College Students Attitudes Toward Learning Process And Outcome Of Online Instruction And Distance Learning Across Learning Styles

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ABSTRACT

This study uses the Learning-Style Inventory – LSI (Smith & Kolb, 1985) to explore to what extent student attitudes toward learning process and outcome of online instruction and Distance Learning are affected by their cognitive styles and learning behaviors. It finds that there are not much statistically significant differences in perceptions on many learning process and outcome indicators across learning styles. However, students who learn from concrete experience and reflective experimentation/observation didn't appreciate the flexible class schedule, need instant questions and feedback, and expect more leniency from the instructor.

Keywords: Distance Learning; Instructional Design; Learning Styles; Learning-Style Inventory (LSI); Online Instruction

INTRODUCTION

Distance Learning has been fostering an environment in which students could overcome restrictions of time and place to access to instruction at their convenience. With the proliferation of information technology at low costs and with the ease of access to the World Wide Web, online instruction over the Internet has become a supplement and/or replacement of traditional classes. However, Young and Norgard (2006) find that 58% university students in their sample indicated they had learned more from traditional face-to-face classes than from Distance Learning. One suspects that differences in individual cognitive styles and learning behaviors reflecting in learning aptitudes/learning styles have affected the outcome and performance of online students and consequently the acceptance of this type of innovative instruction.

Research indicates that traditional in-class learning/teaching practices may not be suitable for the online environment due to differences in the storage, delivery, and presentation of knowledge (Rungtusanatham et al., 2004; Yan, 2004). Several conceptual models for effective online learning/teaching have been proposed (Wang, 2003; Marks et al., 2005; Moore, 2005; Holsapple & Lee-Post, 2006; Eom et al., 2006). However, online student cognitive styles and learning behaviors haven't been paid due attention and taken appropriate measures like in traditional classes. This study investigates to what extent student attitudes toward acceptance of online instruction and Distance Learning are affected by their cognitive styles and learning behaviors reflecting in learning styles. The identification of significant learning characteristics that effect student performance would contribute to the improvement of instructional design in order to gain student acceptance of online courses and provide them with positive and productive learning experiences.

A FRAMEWORK FOR INVESTIGATION

Research has indicated that if an instructor assumes a "one-size-fits-all" teaching approach in that all students would learn the same way and/or that the same teaching approach could connect with all students, he or she

would reach only some of his/her students in a given course (Hawk & Shah, 2007; Offir et al., 2007). This is especially true in online instruction and Distance Learning as the instructor and his/her students don't have many opportunities for face-to-face meeting to develop/nurture a productive working relationship as in traditional in-class learning. The issue becomes more crucial because the delivery process in an online class, unlike in a traditional face-to-face environment, could not be refined and/or adjusted in response timely to student aptitudes and behaviors.

Previous studies have identified various determinants/characteristics of student satisfaction and effective online learning (Wang, 2003; Marks et al., 2005; Eom et al., 2006), but student learning aptitudes/behaviors haven't been paid due attention. From a Learning Theory and Instructional Design perspective, this paper uses a set of 17 indicators to investigate student preferences toward online instruction, taking into account individual aptitudes and cognitive styles. Student attitudes toward learning process and outcome across learning styles are analyzed to identify their acceptance of online classes. In the following, selected determinants identified in the literature are discussed. Learners' characteristics, specifically learning styles reflecting individual aptitudes and cognitive styles, are considered as independent variables, whereas online instruction performance indicators are considered as dependent variables.

Learning Styles As Learner's Characteristics

In Distance Learning, students are responsible for the completion of class work without close supervision from an instructor. As such, this learning environment requires a certain level of self-motivation and self-organization from students (Leidner & Jarvenpaa, 1995; Hiltz & Wellman, 1997; Garrison & Cleveland-Innes, 2004). The possession, or lack of this quality, would very likely affect the success of a student taking online courses. Differences in learning outcomes could be attributed to indicators such as learners' traits, learning types, and behaviors (Kolb, 1984; Goldstein, 1998, Schniederjans & Kim, 2005; Offir et al. 2007). Research indicates that an instructor should not assume that all students learn the same way or that one teaching approach will connect with all students (Hawk & Shah, 2007). There exists even a strong argument that some students are more inclined to fail in an online learning environment due to the mismatch between instructional design / course delivery process and their learning styles (Terrell, 2005).

