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IMPACT OF LEARNING STYLES ON e-LEARNING ENVIRONMENT: AN EMPIRICAL STUDY

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ABSTRACT

e-learning is a popular medium of imparting knowledge during this age of World Wide Web (www). A large number of educational institutions have adopted this medium to educate students globally. Some students find this medium very exciting and useful while others are not very comfortable with it. There is a need to identify the characteristics of students who are comfortable with this medium and those who are not. In this study, an attempt is made to match students learning style with their attitude towards e-learning. Learning style questionnaire (LSQ) developed by Honey and Mumford (1992) was used to determine the learning style of the students belonging to institutes of higher learning. The results indicate significant difference in the attitude towards e-learning among students having different learning styles. Students characterized as activists and pragmatists were found to have a positive inclination towards e-learning programs, whereas those characterized as theorists and reflectors showed less inclination towards e-learning. The findings of the study have practical implications for educators and designers of e-learning programs.

KEYWORDS

Learning styles, e-learning, Honey and Mumford, LSQ.

INTRODUCTION

There are many synonyms used for the term e-learning such as distance learning, web-based learning, computer assisted learning and internet learning. The main difference between e-learning and face-to-face learning is that in e-learning the learner is at a distance from the instructor, the learner can have access to the instructor via use of some technology (Ally, 2004).

The term e-learning has been defined by American Society for Training and Development (ASTD), as a medium that "covers a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaborations" (ASTD Learning Circuits, 2007). Fry (2000) defines e-learning as "delivery of training and education via networked interactivity and a range of other knowledge collection and distribution technologies." Bleimann (2004) stated that e-learning is a self-directed learning that is based on technology, especially web-based technology. According to him e-learning is collaborative learning.

TYPES OF e-LEARNING

E-learning can be divided into the following three categories:

1. Face to face learning with support provided through internet.
2. Learning at self-pace through net.
3. Multiform learning through net (such as videos, e-book etc.).

STRENGTH AND WEAKNESSES OF e-LEARNING

The following are the strengths and weaknesses of e-learning

TABLE 1: STRENGTHS AND WEAKNESSES OF e-LEARNING

Strengths	Weaknesses
Flexibility in learning	Requires a lot of self-direction and self-discipline
Cost effective (saving cost of travelling, and other costs related to brick and mortar classroom)	Lack the advantages of classroom interaction
Results in positive return on investment (Cross, 2006; Bhattacharya and Sharma, 2007)	Suitable for independent learners and those who are tech savvy (Reynolds, 2008)

LIMITATIONS OF e-LEARNING

The following limitations of e-learning have been highlighted by Wong (2007):

1. Technology limitations: Success of e-learning initiatives depends upon availability of appropriate computer hardware and software as well as availability of internet with suitable bandwidth
2. Personal issues: such as lack of information and communication technology (ICT) skills, self-direction and self-discipline can hamper success of any e-learning program.
3. Limitations compared to traditional campus: Lack of physical interaction, counseling and career development.
4. Design limitations: ICT novices might find it too technical.
5. Other limitations such as time consuming since the instructor has to respond to the student queries in writing which is generally more time consuming as compared to verbal interaction.

CHALLENGES FOR STUDENTS AND TEACHERS

The challenges of e-learning for students and teachers are as follows:

TABLE 2: CHALLENGES OF e-LEARNING FOR STUDENTS AND TEACHERS

Challenges for Students	Challenges for Teachers
Learner centered and not teacher centered. The learners need to be more proactive as compared to the learners in a teacher centered environment. (Gannon-Cook & Ley, 2004).	Requires extra effort from the teacher
More time consuming than face to face learning (Howland & Moore, 2002)	Requires constant updating of the material available on the net
Requires better writing skills rather than spoken skills (Al-Harthy, 2005).	The quality of teaching is generally low as compared to face to face learning.

There exists difference in individual learning styles and these individual styles pose a challenge for those who want to impart knowledge. In case of e-learning these individuals learning styles need to be kept in mind by those who are using this medium (Canavan, 2004). The educators need to know how people acquire and preserve knowledge to keep track of their progress. Knowledge about learning styles can be helpful in increasing student’s self-awareness as well as better understanding of their strengths and weaknesses as learners (Coffield, 2004). The objective of this study is to find out whether there is significant difference in attitude among students with different learning styles towards e-learning and which learning style is more suitable for e-learning programs.

LITERATURE REVIEW

Different definitions of learning styles exist in literature, some of which are:

- A description of attitude and behavior which determines an individual’s preferred way of learning (Honey and Mumford, 1992, p.1).
- The complex means and conditions under which learners most efficiently and most effectively perceive, process, store and recall what they are attempting to learn (James & Gardner, 1995, p.20).
- Characteristics, strengths and preferences in the ways learners take in and process information (Felder, 1996, p.18).

