

# Learning Styles and the Adoption of Modern Technology among Adult Learners

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## **Abstract**

Recently, Web 2.0 technology tools have been spread and adopted in many educational settings. Adopting such technologies maybe influenced by many factors. The purpose of this study is to explore the learning styles of adult learners and to discover the relationship between these learning styles and the adoption of Web 2.0. Considering learning styles the factor that may affect the perception of Web 2.0 tools. The Index of Learning Styles (ILS) and the Technology Acceptance Model (TAM) were used to investigate the learning styles and Web 2.0 perceptions among the students. Descriptive and correlation analyses were conducted. Data analysis revealed that adult learners have a positive perception of technology, but learning styles are not correlated with the perception of Web 2.0 tools.

## **Introduction**

Today, our classrooms have evolved greatly due to the change in educational technology occurring during the last two decades. We can observe students preparing themselves to go to classrooms by packing up modern technology devices such as laptops, iPads, iPods, iPhones, Mp3 players, and tablets. Most of these modern technology tools enable students to access the internet and search whatever knowledge they seek or read any materials.

Recently, technology is becoming a dominant factor in all aspects of our life. Learning environment as a part of our life has been changed due to the elaborating of technology. According to Prensky (2001) "Our students have changed radically. Today's students are no longer the people our educational system was designed to teach" (p. 1). Technology has changed our learning environments in all grade levels especially higher education settings.

Learning styles are an essential key for learning and perception towards learning and using modern technology tools. Kolb and Kolb pointed out that learning styles have become an essential factor in providing an effective learning experience (Kolb & Kolb, 2003). Examining learning styles provide educators with an idea of many characteristics that learners apply in the learning environments. Renzulli and Dai (2001)

stated that “research on learning styles aids educators to examine the matter of “what are characteristics ways one approach on learning tasks” (p. 34).

According to Dunn and Dunn (1998), research and identification of learning styles were a major component in the field of education. Cassidy (2004) stated that “one concept in particular which has provided some valuable insights into learning in both academic and other settings is learning styles” (p. 420).

## **Problem Statement**

This study was designed to explore the different learning styles of adult learners in the higher education settings and their perceptions of modern technologies in the learning situations. The study also aimed to examine whether there is any correlation between the learners’ learning styles and their perceptions of modern technologies. The following research questions were used in this study:

1. What are the students’ learning styles preferences, as measured by the Index of Learning Styles?
2. What are the students’ scores, as measured by Technology Acceptance Model?
3. What is the relationship between the students’ learning styles preferences, as measured by the Index of Learning Styles, and scores, as measured by Technology Acceptance Model?

## **Literature Review**

Today, we live in a technology era where technology tools are used in many learning settings. Technology has changed the way we learn. It has brought many different features to our learning environments in all grade levels. Recently, educators face many challenges such as the adoption of the rapidly increasing new technologies in higher education institutions for teaching and learning. The emergence of the internet or the World Wide Web (WWW) had a great influence on the education system throughout the world. According to Shaohua and Peilin (2008), Web 2.0 is the “second wave of the World Wide Web... that allows individuals to publish, collaborate and share experiences with other similar individuals or groups” (p. 1121). Reviewing the history of Web 2.0 tools, we can find that the term Web 2.0 was first created by Tim O’Reilly (2005), who coined the term Web 2.0 as a part of the new modern generation of interactive web-based services that used for instructional design and enhancing learning processes in the education fields through allowing users to create content independently. These technologies allow users to communicate, interact, and engage in discussions with different users around the globe.

There are many applications of Web-based services that generally demonstrate the foundations of the Web 2.0 concept, and they are already being used to a certain

extent in education. Many of these tools are free and work to enhance basic skills such as communication, collaboration, creativity, and global knowledge. These applications include Voicethread, Wordle, Glogster, Prezi, Padlet, and social media tools such as Facebook, Twitter, Youtube, Google+, blogs, wikis, podcasting, and content syndication (Sheninger, 2014).

