallis test was used to ensure the content validity of the project evaluation scale and to determine consistency of scores given by the researcher and experts to randomly selected 5 projects. In addition, validity, reliability and factor analysis were performed for all scales and tests in achievement tests in the research.

FINDINGS

The score table related to experimental and control students’ responses of academic achievement test, the projects they prepare in the application process, the attendance scores and overall final academic achievement scores are given in Table 8.

<table>
<thead>
<tr>
<th>Score Types</th>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>$\bar{x}$</td>
</tr>
<tr>
<td>Pre test score</td>
<td>51</td>
<td>29.13</td>
</tr>
<tr>
<td>Post test score</td>
<td>51</td>
<td>38.09</td>
</tr>
<tr>
<td>Projet score</td>
<td>51</td>
<td>85.29</td>
</tr>
<tr>
<td>Attendance score</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Final Academic Achievement Score</td>
<td>51</td>
<td>60.66</td>
</tr>
</tbody>
</table>

Is there a significant difference between "Pre-tests – post-test Course Achievement Scores" of the students who use problem-based collaborative learning environment developed with dynamic web technologies support? To answer this question;
The comparison of pre-test – post-test scores of experimental group (paired samples t-test) was done. The comparison of the results of pre-test and post-test which are performed to demonstrate experimental group students’ academic development at the end of the application conducted are given in Table 9.

### Table 9. The Comparison of Pre-Test – Post-Test Scores of Experimental Group t-Test Analysis Results

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>Test</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>51</td>
<td>29.13</td>
<td>5.07</td>
<td>50</td>
<td>-29.25</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>51</td>
<td>60.66</td>
<td>7.03</td>
<td>50</td>
<td>-29.25</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.05$

A significant difference was found between the experimental group pre-test and post-test scores (pre-test mean $\bar{X} = 29.13$; post-test mean $\bar{X} = 60.66$) for statistically * $p < .05$ level of significance ($p < 0.05$). After 8-week application, it is determined that the academic achievements of the experimental group students were improved (Table 9). This finding resulting from the experimental group pre-test post-test comparison (t - test) analysis is supported by Parker and Thompson’s (2012) research.

Is there a significant difference between “Pre-tests – post-test Course Achievement Scores” of the students who do not use problem-based collaborative learning environment developed with dynamic web technologies support? To answer this question, the comparison of pre-test – post-test scores of the control group (paired samples t-test) was carried out.

The comparison of the results of pre-test and post-test which are performed to demonstrate control group students’ academic development at the end of the application conducted are given in Table 10.

### Table 10. Control Group Pre Test- Post Test Comparison (t-Test) Analysis Results

<table>
<thead>
<tr>
<th>Control Group</th>
<th>Test</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>53</td>
<td>28.01</td>
<td>5.14</td>
<td>52</td>
<td>-25.01</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>53</td>
<td>52.22</td>
<td>7.15</td>
<td>52</td>
<td>-25.01</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.05$

A significant difference is found between the control group pre-test and post-test scores (pre-test mean $\bar{X} = 28.01$; post-test mean $\bar{X} = 52.22$) for statistically * $p < .05$ level of significance ($p < 0.05$). After 8-week application, it is determined that there is a significant difference in the academic achievement of the control group students (Table 10). It is determined that control group students’ academic achievements are improved. The findings which do not support this finding resulted from control group pre-test post-test comparison (t - test) analysis are reached. For example Polat and Tekin’s (2012) research findings do not support this result.

Is there a significant difference between “post-test Achievement Scores” of the students who use problem-based collaborative learning environment developed with dynamic web technologies support and who do not? To answer this question, Experimental-control groups post-tests comparison (independent samples t-test) was carried out.

The results from the comparison of “course achievement scores” of students who use problem-based collaborative learning environment developed with dynamic web technologies support (experimental group) and students who do not use such support (control group) are given in Table 11.
In the post-tests performed after the application to experimental and control groups, p is significant due to .00 < .05 for significance level of p < .05. In the post tests (experimental group post-test mean $\bar{X} = 60.66$; control group post-test mean $\bar{X} = 52.22$), it is determined that the experimental group post-test scores are higher than the control group post-test scores (Table 11). This result indicates that the application is more significant in favor of the experimental group. In addition, in order to determine the effect size of the problem-based collaborative learning environment designed with dynamic web technologies on academic achievement, the eta squared ($\eta^2$) value is examined. Effect size values are calculated as $\eta^2 = .53$. In this case, considering the effect size value ($\eta^2 = 0.53$), it can be said that problem-based collaborative learning environment designed with dynamic web technologies have a “large” effect size on academic achievement. The finding resulted from Intergroup (experimental - control group) post-test comparison (t-test) analysis is supported by Parker and Thompson’s (2012) research. The opposite findings which do not support this finding resulted from intergroup (experimental - control group) post-test comparison (t-test) analysis are reached. For example, the Akyol and Ferda (2012) research findings are not parallel with this result; in other words, they do not support this finding.

Many research studies (e.g., Alsancak, 2010; Alsancak & Altun, 2010; Chen, 2008; Chiou, 2011; Ferdig Dawson & Eric, 2008; Kwon, Hong, & Laffey, 2013; Razon, Mendenhall, Yesiltas, Johnson, & Tenenbaum, 2012; Tambouris et al., 2011) in literature which support the findings resulting from data collected at the end of the application process; “course achievement scores” of students who use problem-based collaborative learning environment developed with dynamic web technologies were higher than that of those who do not. This difference between the experimental and control group students’ “academic achievement scores” at the end of the research process emerges because the environment developed with DWT provides continuous interaction with lecturers and other colleagues in their group, classmates and developed environments independent of time and space limitations and active participation both in and out of the school constantly for experimental group students. The other important reasons are having more academic engagement to solve real design problems cooperatively and having higher active participation periods of students in problem-based collaborative environment developed with dynamic web technologies.