Learning styles gained the attention of the researchers in the late nineteenth century. Various researchers noted the differences in learning behavior of learners. Several instruments were developed to measure learning styles of young and adults (Dunn et al., 1981). The literature review on learning styles bring to light many studies conducted on examining the learning styles of college students. In one of the studies conducted by Canfield (1988) learning style of students enrolled in different majors at the college level was investigated. The results showed a significant difference among learning styles of students. In another study students enrolled in business studies were the subject of investigation; the results indicated that the learning style of students enrolled in accounting, finance and economics was significantly different from those enrolled in management and marketing (Biberman and Buchanan, 1986). Dunn et al. (1981, 1989) pointed out that if learning style of college students is properly identified and instructions are provided accordingly it could lead to learning that is more effective. The literature review on learning styles depicts several models presented by different authors. Coffield et al. (2004) highlighted 71 models of learning styles out of which they categorized 13 models to have significant importance with respect to their wide spread usage and influence on others models. A summary of some of the prominent models developed by different authors to define the learning style of individuals is given in table 3:

TABLE 3: PROMINENT INSTRUMENTS FOR DEFINING STYLES OF LEARNING

Instrument	Developed by	Description
Learning Style Inventory (LSI)	Kolb (1984)	LSI defines four stages of learning cycle: reflective observation (RO), concrete experience (CE), abstract conceptualization (AC), and active experimentation (AE).
Felder-Silverman Learning Style Model (FSLSM)	Felder & Silverman (1988)	FSLSM defines four dimensions of learning styles: sensory/intuitive, active/reflective, visual/verbal and sequential/global.
Cognitive Style Analysis (CSA)	Riding (1991)	CSA measures an individual’s preference for processing information holistically or analytically and to think verbally or visually.
Learning Style Questionnaire (LSQ)	Honey and Mumford (1992)	LSQ defines four types of learners: Theorists, activists, reflectors and pragmatists.
Index of Learning Style (ILS)	Felder and Soloman (1997)	ILS is based on FSLSM.

HONEY AND MUMFORD LEARNING STYLE

Based on Kolb’s (1976) work, Honey and Mumford (1982) presented a learning style model consisting of four stages: Activists, Reflectors, Theorists and Pragmatists (businessballs.com).

- Activists play an active role in learning process and enjoy new tasks and ideas. They learn best when they are involved in new problems and opportunities. They dislike strict schedules and tight instructions. They like to work in groups.
- Reflectors like to think and learn by observation. They prefer working through different analysis and report. They do not prefer to be leaders and do something without doing their homework.
- Theorists are more analytical and rational and they are challenged in complex environment where they can use their knowledge and skills. They learn less where they have to participate in situations involving feelings and emotions.
- Pragmatists are more in favor of hands on experience rather than theoretical learning. They can work on practical issues by drawing up action plans keeping end results in mind. They learn least when there is no practice or if clear guidelines on how to do things are missing (Campaign for Learning, 2012).

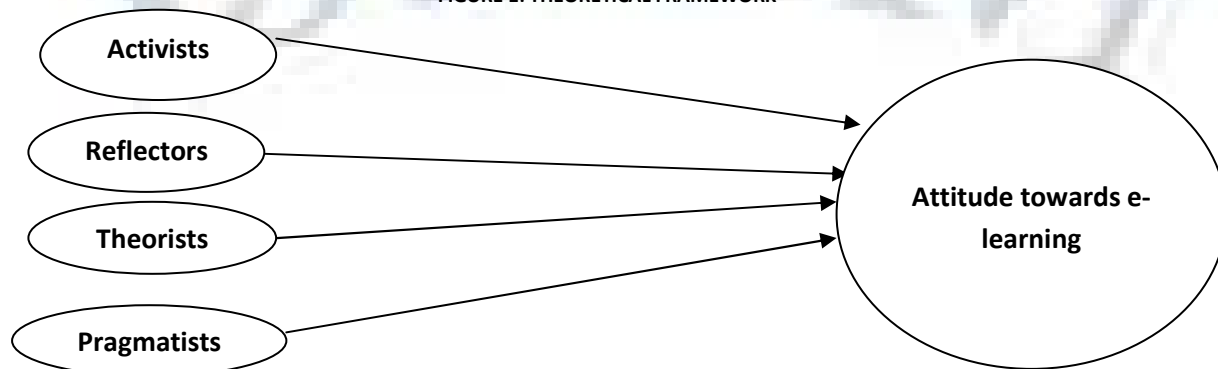
The reason for selection of Honey and Mumford learning style model for this study are same as identified by Canavan (2004). Honey and Mumford learning style is an information processing model based on experiential learning. The other models of learning focus on factors such as senses and environment while learning involves perceiving and processing of information (Sarrikoski, 2000). In UK the Honey and Mumford model of learning styles appears to be dominant in management and business practice, whereas in the USA same holds true for Kolb’s experiential model. As reported by Evans and Sadler-Smith (2006) about Honey and Mumford’s LSQ:

“As far as Honey and Mumfords’ Learning style Questionnaire (LSQ) is concerned, its pragmatic contribution cannot be denied, moreover its authors do not make any claims for it as self-standing psychometric test; rather they see LSQ as a means by which an awareness of the concept of learning style and the learning cycle may be raised and embedded in the minds of practicing managers”.