## **The Importance of Web 2.0 in Higher Education**

Integration of Web 2.0 technology tools in higher education settings allows instructors to apply the Web 2.0 tools to support technological skill development and problem solving related to learning and teaching processes. Hemmi, Bayne, and Land (2009) argued that “the technology infrastructure of Web 2.0 and its associated applications provide the higher education community with authoring and community-building capabilities, the pedagogical implications of which are still largely unexplored” (p. 19). Chuang (2004), stated that “the major concerns in educational technology have moved away from hardware- and software-related issues; instructional strategies, professional development, and continuity of administrative support have emerged as the new issues” (p. 1). Adoption of the rapidly increasing new technologies in higher education settings is considered one of the basic challenges facing educators today.

Over the years, researchers have investigated the factors that influence the acceptance of computer technology, so their efforts and dedicated research have produced several models that have been developed and used to examine and understand technology perceptions. These models include the *theory of reasoned action* (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), the *theory of planned behavior* (TPB) (Ajzen, 1991; Mathieson, 1991), and the *technology acceptance model* (TAM) (Davis, 1989; Davis, Bagozzi & Warshaw, 1989). However, the *technology acceptance model* (TAM) has received the most focus of recent research as a method to understand the relationship between user’s perceptions (such as perceived usefulness (PU) and perceived ease of use (PEOU) of technologies) and usage behavior intention (BI).

Although institutions provide benefits and investments in integrating technology into education, many technology options have been underutilized or totally abandoned due to limited user acceptance (Liu, Liao & Pratt, 2009; Park, 2009; Teo, 2009). As a result, there is a demand for effective learning and teaching opportunities, which can be considered both a challenge, and an opportunity for the educational system (Foot, 2000).

## **Learning Styles and Technology**

Since learning styles clarify the learning differences between learners they can aid instructors in designing instructions effectively to meet the variety of learning

preferences (Akdemir & Koszalka, 2008). Learning styles as a field of research and study has many beneficial implementations for both the learner and educator (Moussa, 2014). Therefore, investigating students' learning styles can help instructors to develop an appropriate instruction design for their learners (Smith & Dalton, 2005).

The term "learning styles" can be understood simply as the verity of techniques preferred by students to help them perceive and process information and interact with the learning environment (Moussa, 2014). Learning styles can also, be defined as individual's general preference towards specific learning approach (Keefe & Ferrell, 1990; Robotham, 1999). This means learners favor one learning style over others. If educators aim to produce effective learning, they should work on integrating students' learning styles with educational technology tools.

## **Web 2.0 and Learning Theories**

Since the emergence of Web 2.0 tools, they have been widely used in different educational settings. Examining the literature of modern technology and learning theories, advanced new technology was found to be related to many learning theories. Hackney et al. (2003) suggested that educational services should be "continually linked with clients' needs and this is best done through systematic needs assessments and service evaluations" (p. 3), which may concern about a thorough investigation of students' specific educational requirements, learning preferences, and need for guidance with particular instructional methods. The individual needs should be in the center point of education as well as all human communications and interactions (Hackney et al., 2003).

According to Enonbun (2010), constructivism learning theory is related to the new age of information and knowledge, because the World Wide Web enables learners to access tons of information and to be self-directed learners. Web 2.0 technologies have been used in education in many forms, including broadcast style of teaching which uses web pages or delivers the content through visual learning environment (VLE), or uses discussion boards and chat to develop communication to specific groups. One of the advantages that makes Web 2.0 tools a significant technology in the educational settings is that they are easy to use and seem to be familiar to both students and staff. Even if today's students are digital natives who perceive and manage information in a different way than their ancestors (Prensky, 2001).