Experimental group students have spent more effort in the developed environment than the control group students in meeting the minimum requirements indicated in the weekly work plan for the application process; they allocate more active studying time to meet course requirements, and thus they engage more in active participation. Furthermore, student-teacher interactions in and out of the classroom, being in contact with developed medias academically have very important impact on student academic achievement. The communication built between student-teacher and environment and academic engagement students effort to build this communication in identified time contribute to increase in their academic achievements, their improved personal development, and developed skills defined as 21st century proficiencies (Anderson & Garrison, 1998; as cited in Cakir et al. 2007; Astin, 1993; Chickering & Gamson, 1987; Cuseo, 2009; Pascarella, Tenerzi, & Hibel, 1978; Tenerzi & Pascarella, 1980).

**CONCLUSION AND DISCUSSION**

In the scope of research; according to the results reached comparing "course achievement points (academic achievement points)",
1. According to the experimental group pre-test - post-test comparison analysis results; it is determined that experimental group students’ academic achievement scores are increased as a result of the application.

2. According to the control group pre-test - post-test comparison analysis results; it is determined that control group students’ academic achievement scores are increased as a result of the application.

3. According to the intergroup (experimental-control groups) post -test comparison analysis results, it is significant in favor of the experimental group students. According to this result, it is determined that post-test scores (course achievement scores) of the experimental group are higher than the control group’s post-test scores (course achievement scores).

The results suggest that students who use problem based collaborative environment developed by dynamic web technologies have higher academic achievement than those who do not. In other words, students who experienced instruction based on cooperation developed with dynamic web technologies have higher academic achievement scores than those not exposed to DWT. The experimental process conducted in 8-week application led to a significant difference on “course achievement scores” (academic achievement) in favor of the experimental group.

To conclude, the difference between experimental and control group students’ academic achievement scores at the end of the research process depends on the use of dynamic web technologies. The environment developed by dynamic web technologies provided without time and space limitations, enabled constant interaction between teacher-student and environment, more academic engagement in order to solve real designed problems and enhanced study with this technology support collaboratively. The fact that students who use problem based collaborative learning environment developed with dynamic web technologies support, have more active participation time than those who do not as mentioned indicates the difference between students “Academic Achievement Scores” at the end of the application process.

**RECOMMENDATIONS**

**Suggestions for application**

In this research, it is presented that problem based collaborative learning environment supported with DWT has positive impact on academic achievement. The most important visions of CEIT are to increase student academic achievement, to involve students in this process, to have students gain the culture of collaborative work, the integration and implementation of technology in this process. In addition, doing technology-based collaborative work is very important for pre-service teachers; there are deficiencies in educating teachers in using technology in collaborative environments. Giving accurate feedback on time is appropriate because students construct knowledge continuously as they are working together and interact with the teacher-student-environment independent of time and space. Therefore, it is recommended to provide courses for teachers to use the technology. In addition, it is recommended to add a course about new collaborative technologies and how teachers should use them for CEIT departments.

Depending on the positive impact of DWT supported problem based collaborative learning environments on academic achievement, the use of instructional design based on collaborative learning should be encouraged. Therefore, The Ministry of Education is considered important that using DWT supported collaborative learning environments in in-service training teachers’ courses because it will provide positive results such as increased academic achievement. It is recommended that technology supported learning environments with dynamic web technologies be developed for training and educating pre-service teachers.

**Suggestions for researchers**

Since DWT supported problem based collaborative learning environment provides constant
interaction between teacher-student and environment and it improves personal development and academic achievement, dynamic web technologies supported problem based collaborative learning environments' impacts on different educational outcomes can be examined.

In this research, the finding that DWT supported problem based collaborative learning environment increases academic achievement is reached. It is considered as essential to examine technology supported collaborative learning impact on several variables which affect learning directly such as "attendance", "attitudes toward learning", "attitudes toward the course" or "perception status of the teaching environment" while investigating the causes of increased academic achievement. In order to expand this research, applying DWT supported problem based collaborative learning environment intended to solve real design problems in the same way again with a research group composed of pre-service IT teachers or pre-service teachers from other branches, and to compare these research findings with existing ones are seen as important.

REFERENCES


Chiou, Y. F. (2011). *Perceived usefulness, perceive ease of use, computer attitude, and using experience of web 2.0 applications as predictors of intent to use web 2.0 by pre-service teachers for teaching.* (Unpublished doctoral dissertation, Education and Human Services of Ohio University, USA).


The Intention to Use GeoGebra in the Teaching of Mathematics Among Malaysian Teachers


ABSTRACT

This quantitative study examined Malaysian teachers’ perception towards using GeoGebra in mathematics teaching. The relationship between teachers’ Perceived Current Competencies (PCC) of GeoGebra, and Intention to Use (IU) it as well as the difference between male and female teachers and between users and non-users of GeoGebra were investigated. An online survey was administered on 132 teachers who had already participated in GeoGebra workshops in Malaysia. The results of correlation and independent t-test revealed a positive relationship between teachers’ perceived current competencies with their intention to use GeoGebra in teaching mathematics. There were no significant differences between male and female teachers in their intention to use GeoGebra in teaching mathematics. On the other hand, significant differences were observed between users and non-users of GeoGebra in their intention to use GeoGebra in their mathematics classrooms.