In online context, it is critical to consider learning styles of students. In the instructor is aware of differences in learning styles of their students and the different techniques to accommodate students with different learning styles, he will be able to teach more effectively in online environment. Teachers who are conscious of differences in learning styles are in a better position to adjust their teaching techniques and strategies. They can create a learning environment in which materials, resources and methods are utilized to address the learning requirements of their students, thus maximizing their learning potentials (Zapalska and Brozik, 2006).

LEARNING STYLES

FIGURE 1: THEORETICAL FRAMEWORK



HYPOTHESES

- H1: Activists learning style has a positive impact on attitude towards e-learning.
 H2: Reflectors learning style has a positive impact on attitude towards e-learning.
 H3: Theorists learning style has a positive impact on attitude towards e-learning.
 H4: Pragmatists learning style has a positive impact on attitude towards e-learning.

METHODOLOGY OF STUDY

Data was collected by means of a questionnaire developed to find out the impact of learning styles on attitude towards e-learning. Questionnaire consisted of two parts. In first part, demographic information of the respondents such as gender, age, education and computer experience was collected. In second part, learning style of the respondents and attitude towards e-learning was measured using 5-point likert scale - where 1 stands for strongly agree and 5 for strongly disagree. Learning style questionnaire (LSQ) developed by Honey and Mumford (1992) was used to determine the learning style of the respondents. Attitude towards e-learning was measured using the items defined by Chen and Huang (2012) for system acceptance in their study.

Sample population for this study was the students enrolled in business degree program (BBA/MBA/MS Management Sciences) in the public and private sector universities located in Rawalpindi and Islamabad (twin city) region. Based on convenience sampling six universities (three public and three private) were selected for conducting the survey. A list of courses offering some online material (mixed mode e-learning) during spring 2012 semester was prepared. All the questionnaires were filled in the classroom environment and all the participants were briefed about the purpose of survey and the items on the questionnaire. Total 230 questionnaires were distributed since a sample of 200 is considered suitable enough for structural equation model (SEM) research (Kenny, 2011; Iqbal and Qureshi, 2012). Total 202 completely filled questionnaires were retrieved and found suitable for further analysis – a response rate of 88%. All the responses were entered in Statistical Package for Social Sciences (SPSS version 17.0) for further analysis.

RESULTS AND DISCUSSIONS

The demographic profile of the respondents is shown in Table 4:

TABLE 4: DEMOGRAPHIC PROFILE OF RESPONDENT

		Frequency	Percent
Gender	Male	121	59.9
	Female	81	40.1
	Total	202	100.0
Age	18-25	56	27.7
	26-35	112	55.4
	36-40	23	11.4
	Above 40	11	5.4
	Total	202	100.0
Education	Undergraduate	42	20.8
	Graduate	100	49.5
	Post Graduate	60	29.7
	Total	202	100.0
Computer Experience	Less than 2 years	17	8.4
	Between 2-5 years	114	56.4
	More than 5 years	71	35.1
	Total	202	100.0

In order to check the reliability of questionnaire cronbach alpha (Cronbach, 1951) for each variable was computed and were found to be well above the acceptable range of 0.60 (Nunnally, 1978): attitude towards e-learning (.821), activists (.855), pragmatists (.788), theorists (.817) and reflectors (.838).

Ordinary least square (OLS) regression is used to find out the results of hypothesized relationships. The results are given below:

TABLE 5: RESULTS OF REGRESSION TEST

	Const.	Activists	Pragmatists	Theorists	Reflectors
Coefficient	.339	.633	.125	-.055	.087
Std. Errors	[.434]	[.065]	[.035]	[.089]	[.084]
T-stats.	(2.497)	(9.438)	(2.434)	(-1.096)	(1.329)
P-value	.013	.000	.016	.275	.186
F-stats.	56.587				
P-value	.000				
Adj. R square	.525				

a. Predictors: (Constant), Reflectors, Pragmatists, Theorist, Activists

b. Dependent Variable: Attitude towards e-learning

Table 5 shows that the overall model is significant ($F=56.587, P<.05$). The value for adjusted R-square is .525 which means 52.5% of the variance in the dependant variable is explained by the variations in the independent variables. As far as the impact of four learning styles on attitude towards e-learning is concerned, the results show that activists (sig. value .000) and pragmatists (sig. value .016) have a positive attitude towards e-learning medium of learning. Whereas theorists (sig. value .275) and reflectors (sig. value .186) learning styles have no significant impact on attitude towards e-learning. Therefore, the results support two of the hypotheses (H1 and H4) and do not support the other two hypotheses (H2 and H3). The findings are in line with some other researches on the topic. For example, Manochehr (2006) has made a study where he compared "the effects on e-learning versus those on traditional instructor-based learning, on student learning, based on students learning styles". His findings were that Learning style is not very much important in traditional brick and mortar system of learning but it is crucial in e-learning. It was concluded in the study that students with converging learning style (assimilators) attained better learning results in e-learning.

In another study conducted by Graf and Kinshuk (2006) behavior of students in online courses was observed. The focus was to observe student behavior according to their preference of learning styles. Significant difference was observed in the learning of individuals with reflective and active learning styles; reflective learners spent more time on examples whereas active learners showed better performance on questions dealing with facts. Learning styles of intuitive learners and sequential learners also showed remarkable differences. Intuitive learners spend more time in answering tests and visited reference materials frequently. On the other hand, sequential learners showed a tendency to start from the beginning of each chapter.

Shaw and Marlow (1999) used LSQ to study the relationship between attitude towards information and communication technology (ICT) and learning styles. The study also included gender and student cohort as variables of interest. The results of the study indicated no significant difference in learning styles based on

gender or student cohort. However, a significant negative (but weak) relationship was noted between the “theorists” and the ‘interactivity’ and ‘context’ attitude dimensions.

Huang et al. (2012) tried to find out the relationship between learning styles and e-learning performance in their study. The results indicated that the students with “sensory” learning style participated more and for extended duration in online setup. Their higher level of online participation resulted in better e-learning performance. This finding is supported by the fact that sensing learners are more practical as compared to “intuitive” learners and they prefer to learn by solving problems using grounded theories (Felder and Silverman, 1988). Students with sensory learning style can perform better in current e-learning environment, whereas students characterized as intuitive may find difficult to adjust in current e-learning setup.

In another study relationship between learning styles, participation types and learning performance was examined among the students in a programming language course supported by an online forum (Shaw, 2012). The findings of the study were that different learning styles resulted in different learning scores and students characterized as ‘accommodators’ scored higher compared to others.

CONCLUSION & RECOMMENDATIONS

The research concludes that e-learning is a medium of choice for the students who enjoy learning new tasks and like to work in groups. Similarly those students who prefer practical hands on experience over theory will be much excited about this idea. Whereas those students who are slow in learning new things and spend a lot of time in analyzing situations will find e-learning comparatively less attractive. The findings are useful for online teachers as well as designers of e-learning products to see how the needs of students with different learning styles can be fulfilled. Additionally students can also decide based on their learning styles whether they should enroll in any e-learning course or not.

MacKeracher (2009) pointed out that adult learners have distinct mental abilities and learning styles. If there were a mismatch between learners and facilitators’ learning style, the results would be unsatisfactory. Learning styles are value-neutral in the sense that a style adaptive in one situation may not be adaptive in others. The tendency of the learners is to begin with the learning activity they are comfortable with (p. 82-83).

An online learning environment can have the active learning features in which students interact with each other through writings and discussions in various platforms and it can have passive learning features when students read, listen and analyze different figures and graphs. The instructors should aim at meeting the requirements of individual and social learners by providing both synchronous and asynchronous activities, individual and group work, supportive interaction and facilitation. In order to facilitate the auditory and visual learners audio and visual materials, video casts of teaching performances, podcasts of different cases and samples, graphics including diagrams, figures and tables should be provided. The learning requirements of concrete and abstract learners can be fulfilled by providing various hands-on activities, simulations and games, activities that require research, exploration and creativity and different type of printed materials like books, handouts, worksheets, newspapers and puzzles. The logical and sensual readers need content that involve deductive and inductive approaches as well as real-life problems. In order to make online learning more effective the instructors should use a mix of different teaching methods including lecturing, discussion, role playing, storytelling, scaffolding, case-studies and discovery learning (Gülbahar & Alper, 2011).

LIMITATIONS AND FUTURE DIRECTIONS

The study has been limited to students of higher learning belonging to business degree program. Students belonging to other disciplines were not covered in this study. Cross discipline study could yield different results. Also experimental study design to find out the effectiveness of e-learning program for students demonstrating different learning styles can yield results worthy of practical application.

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