## **Methods**

This study aimed to explore the learning styles of adult learners and their perception of modern technology tools (Web 2.0) and the relationship between these learning styles and the technology tools (Web 2.0) at a Southeastern University in U.S.

in the Spring 2015. The Felder-Solomon Index of Learning Styles (ILS) (1997), the Technology Acceptance Model (TAM) created by (Davis, 1989), and a demographic questionnaire were used to examine the learning styles and the technology perception. All instruments were used in person (paper & pencil) format. Participant students were a representative sample of several colleges from both graduate and undergraduate students.

The researcher visited many classrooms and presented the purpose of the study and then invited participants to contribute to the study. Participants who volunteered to contribute to the study received a packet of information that included: study information sheet, the Index of Learning Styles, the Technology Acceptance Model (TAM), and the demographic questionnaire. All of these items were attached together to ensure the responses of each student are kept together. Also, to facilitate data input, the packets were distributed to the participants either at the beginning or the end of the class period depending on the professor who was teaching the class at that time. The information sheet provided enough information about the study so that each participant is required to provide a consent form to decide whether they intended to participate in the study or not. The completion of all instruments took 15-20 minutes. There were 315 students both males and females contributed to this study with age ranged from 19 to 65 years with an average of 24.1, median of 21, mode of 21, and standard deviation of 7.247. The participants are a representative sample of different ethnicities.

Data analysis was conducted after gathering the information on the Index of Learning Styles (ILS), Technology Acceptance Model (TAM) and the demographic survey. Statistical Package for the Social Sciences (SPSS) version 21.0 was used to examine the students' perceptions of Web 2.0 through descriptive analysis. The online official website of the Index of Learning Styles provided the students' preferred learning styles. The correlation analysis was conducted to examine the relationship between students' learning styles and their perception to modern technology.

The Index of Learning Styles (ILS) consists of 44 questions measuring four domains: the *active/reflective* dimension is related to how individuals process information; the *sensing/intuitive* dimension is related to how individuals perceive information; the *visual/verbal* dimension is associated to the process of information input by individual and the *sequential/global* dimension is associated with the understanding of information (Felder & Brent, 2005; Felder & Silverman, 1998; Felder & Spurlin, 2005). TAM instrument is a five-point Likert-type scale includes three subscales: the perceived ease of use PEOU, the perceived usefulness PU, and the third behavioral intentions BI.

## Results

### *The Reliability of the Measurement*

A Cronbach's Alpha was conducted to examine the internal consistency of the scale. Survey items were then disaggregated by constructs, it showed that for the three subscales PEOU, PU, and BI Cronbach's Alpha were .934, .938, and .914, respectively. For the full TAM *alpha* was .954 which represents a strong reliability, indicating that the scale is adequate to use (see Table 1).

Table 1  
*The Internal Consistency of TAM*

Scale	Cronbach's Alpha	N of Items
PEOU	.934	6
PU	.938	6
BI	.914	5
TAM	.954	17

Descriptive analysis of learning styles revealed that out of the 315 participants there were 175 (56%) active, 140 (44%) reflective, 247 (78%) sensing, 68 (22%) intuitive, 242 (77%) visual, 73 (23%) verbal, 210 (67%) sequential, and 105 (33%) global learners.

Table 2  
*Distribution and Percentages of Participants by Learning Styles Domains*

Domain	Active/Reflective		Sensing/Intuitive		Visual/Verbal		Sequential/Global	
	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
<i>n</i>	175	140	247	68	242	73	210	105
<i>%</i>	56%	44%	78%	22%	77%	23%	67%	33%

*N*=315

These results are consistent with the previous results obtained by Jacob and Shoemaker (1993), Kiersey and Bates (1978, 1984), where they found that the American population consists of 75% sensing learners and 25% intuitive learners. In addition, Teevan, Michael and Schlesselman (2011) conducted study using the ILS to examine the

learning styles of students at a U. S. School of Pharmacy. They found that 84% out of their 210 participants were sensing learners and 16% were intuitors, 73% were visual and 23% were verbal, 67% were sequential, and 33% were global learners. Also, the results for this study support the findings of Al-Othman (2004) who found that the percentage of the participants of his study was 65% sensing and 35% were intuitive.