Keywords: GeoGebra, mathematics, teaching of mathematics, educational technology

INTRODUCTION

Teachers’ attitude and behavior in the technology integration process has been emphasized by several researchers since teachers’ beliefs and perceptions drive most of their teaching practice and make for better choices of student learning opportunity in the classroom (Cuban, Kirkpatrick, & Peck, 2001). Teacher contribution in this process is so significant that the National Council of Teachers of Mathematics (NCTM, 2000) declared teachers as one of the six main factors behind effective use of new technology in mathematics education. Therefore, to support teachers in dealing with the technology integration challenges, being aware of their beliefs and perception of new computer-based programs from different dimensions can ease this process.

GeoGebra, an open-source Dynamic Mathematics Software (DMS), is one of the recent instructional tools drawing much attention of researchers and mathematics educators for its potential to revolutionize mathematics teaching and learning. This program possesses the features of Dynamic Geometry Software, Computer Algebra System, and also spreadsheets all in a single integrated package (Hohenwarter, Jarvis, & Lavicza, 2009); it provides a virtual environment for students to simultaneously view both a numeric algebraic component (e.g., an equation or coordinate) and the geometric corresponding features of an object (Preiner, 2008). Discovering new patterns, exploring and testing conjectures, and manipulating various geometric shapes are among the numerous activities students can perform by designing and drawing their own sketches on dynamic mathematics software application (Stols & Kriek, 2011).

Previous studies indicate that GeoGebra improves the discovery learning process (Mainali & Key, 2012) and also students’ motivation, engagement, and achievement in mathematics learning (Dogan & Içel, 2011). Several studies have reported positive attitudes of students and mathematics teachers toward using this software in mathematics teaching and learning (Saha, Ayub, & Tarmizi, 2010; Shadaan & Eu, 2013; Zakaria &
Lee, 2012). In a Malaysian qualitative study by Zakaria and Lee (2012) teachers found that GeoGebra is user friendly and employs straightforward and comprehensible instructions in addition to offering accurate and simple information. Şandır and Aztekin (2016) reported that pre-service teachers found GeoGebra easier to use than other dynamic mathematical software.

Despite the remarkable benefits of using GeoGebra in enhancing students’ learning of mathematics and providing great opportunity for visualization, manipulation, and exploration of geometrical figures and mathematical concepts, a considerable number of teachers are still struggling with the task of effectively using it for everyday teaching (J. Hohenwarter, Hohenwarter, & Lavicza, 2010; Preiner, 2008). According to Žilinskienė (2015), “even though teachers have access to computers and appropriate software is available both in schools and at home, technology is rarely integrated substantially into everyday teaching” (p.139).

The results of a survey conducted on 151 secondary Math teachers in Malaysia revealed that only 2% of those who had attended the dynamic geometry software workshop used it as a classroom teaching tool (Osman, 2006). The teachers indicated lack of time, lack of technological skills, and lack of confidence as reasons for not using dynamic geometry software in their mathematics teaching (Meng, 2012; Osman, 2006). Several studies show that teachers’ competencies from both technical and pedagogical points of view have significant impact on their intention to use technology. Agyei and Voogt (2011), found that among various barriers to incorporating new technology into teaching and learning as identified by mathematics teachers were the lack of knowledge about the ways to integrate ICT in lessons, and lack of training opportunities for ICT integration knowledge acquisition. Additionally, the study also mentioned that the current challenges of mathematics teachers include how to integrate new technology and how to design new learning activities for students. Žilinskienė and Demirbilek (2015) observed that Lithuanian primary school teachers’ usage of Geogebra in the classroom depend upon intellectual property rights (IPR) in which they prefer free tools, as well as pedagogical impact in which the tool used must meet a learning objective. However, technological aspects of the tools were not much of a concern for the Lithuanian teachers due to their low ICT competency.

**Purpose of the Study**

As Malaysia is working at achieving better performance in international standardized testing such as Trends in International Mathematics and Science Studies (TIMSS) and Program for International Student Assessment (PISA), various angles are addressed, including integrating technology to improve Mathematics teaching. In Malaysia, using open source programs such as GeoGebra in mathematics education in schools is still new (Bakar, Ayub, Luan, & Tarmizi, 2010); there is also a dearth of research examining Malaysian teachers’ perception of GeoGebra use in their mathematics teaching (Hutkemri & Nordin, 2011). Therefore, this study is focused on exploring Malaysian teachers’ intention to use GeoGebra in the classroom teaching of mathematics based on their perceived current competencies. Perceived current competency in this study is an independent variable that anticipates the extent to which teachers feel that they have the actual proficiency, in terms of both technical skills and pedagogical knowledge, to utilize GeoGebra in classroom teaching of mathematics. It also determines their choice of further training and future professional development programs. Intention to use is a construct that defines a teacher’s determination or plan to use GeoGebra as a teaching tool in the classroom.

**Theoretical Framework**

The Technology Acceptance Model (TAM) is one of the most popular and parsimonious frequently used model for assessing acceptance of new technology. TAM was proposed by Davis in 1989 (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) and originated from the Theory of Reasoned Action (Ajzen & Fishbein, 1980) which claims that the intention to use a computer-based technology is influenced by its user’s beliefs and perceptions. According to TAM, two main variables, perceived usefulness (PU) and perceived ease of use (PEU), are fundamental determinants of user acceptance. This model posits that the actual technology use is influenced by behavioral intention, and behavioral intention is in turn influenced by user’s attitude toward the new technology system or program (Teo et al., 2008).