There are numerous learning style instruments available. Hawk and Shah (2007) review the validities, reliabilities, and applications of five prominent learning style instruments. Their survey includes the Kolb Learning Style Indicator (LSI), the Gregorc Style Delineator, the Felder-Silverman Index of Learning Styles, the VARK Questionnaire, and Dunn and the Dunn Productivity Environmental Preference Survey. Harrington and Loffredo (2010) find that personality types identified by the Myers-Briggs Type Indicator (MBTI) (Myers, 1987, 2003) play a significant role in student preference for online versus face-to-face instruction. Researches confirm that Introvert types prefer online/computer-assisted instruction, whereas Extroverts prefer face-to-face/collaborative learning (DiTiberio, 1996; Offir et al. 2007; Harrington & Loffredo, 2010).

The *Learning-Style Inventory – LSI* (Smith & Kolb, 1985), based on expressed learning behaviors/preferences, identifies four learning modes: 1) *Concrete Experience* (*CE*) or learning from feeling, 2) *Reflective Observation* (*RO*) or learning by watching and listening, 3) *Abstract Conceptualization* (*AC*) or learning by thinking, and 4) *Active Experimentation* (*AE*) or learning by doing. Individual learning style is a combination of these four learning modes. Responses to 12 items corresponding to these learning modes will reflect an individual's leaning toward a certain mode consequently categorizing that learner into four learning styles. A *Converger* learns from abstract conceptualization and active experimentation. A *Diverger* learns from concrete experience and reflective experimentation. An *Assimilator* learns from abstract conceptualization and reflective observation. An *Accommodator* learns from concrete experience and reflective observation. He or she prefers hand-on experience, would act on gut feeling rather than on logical analysis, and rely more on people for information.

The *Learning-Style Inventory* has received solid support for its validity and reliability (Keyes, 2002; Hawk & Shah, 2007). Furthermore, researches in neuroscience also support the whole brain involvement in effective learning through Kolb's experiential learning cycle (Kolb & Kolb, 2005). This instrument is also available in the institution under study.

Online Instruction Performance Indicators

Learning style, as a prominent learner's characteristic, is expected to have influences on effective learning in terms of increase in knowledge, application of new knowledge, and positive reactions to the course delivery (Lengnick-Hall & Sanders, 1997; Moore, 2005). Consequently, one should investigate its significant effects on the *response to learning process* and the *outcome of learning* to assess the effectiveness of student learning and instructional design.

Response To Learning Process

Attitudes toward delivery process could be represented by perceived easiness/difficulties in using various instructional technology/media in an online class. For a student, ease of learning may include comprehensive presentation of course content, feedback from instructor, and communication with classmates (Hiltz, 1994). The course content should be appropriate for the target audience. Timely feedback from the instructor should be available to refine knowledge by focusing on relevant information. Frequent interaction with instructor and classmates is necessary to reinforce the acquired knowledge, enhance learning interest, and broaden the student's view on the subject matter (Gagne, 1985).

Outcome Of Learning

After successfully completing a course, a learner is expected to acquire improvements in personal beliefs, actions, skills, and abilities (Lengnick-Hall & Sanders, 1997). One could measure the mastering of intended contents and learning goals by the degree of completion of course requirements. Since normative criteria of student performance have been defined, one should be able to assess how well students have learned from a course through their class work and the relative achievement in comparison with other group of learners, especially those in online classes versus those in traditional classes. Students should be able to provide qualitative assessments to express their attitudes toward the usefulness of content and make comparisons across other learning experiences taken inside as well as outside the classroom environment (Moore, 2005).

Based on selected indicators in the literature (Arbaugh et al., 2009; Zawacki-Richter et al., 2009; Ritzhaupt et al., 2010), this study investigates whether or not 1) the leniency of instructor plays any part in their outcomes, 2) the same content and skills have been acquired as in traditional class, 3) the grades reflect their true performance, and 4) the online course provides sufficient prerequisite knowledge to follow other courses in the curriculum.

In light of related previous works (Arbaugh et al, 2009; Zawacki-Richter et al, 2009; Ritzhaupt et al., 2010), this study investigates whether students have been benefitted from a flexible schedule of an online class, how much time and effort have been spent to keep up with material and assignments, and the possible influence of missing prominent aspects of the traditional classroom, such as face-to-face communication and instant response with classmates and instructor.