Data analysis indicated that the students had a positive perceptions of Web 2.0 technology tools. For the scale of perceived ease of use (PEOU) of Web 2.0 the total score ( $M = 22.50, SD = 4.701$ ). For the scale of perceived usefulness (PU) of Web 2.0 ( $M = 20.62, SD = 5.426$ ). For the scale of behavioral intention (BI) of Web 2.0 it was ( $M = 17.36, SD = 4.455$ ). So the undergraduate and graduate students at the Southeastern University perceived Web 2.0 to be easy to use, useful in studying, and they had a good behavioral intention towards using the Web 2.0 technology in the future.

Table 3

*Summary of Mean and Standard Deviation of participants of TAM measurements.*

Variable	M	SD
Perceived Ease of Use	3.75	.783
Perceived Usefulness	3.44	.874
Behavioral Intention	3.47	.891

$N = 315$

Data analysis revealed that there was no correlation between PEOU and the four domains of learning styles: for the learning style domain of active/reflective is not significant ( $r = -.001, p = .483$ ); for the sensing/intuitive domain ( $r = -.013, p = .407$ ), for visual/verbal, ( $r = .085, p = .067$ ); and for sequential/global domain ( $r = .045, p = .213$ ). So, the correlation between PEOU and the four domains of learning styles is not statistically significant.

Also, it was found there is no correlation between PU and the four domains of learning styles; ( $r = .011, p = .420$ ) for the learning style domain of active/reflective, ( $r = -.032, p = .285$ ) for sensing/intuitive domain, ( $r = .060, p = .144$ ) for visual/verbal, and ( $r = .005, p = .464$ ) for sequential/global domain. So, the correlation between PU and the four domains of learning styles was not statistically significant.

For BI, there is no correlation between BI and the four domains of learning styles. For active/reflective,  $r = .034, p = .271$  is not statistically significant, also for sensing/intuitive domain,  $r = -.047, p = .203$ , for visual/verbal,  $r = .040, p = .240$ , and for sequential/global domain,  $r = .028, p = .310$ . So, the correlation between BI and the four domains of learning styles is not statistically. These results are consistent with the findings of (Cox, 2008) who examined whether there is a relationship exists between students' learning styles and the attitude towards using technology. His study

demonstrated that there is no relationship between attitude toward the use of technology and students' preferred learning styles. According the previous results, the perceptions of Web 2.0 technology were not correlated with the four domains of learning styles (See Table 4).

Table 4  
*The Correlation among the Domains of Learning Styles and Technology Scores*

	PEOU	PU	BI	LS/Active	LS/Sensing	LS/Visual	LS/Seq
PEOU	1						
PU	.56*	1					
BI	.71*	.70*	1				
LS/Active	-.00	.01	.03	1			
LS/Sensing	-.01	-.03	-.05	.15	1		
LS/Visual	.09	.06	.04	.12	-.05	1	
LS/Seq	.05	.01	.03	.18*	.40*	-.02	1

N = 315

## Discussion

Technology has infiltrated many aspects of our life. It is beneficial for learners to keep updated with modern technology. There are many factors that may affect the adoption of modern technology. Learning styles tell us how learners perceive, process, and recall information in the learning environment. This study was conducted to explore the learning styles of adult learners and determine whether there is a relationship between students' learning styles and their perception of modern technology. Data analysis revealed that the majority of learners were sensing and visual learners and the participants had a positive perceptions of Web 2.0 technology tools. Correlation analysis showed that there was no correlation between students' learning styles and their perception of modern technology. These results support the findings of (Cox, 2008) who demonstrated that the students' attitude toward the use of technology is not correlated with the students' preferred learning styles. This should be a starting point for more research to be done in order to explain these results. For future research, this study should be replicated with a different population and compare the results for more clarification.

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