This study aimed at investigating mathematics teachers’ intention to use GeoGebra in teaching
mathematics as influenced by their perceived current competencies. As such, this research was implemented in accordance with a conceptual framework built upon the TAM by Davis (1989). In addition to the PU and PEU, this study intended to examine another perspective which is teachers’ perceived current competencies (PCC) on their usage of GeoGebra as a teaching tool in the classroom. The gender differences between teachers in terms of GeoGebra usage were also examined on their PCC in using GeoGebra.

METHOD

This study employed the cross-sectional survey quantitative analysis method. The population of the study involved mathematics teachers who have been exposed to GeoGebra and its classroom applications through a workshop either organized by government departments such as Ministry of Education Malaysia under periodic teacher professional development programs, or non-governmental organizations such as the GeoGebra Institute of Malaysia. The GeoGebra Institute of Malaysia is a non-profit center that develops and supports the GeoGebra dynamic mathematics software application such as providing teaching materials and source codes, installers, web applications and services language files and associated documentation, as well as holding workshops. The total number of participants was 132, and they were mathematics teachers who have participated in GeoGebra workshops at some point during their teaching career.

Data were gathered via an online survey. The instrument used consisted of items on the participant demographic information, and items related to the constructs under study namely perceived current competencies (PCC) and intention to use (IU) GeoGebra. The PCC items were self-developed and validated by two academicians in the education field and two GeoGebra experts. The PCC item reliability was assessed through Cronbach alpha coefficient. A high value of Cronbach alpha (.93) was achieved. The items for IU were adapted from Davis (1989) and Pittalis and Christou (2011) and were validated in previous studies (Cronbach alpha coefficient was .75 for this construct). Responses were obtained using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

FINDINGS

A total of 132 survey responses were collected. In terms of gender distribution, 76 respondents were female while 56 were male. The respondents were also made up of 83 users and 49 non-users of GeoGebra.

The results of a bivariate correlation analysis displayed a statistically significant positive relationship between perceived current competencies (PCC) and intention to use (IU) GeoGebra among respondents \( r = 0.507, p < .001 \). This positive correlation between two variables indicated that if teachers’ perceived current competency increases, intention to use will also increase. The results are shown in Table 1.

<table>
<thead>
<tr>
<th>Intention to Use (IU)</th>
<th>Perceived Current Competence (PCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to use (IU)</td>
<td>Pearson Correlation Sig. (2-tailed) 1 .507** 0.000</td>
</tr>
<tr>
<td>Perceived current competence (PCC)</td>
<td>Pearson Correlation Sig. (2-tailed) .507** 0.000 1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

An independent t-test analysis was conducted to examine whether gender differences play a role in perceived current competencies and intention to use GeoGebra among the teachers. The results in the following Table 2 revealed that gender differences did not have any influence on the teachers’ perceived
current competencies and intention to use GeoGebra in the teaching of mathematics.

### Table 2 Results of Independent t-test on Female and Male Teachers’ PCC and IU

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Current Competence (PCC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>3.43</td>
<td>.733</td>
<td>-1.544</td>
<td>130</td>
<td>.125</td>
</tr>
<tr>
<td>Male</td>
<td>3.66</td>
<td>.928</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intention to Use (IU)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4.07</td>
<td>.756</td>
<td>-.652</td>
<td>130</td>
<td>.515</td>
</tr>
<tr>
<td>Male</td>
<td>4.16</td>
<td>.787</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Independent samples t-test analysis was again performed to evaluate the differences between teachers who were GeoGebra users and teachers who have never used the software in their perceived current competencies (PCC) and intention to use (IU) GeoGebra. The results indicated differences between the two groups in their intention to use GeoGebra for teaching and learning mathematics in which the scores of GeoGebra users were higher (M = 4.35, SD = 0.71), than that of non-users (M = 3.70, SD = 0.70), with t (130) = 5.09, p < 0.05. The statistically significant higher scores of GeoGebra users’ IU suggested that being a user of GeoGebra had some influence on teachers’ intention to use the software in teaching of mathematics. Similarly, statistically significant difference among the two groups was also observed for PCC with t (130) = 4.59, p < 0.05. Results are shown in Table 3.

### Table 3 Results of PCC and IU Independent t-test on Users and Non-users of GeoGebra

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived current competence (PCC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users</td>
<td>83</td>
<td>3.77</td>
<td>.815</td>
<td>4.587</td>
<td>130</td>
<td>0.000</td>
<td>.85</td>
</tr>
<tr>
<td>Non-users</td>
<td>49</td>
<td>3.13</td>
<td>.684</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intention to use (IU)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users</td>
<td>83</td>
<td>4.35</td>
<td>.710</td>
<td>5.092</td>
<td>130</td>
<td>0.000</td>
<td>.92</td>
</tr>
<tr>
<td>Non-users</td>
<td>49</td>
<td>3.70</td>
<td>.692</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DISCUSSION

This study sets out to explore Malaysian mathematics teachers’ intention to use GeoGebra in teaching mathematics in the classroom. The significant positive relationship between teachers’ perceived current competencies and their intention to use GeoGebra found in this study indicated teachers who perceive themselves as skilful in the application will most likely use it in their mathematics teaching. This is supported by Jones (2001) who suggested teachers’ readiness as a key factor in incorporating technology into classrooms, which is influenced by training, preparation, and work environments. Jones elaborates that learning new software, designing and developing suitable lesson plans to incorporate technology use, and
transforming traditional instruction techniques are some of the challenges that teachers face when trying to embrace technology.