EMPIRICAL FINDINGS AND DISCUSSIONS

Results reported herein are based on a survey of 105 students taking an online class on Introduction to Information Systems, a service course at a major western state university in the US. The survey questions include student demographic data, preferences on learning environment, attitudes toward learning process and outcome – learning characteristics and performance indicators of the evaluation framework discussed in the previous section. Learning styles were assessed with the Learning-Style Inventory (Smith & Kolb, 1985) attached to the questionnaire.

On learning experience, the average expressed attitudes from students for most issues under study are more than neutral/indifferent with a score of higher than 3 on the 5-point Likert scale (from 1 for Strongly Disagree to 5 for Strongly Agree). Overall perceptions of the learning process (Variables 1 to 11 or V1-V11) and outcomes (Variables 12 to 15 or V12-V15) are summarized in Table 1. Then results in Table 2 present the differences in perceptions across learning styles and will be discussed.

Overall Perceptions On Learning Process And Outcome

Students perceived that a flexible class schedule of an online course did enhance their learning process (V1). However, they felt that they had to put in more effort to keep up with the progress of the online class (V2). Students felt that they had more materials to learn (V3) and had to spend more time learning these materials than those of traditional classes (V4, V5).

Students felt they were missing face-to-face communication with the instructor and classmates when taking an online course (V6). The fact of missing face-to-face communication somewhat negatively affected their study (V7). Similarly, they felt they were missing the chance to ask instant questions as in traditional classes (V8). This fact slightly affected their study in a negative way (V9).

Although without face-to-face meetings, students in this online class felt that they did know their relative performance in comparison to their classmates (V10), as the instructor posted class grades with individual codes for students to look up their own grades. This positively affected their learning progress (V11).

On self-evaluations of their performance, online students did not strongly think that they had benefitted from the instructor's leniency more than in a traditional class (V12). They perceived that grades from this online course did not accurately reflect their true performance (V14). They also indicated that they did not gain more knowledge from this online class than from a traditional class (V13). However, students tended to agree that they had learned sufficient knowledge/skills / prerequisites to follow other courses in their curricula (V15).

Table 1: Summative Evaluation Of Perceptions On Learning Effectiveness

Variables	Mean	Std. Deviation
Perceptions On Learning Process		
V1. Flexible class schedule enhance learning	3.10	1.14
V2. Have more effort to keep up with progress of the class	3.85	1.22
V3. Have more material to learn than traditional class	3.96	1.18
V4. Spend more time to learn materials of online class	3.92	1.20
V5. Spend more time to do assignments than traditional class	3.70	1.16
V6. Feel missing face-to-face communication with instructor and classmates	3.56	1.32
V7. Missing face-to-face communication with instructor and classmates *negatively* affect study	3.18	1.36
V8. Feel missing the chance to ask instant questions	3.70	1.36
V9. Missing the chance to ask instant questions affect *negatively* studying	3.16	1.37
V10. Know relative performance in comparison with classmates in online course	3.18	1.19
V11. Knowing relative performance affect *positively* learning progress	3.46	1.05
Perceptions On Learning Outcome		
V12. Instructor is more lenient in an online class than in a traditional class	3.04	1.18
V13. Have acquired the same content and skills as in traditional class.	2.81	1.09
V14. Grade from online course reflect accurately true performance	2.76	1.29
V15. Online course provide sufficient knowledge / skills / prerequisites to follow other courses in curriculum	3.27	1.08

Perceptions On Learning Process And Outcome Across Learning Styles

Analysis of Variances (ANOVA) reported in Table 2 reveals significant differences in perceptions on learning process and outcome across learning styles in terms of flexible class schedule (V1), missing instant questions (V9), and instructor's leniency (V12).