Lack of appropriate available training is often mentioned by teachers as a reason preventing them from taking full advantage of the great potential of educational technology and software. This is in line with Meng (2012) who suggests that, in Malaysia, there is an urgent need to develop secondary mathematics teachers’ skills of using dynamic geometry software to provide helpful support and sustain the continuous integration of dynamic mathematics software into mathematics teaching and learning as advocated by the Malaysian Ministry of Education (Pittalis & Christou, 2011). Adding on to this perspective, the challenges teachers face when adopting technological means in the classroom need to address the “elimination of negative attitudes towards technology and demonstrate the changes that bring benefit, increase efficiency, and simplify work” (Radovic et al., 2014, p. 415).

To ensure that professional development needs in improving current classroom practices are fulfilled, Clark-Wilson and Hoyles (2016) suggest that the following elements be included in mathematics teachers’ professional development programs:

- “Mathematical tasks that supported teachers to reflect on appropriate mathematical content and progression for each of the curriculum topics (developing both mathematical and pedagogical aspects of MKT).
- Short video clips and guidance materials that introduce and support teachers’ instrumental geneses, which includes consideration of how teachers can, in turn support and develop students’ instrumental geneses.
- Exemplar students’ digital and paper/pencil productions embedded within professional tasks for teachers.”

In short, should the teaching of mathematics require integration of software or other technological tools, teachers should be given enough exposure and training in using the technological tool as well as the pedagogical skills to ensure impactful delivery of classroom lessons. It is also imperative for schools to facilitate technology integration in the classroom by providing appropriate infrastructure, infostructure, and professional development support to ensure teachers’ relevance in 21st century classrooms.

REFERENCES


Using Random Parameter Logit in Open And Distance Learning (ODL) Institutions in Malaysia

Chooi Chea Chiam [1], SzeWei Loo [2]

ABSTRACT

Attention has been drawn to Open Distance Learning (ODL) as a mode for teaching and learning with the advancement in communication via the Internet. Education today has expanded the role of ICT in learning and knowledge generation, leveraging on Internet technology to transmit education across the country. Technology advancement and the introduction of ODL in education has created heated competition among these private higher education providers in Malaysia. ODL mode offers a flexible form of learning. Learners of ODL tend to be more challenging to fulfill their needs as they have other commitments in life, therefore, these learners will have certain criteria when choosing their learning education institution. The aim of this study is to investigate the vital attributes contributing in choosing an ODL higher education institution in Malaysia and to explore the consumers’ socioeconomic characteristics with their willingness-to-pay fees. Although studies on the attributes that influence student choice of a university exist, these have failed to use the choice experiment method to examine the attributes influencing choice of ODL education provider. The sample population was 320 using face-to-face interview. The results would be able to provide ODL education providers in Malaysia with knowledge on making the right marketing strategy.

Keywords: choice experiment, attributes, open and distance learning (ODL), willingness-to-pay (WTP), random parameter logit (RPL)

INTRODUCTION

Sustainability remains the question within the private higher education sector industry today with many players intensifying competition in the market. On a positive note, competition can be viewed from a larger perspective particularly with Malaysia aspiring to be the hub of higher education within the region. Like many other service firms in the market, education institutions may want to review their marketing strategies to compete in the increasingly competitive market. It is vital that higher education providers understand the attributes and the willingness-to-pay of the education consumers for the services rendered. Over the years, there has been rapid growth on the dependency of information technology for open and distance learners around the world. In open and distance learning (ODL) mode, the absence of traditional classroom face-to-face interaction between learners and tutors is substituted with the online forum. As the demand for tertiary education via ODL has increased over the last decade especially from among working adults, it is important that educational institutions take pro-active steps to ensure they meet the attributes that learners are expecting to get from the institution. Tertiary education is arguably a high-involvement product and it represents a substantial investment in monetary and temporal terms. Hence, prospective education consumers would carefully examine the options available in the market. Educational marketers must study the reasons for students selecting a particular tertiary institution from a large number of alternatives. Apart from that, how students come to a purchase decision and the attributes they are appraising for their options in education institutions is an important question. The objectives of this study are (a) to determine the attributes that prospective students are willing to pay in selecting the education provider; and (b) to evaluate the influence of prospective students’ socio-economic characteristics and...
attitudes on their choice of education provider in Malaysia.

**Past Literature**

According to Brown (1991), education consumers are to select those education institutions that match their selection attributes academically, socially and financially. Plank and Chiagouris (1998) reported that five attributes play a role in education provider decision making, namely (a) academic programs offered (b) academic programs available (c) perceived good job after graduation (d) financial aid and (e) value for money. Meanwhile according to Webb et al (1998), there are 10 suggested criteria. They are (a) academic programs available (b) academic reputation of the institution (c) the marketability of the degree conferred (d) faculty contact time (e) accreditation (f) campus employment (g) financial aid (h) placement reputation (i) completion time and (j) library size. According to Joseph et al. (2005), 6 criteria have been identified in assessing service quality in higher education. These are (a) program issues (b) academic reputation (c) physical aspects (d) career opportunities (e) geographical location of the institution and (f) duration of studies.

Choice Experiment (CE) is used to evaluate non-market goods (Hanley and Barbier, 2009). CE involves designing different options with different levels of attributes and characteristics. The respondents were then asked to choose their preferred options based on the given options in the surveys. A “status quo” term is always used as a baseline in the questionnaire in order to achieve welfare measure that is consistent with the economic theory (Adamowicz et al. 1998; Layton and Brown, 1998).

**METHODOLOGY**

A total sample of 320 was collected in year 2014 from several ODL higher education institutions in Malaysia. The attributes and its levels are needed to be defined carefully and as precisely as possible. Therefore, the attributes are chosen based on previous studies on the industry in the market today. Besides that, the level for each attributes is determined by interviewing several experts in the ODL institution.

CE estimates the Willingness-To-Pay (WTP) value based on the estimated $\beta_i$ values from equation $V_{ij} = \beta_1 X_{ij1} + \beta_2 X_{ij2} + \ldots + \beta_i X_{ij}$. The estimates $\beta_i$ values, which implies the effect on the utility of a change in each attribute level. For example, $\beta_i$ shows the effect on utility of a change in attribute $X_{ij}$ (Hanley and Barbier, 2009). WTP is the price or cost attribute and the marginal change in an attribute is typically derived by dividing the $\beta_a$ (value of each non-monetary attribute) by $\beta_c$ (value of the price attribute). The Marginal WTP or $\frac{\beta_a}{\beta_c}$, this value for any attributes, other than the price is called the implicit price or marginal rate of substitution (MRS) (Hanley and Barbier, 2009).

The estimation of the consumers’ decision by maximum likelihood using the random parameters logit model (RPL); also known as the mixed logit model was outlined by Train (2003). The RPL model is able to capture unobserved individual effects when estimating our parameters as it separates the parameter into a fixed and random element.

$\beta_i = \beta + \mu_i$, with the RPL model when choosing across m alternatives the probability that individual i chooses schooling choice j is: $Pr(i \text{ chooses } j) = \frac{\exp(\beta_i \cdot Z_{ij})}{\sum_{i=1}^{m} \exp(\beta_i \cdot Z_{ij})}$, where $Z_{ij}$ is a vector of attributes that vary across alternatives available and the probability is a weighted average of the logit formula evaluated at different values of $\beta_i$, with weights given by the density $f(\beta_i)$. 

The research objectives

The specific objective of this study is to evaluate the influence of respondents’ socio-economic and attitudes variables on the willingness-to-pay for ODL education attributes in Malaysia.

Definition of attributes’ levels

The identification of attributes and the levels was obtained from past studies and several officials from various education institutions and the “status quo” term should be included as well. The selected attributes and levels are shown in the following Table 1.

Table 1 Selected Attributes and Their Levels

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Attribute Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programs offered</td>
<td>Less satisfactory*</td>
</tr>
<tr>
<td></td>
<td>Satisfactory</td>
</tr>
<tr>
<td></td>
<td>Very satisfactory</td>
</tr>
<tr>
<td>Facilities offered (hostel, internet, library, laundries etc)</td>
<td>Not satisfactory*</td>
</tr>
<tr>
<td></td>
<td>Less satisfactory</td>
</tr>
<tr>
<td></td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Reputation of the institution</td>
<td>Less satisfactory*</td>
</tr>
<tr>
<td></td>
<td>Satisfactory</td>
</tr>
<tr>
<td></td>
<td>Very satisfactory</td>
</tr>
<tr>
<td>Total amount paid per semester (without accommodation)</td>
<td>RM1850*</td>
</tr>
<tr>
<td></td>
<td>RM2050</td>
</tr>
<tr>
<td></td>
<td>RM2250</td>
</tr>
<tr>
<td></td>
<td>RM2450</td>
</tr>
</tbody>
</table>

* Status quo or current situation of the ODL education provider institutions in Malaysia.

Program offered

The number of demanded and reputable programs offered. The options of programs offered:

Less satisfactory: Did not meet the programs and syllabus needed and asked by the prospective students

Satisfactory: Fairly meet the programs and syllabus needed and asked by the prospective students.

Very satisfactory: Able to meet the programs and syllabus needed precisely by the prospective students.

Facilities offered

Facilities offered refer to the various facilities offered by the institution to its students for example, internet coverage, library, the security of hostel and laundries:

Not satisfactory: Fail to meet all the needed services by the prospective students for example, weak internet connection, small library, dirty and no security for the hostel and no laundry service.

Less satisfactory: Certain facilities fail to meet the expectations of prospective students.

Satisfactory: Able to meet all the needed services by the prospective students.

Reputation of the institution

Reputation and image of the institution refers to establishment and image of the institution over the
years of quality service rendered.

Less satisfactory: Unable to project reputable and established institution over the years in the education industry.

Satisfactory: Fairly able to project reputable and established institution over the years in the education industry.

Very satisfactory: Able to project very reputable and established institution over the years in the education industry.

RESULTS AND DISCUSSIONS

A summary of the socio-economic profile of respondents is presented in Table 2. The total number of respondents is 320. The respondents' age is between 28 years old to 72 years old, with mean 35 years of age.

<table>
<thead>
<tr>
<th>Table 2 Socio-economic Profile of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Age (year)</td>
</tr>
<tr>
<td>Income per annum</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Race</td>
</tr>
<tr>
<td>Malay</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Indian</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>Marital Status</td>
</tr>
<tr>
<td>Single</td>
</tr>
<tr>
<td>Married</td>
</tr>
<tr>
<td>Others</td>
</tr>
</tbody>
</table>

The respondents' gender distribution was: 36.9% and 63.1% male and female respectively. By ethnic distribution, the respondents were 66.3% Malay, 19% Chinese, 11.3% Indian and only 3.4% are from other ethnicity. As for the marital status, 42.54% of them are currently single, 50.9% of them are married and 6.6% of them are others, such as widowed or divorced.