Table 2: Perceptions On Learning Process And Outcome Across Learning Styles

Variables	Mean LS 1	Mean LS 2	Mean LS 3	Mean LS 4	F Test P-Values
Perceptions On Learning Process					
V1. Flexible class schedule enhance learning	3.32	2.40	3.10	3.57	.101
V2. Have more effort to keep up with progress of the class	3.58	4.00	3.72	3.85	.704
V3. Have more material to learn than traditional class	4.05	4.00	3.72	3.57	.540
V4. Spend more time to learn materials of online class	4.11	4.07	3.62	3.43	.337
V5. Spend more time to do assignments than traditional class	3.68	3.87	3.31	3.86	.301
V6. Feel missing face-to-face communication with instructor and classmates	3.42	4.00	3.48	3.71	.711
V7. Missing face-to-face communication with instructor and classmates *negatively* affect study	2.95	3.40	3.24	4.00	.387
V8. Feel missing the chance to ask instant questions	3.68	4.07	3.34	4.29	.362
V9. Missing the chance to ask instant questions *negatively* affect studying	2.95	2.80	2.83	4.00	.068
V10. Know relative performance in comparison with classmates in online course	3.16	3.53	3.17	2.86	.752
V11. Knowing relative performance *positively* affect learning progress	3.74	3.00	3.24	3.86	.128
Perceptions On Learning Outcome					
V12. Instructor is more lenient in an online class than in a traditional class	3.00	2.27	3.10	3.86	.031
V13. Have acquired the same content and skills as in traditional class.	2.79	2.47	2.79	3.29	.567
V14. Grade from online course reflect accurately true performance	2.79	2.60	2.62	2.86	.897
V15. Online course provide sufficient knowledge / skills / prerequisites to follow other courses in curriculum	3.11	3.13	3.24	3.86	.599

Legend: LS 1 **-** Converger
  LS 2 **-** Diverger
  LS 3 **-** Assimilator
  LS 4 **-** Accommodator

The *Divergers* (LS2), learning from concrete experience and reflective observation, did not perceive that a flexible class schedule would enhance their learning (V1). This group also did not perceive that the instructor was more lenient in this online class than in a traditional class (V12). The *Accommodators* (LS4), learning from concrete experience and active experimentation, strongly perceived that missing the chance to ask instant questions had negatively affected their studies (V9).

Overall, there are not much statistically significant differences in perceptions on learning process and outcome across learning styles. An exception is that the *Divergers* did not appreciate the flexible class schedule as they had too much imagination and were paralyzed by alternatives such that they could not make decisions to meet the due date (Smith & Kolb, 1985). Consequently, this group expected online instructors to be more lenient. The *Accommodators* expressed the need for instant questions and feedback on their many trivial improvements and inefficient/unnecessary activities in order to complete their works (Smith & Kolb, 1985). From Kolb's experience of the learning model, one notes that both groups preferred concrete experience in their learning process. These two student groups account for 31% of the sample under study.

To accommodate these student groups, researchers suggest many classroom activities, such as lecture examples, problem sets, readings, films, simulations, laboratories, observations, and field work are needed (Kolb, 1984; Svinicki & Dixon, 1987). In online instruction and Distance Learning environment, more hands-on components, such as video clips, annotated screenshots, and/or animated lecture notes, are needed to enhance student learning process. Structured guidelines for completing class work and regular reminders of due dates may be needed to assist these students.

CONCLUDING REMARKS

This study offers some insights toward an effective instructional design for online instruction and Distance Learning in order to provide students with positive outcome, taking into consideration the differences in student cognitive styles/learning behaviors reflected in learning styles.

Findings of this study confirm the merit of a flexible schedule and the negative effect of non face-to-face setting in an online class. Students also perceived having a heavier workload but felt that they did not acquire more knowledge from this online class than from a traditional class. Overall, students tended to agree that they had learned sufficient knowledge/skills/prerequisites to follow other courses in their curricula.

In terms of different attitudes across learning styles, students who learn from concrete experience and reflective experimentation/observation didn't appreciate the flexible class schedule, they need instant questions and feedback, and they expect more leniency from the instructor. These students need more visual course components, more guidance/feedback from the instructor, and more structured guidelines/schedules to meet their class work due date. They account for 31% of the sample under study.

This study has some limitations. First is in the choice of only one learning style instrument to explore student aptitudes in a single online class of Information Systems. Research indicates that a single instrument may not address all dimensions of the cognitive process and learning behaviors (Hawk & Shah, 2007). Also, other demographic and environmental factors may affect/moderate the way that a student learns (Gagne & Briggs, 1974; Gagne, 1985). Further inquiries are necessary to discover attitudes/preference across multiple online courses in various disciplines with multiple learning style instruments to provide a deeper understanding of online student aptitudes (Hiltz & Arbaugh, 2003; Arbaugh et al., 2009). Having a profile of student learning behaviors would be beneficial in effective instructional design to provide students with positive experiences and successful outcomes in online instruction and Distance Learning.

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