Respondents' perception on ODL education

Respondents were asked about their perception on ODL education as well. There were seven questions related to this aspect from Q15 to Q21. Refer to Table 3 for the results:

Questions regarding respondents' perception on ODL education

Q15. I am glad ODL education choice is available to me
Q16. The present ODL education attributes should be available for my grandchildren
Q17. ODL education is the future of learning
Q18. If things continue on their present course, we will soon experience a major touch in education
Q19. I do not need to care about education attributes

Table 3 Respondents’ Perception Toward ODL Education

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Q15</td>
<td>0.2</td>
<td>4</td>
<td>30</td>
<td>42.4</td>
<td>23.4</td>
<td>3.85</td>
</tr>
<tr>
<td>Q16</td>
<td>1.8</td>
<td>6.8</td>
<td>25</td>
<td>42.2</td>
<td>24.2</td>
<td>3.81</td>
</tr>
<tr>
<td>Q17</td>
<td>1.2</td>
<td>5.6</td>
<td>27.8</td>
<td>39.4</td>
<td>26</td>
<td>3.84</td>
</tr>
<tr>
<td>Q18</td>
<td>4.4</td>
<td>5.2</td>
<td>23</td>
<td>43</td>
<td>24.4</td>
<td>3.78</td>
</tr>
<tr>
<td>Q19</td>
<td>0.2</td>
<td>4</td>
<td>28</td>
<td>45.4</td>
<td>22.4</td>
<td>3.79</td>
</tr>
</tbody>
</table>

Table 3 shows most of the respondents do feel that ODL education is important and is the future of education and they are glad that ODL education is available for them with mean value of 3.85, 3.81 and 3.84 respectively. Most of the respondents are concerned about ODL education attributes.

The analysis will start with basic model followed by basic WTP for the ODL attributes identified by the respondents. Table 4 shows a brief descriptive analysis of the main attributes in the choice experiment.

Table 4 Descriptive Analysis of Main Attributes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (%)</th>
<th>Expected Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROG (Programme Offered)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Satisfactory</td>
<td>28.05</td>
<td>+</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>28.52</td>
<td></td>
</tr>
<tr>
<td>Very Satisfactory</td>
<td>43.43</td>
<td></td>
</tr>
<tr>
<td><strong>FAC (Facilities Offered)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Satisfactory</td>
<td>24.86</td>
<td></td>
</tr>
<tr>
<td>Less Satisfactory</td>
<td>25.66</td>
<td>+</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>49.48</td>
<td></td>
</tr>
<tr>
<td><strong>REP (Institution Reputation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less satisfactory</td>
<td>38.2</td>
<td></td>
</tr>
<tr>
<td>Satisfactory</td>
<td>24.19</td>
<td>+</td>
</tr>
<tr>
<td>Very Satisfactory</td>
<td>37.61</td>
<td></td>
</tr>
<tr>
<td><strong>FEES (Fees per semester)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RM1850</td>
<td>10.64</td>
<td>–</td>
</tr>
<tr>
<td>RM2050</td>
<td>45.26</td>
<td></td>
</tr>
<tr>
<td>RM2250</td>
<td>23.94</td>
<td></td>
</tr>
<tr>
<td>RM2450</td>
<td>20.16</td>
<td></td>
</tr>
</tbody>
</table>

Different options were presented to respondents, distinguished by their attributes and associated cost. Option A and Option B entailed various combinations of better ODL education attributes with higher fees per semester, while Option C is always weak ODL education attributes (current situation) and therefore with the minimum fees of RM1850 per semester. The general econometric model was derived as in the following:

\[ U = \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \varepsilon_0 \]

where \( \beta_1, \beta_2, \ldots, \beta_k \) are related coefficients on the main attributes \( X_1, X_2, \ldots, X_k \).

**Basic Multinomial Model**
For the basic multinomial model, the respondents were expected to value those levels of program offered, facilities offered and institution reputation that resulted in higher quality and bring higher utility. Table 5 shows the basic multinomial model with signs of all the attributes.

Table 5 Basic Multinomial Model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients ($\beta$)</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO</td>
<td>0.63028678</td>
<td>0.04264956***</td>
</tr>
<tr>
<td>FAC</td>
<td>0.53478455</td>
<td>0.03948460***</td>
</tr>
<tr>
<td>REP</td>
<td>0.67477164</td>
<td>0.03140176***</td>
</tr>
<tr>
<td>FEES</td>
<td>-0.09854782</td>
<td>0.01256524***</td>
</tr>
</tbody>
</table>

***Significant at 1%

Table 5 shows that all the attributes sign are in agreement with the theories. Program offered (PRO), Facilities Offered (FAC) and Institution Reputation (REP) are positive in sign. This means the higher the quality of these attributes the higher the willingness to pay. Meanwhile, negative sign for FEES shows that the higher the fees per semester, the lower the willingness to pay. Each attribute, except fees in term of monetary value (FEES) is divided into three levels and recoded as dummy variables (0, 1). Status quo or level one as base line and level two and three implied medium and high level of each attribute. Attribute levels are dummy coded which means that they are set to 1 if the corresponding level is present, and equal to 0 otherwise (Table 6). In all models, base level is the first level of each attribute.

Table 6 Attributes and Attribute Levels

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Attribute Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROG (Programme Offered)</td>
<td>PRO1</td>
<td>1= Programme offered is less satisfactory 0=otherwise</td>
</tr>
<tr>
<td></td>
<td>PRO2</td>
<td>1= Programme offered is satisfactory 0=otherwise</td>
</tr>
<tr>
<td></td>
<td>PRO3</td>
<td>1= Programme offered is very satisfactory 0=otherwise</td>
</tr>
<tr>
<td>FAC (Facilities Offered)</td>
<td>FAC 1</td>
<td>1= Facilities offered is not satisfactory 0=otherwise</td>
</tr>
<tr>
<td></td>
<td>FAC 2</td>
<td>1= Facilities offered is less satisfactory 0=otherwise</td>
</tr>
<tr>
<td></td>
<td>FAC 3</td>
<td>1= Facilities offered is satisfactory 0=otherwise</td>
</tr>
<tr>
<td>REP (Institution Reputation)</td>
<td>REP1</td>
<td>1= Institution reputation is less satisfactory 0=otherwise</td>
</tr>
<tr>
<td></td>
<td>REP2</td>
<td>1= Institution reputation is satisfactory 0=otherwise</td>
</tr>
<tr>
<td></td>
<td>REP3</td>
<td>1= Institution reputation is very satisfactory 0=otherwise</td>
</tr>
</tbody>
</table>

Marginal willingness-to-pay

The MWTP is calculated by computing the marginal rate of substitution between the attribute of interest and the cost factor. According to Hanley and Barbier (2009), this value ratio can also be identified between non-monetary elements of utility (attribute tradeoffs) is known as implicit price (IP). As an example, one of the attribute is program offered dividing the value of this attribute by value of price, will show the average willingness-to-pay of respondents to increase the quality of programme offered from the current
level. The marginal value of the conservation attributes is estimated using the following formula:

\[
\text{Marginal value} = \frac{\beta_{\text{attribute}}}{\beta_{\text{monetary variable}}}
\]

### Table 7 Marginal Value for Different Attribute Levels

<table>
<thead>
<tr>
<th>Variables</th>
<th>Marginal Value</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO2</td>
<td>1960.50646420</td>
<td>1.63505617***</td>
</tr>
<tr>
<td>PRO3</td>
<td>1960.76151350</td>
<td>1.50245622***</td>
</tr>
<tr>
<td>FAC2</td>
<td>1920.11114643</td>
<td>1.22343202***</td>
</tr>
<tr>
<td>FAC3</td>
<td>1896.66538605</td>
<td>0.81297655***</td>
</tr>
<tr>
<td>REP2</td>
<td>1907.75237945</td>
<td>0.74814242***</td>
</tr>
<tr>
<td>REP3</td>
<td>1980.20074490</td>
<td>2.07267003***</td>
</tr>
</tbody>
</table>

***Significant at 1%

Wald procedure in LIMDEP, NLogit 4.0, was employed to estimate the WTP value of the attributes. Referring to Table 7, the Marginal Rate of Substitution (MRS) between less satisfactory and satisfactory for program offered in the logit model is RM1960.50 while an improvement for program offered to very satisfactory level is RM1960.80 per semester, indicating respondents in this study do prefer the best condition (very satisfactory level) of program offered. Meanwhile, there is a lower need for better quality in the facilities offered by the respondents for this attribute. There is a fall from less satisfactory to satisfactory level for facilities offered; RM1920.11 to RM1896.70 per semester. Meanwhile, respondents have the highest WTP for institution reputation where they were willing to move from satisfactory to very satisfactory level by paying higher fees; RM1907.75 to RM1980.20 per semester. This shows that the respondents in this study do value the institution reputation the most.

Table 8 illustrates the results for RPL specifications model. Programs offered is significant at both the higher levels, while only facilities offered at less satisfactory level and reputation of the institution at very satisfactory level are significant with the WTP of the respondents in this study. Other than that, all the signs of the variables are in agreement with economic theory. With the significance of program offered at satisfactory and very satisfactory level are significant at 1% and 5% respectively.

### Table 8 RPL Model Specification for Different Attributes Level

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO2</td>
<td>1.931</td>
<td>4.511***</td>
</tr>
<tr>
<td>PRO3</td>
<td>1.554</td>
<td>5.755**</td>
</tr>
<tr>
<td>FAC2</td>
<td>1.028</td>
<td>5.727*</td>
</tr>
<tr>
<td>FAC3</td>
<td>1.226</td>
<td>2.692</td>
</tr>
<tr>
<td>REP2</td>
<td>2.721</td>
<td>2.366</td>
</tr>
<tr>
<td>REP3</td>
<td>1.274</td>
<td>4.576***</td>
</tr>
<tr>
<td>FEES</td>
<td>-0.0887</td>
<td>0.412**</td>
</tr>
</tbody>
</table>

***Significant at 1%, ** Significant at 5%, * Significant at 10%
CONCLUSION

From the universities’ perspective, it is important to understand the costs and benefits received, as they often have a strong influence on how to market its institutions; investing in the reputation of ODL education institution is vital based on the results of this study. This is also somewhat in line with the RPL results showing that the institutional reputation at very satisfactory level is significant at 1% with the respondents’ WTP in this study. This may be because ODL is still a relatively new learning mode and environment in Malaysia although it has been in the market for more than 10 years. If learners stand to gain more from a particular university program, they may well be supportive of the ODL learning mode. The findings of this study suggest that the economic value of ODL learning in Malaysia is substantial and respondents are generally supportive and willing to pay to study in ODL mode.

Ideally, the result will ensure the ODL provider will have the ability to narrow the digital divide in education. Meanwhile, its current philosophy of creating new and innovative courses to add on to its existing program list should not be neglected, even more so it should be balanced with practical and theoretical input. Indeed, it will live up to its policies of widening access to education, providing lifelong learning opportunities and giving everyone a second chance for education; a university that thrives on knowledge preservation and socialization of citizens.

REFERENCES


