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A Quantitative Examination of Generational Differences in e-Learning at A Hispanic-Serving Institution

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This quantitative inquiry aimed to investigate plausible generational differences among Hispanic learners in the context of e-learning. The investigation examined students' technology ability, learning activity preference, attitude towards technology use, and instructional strategy orientation at a Hispanic-serving institution (HSI) of higher education along the southern border with Mexico. The researchers studied whether age is the dominant factor affecting learners' technology ability, learning activity preference, attitude towards technology use, and instructional strategy orientation after controlling for students' preferred course delivery mode and academic status. Limitations and recommendations were addressed.

Keywords: generational difference; Hispanic learners; e-learning; age

INTRODUCTION

Literature related to e-learning appeared to have investigated and emphasized the important factor of age and/or generational difference (e.g., Akyol, Ice, Garrison, & Mitchell, 2010; Hoskins, 2014; Fair & Wickersham, 2012) as learners from different generations may have different levels of familiarity with and exposure to technology (Ke & Kwak, 2013). On other hand, prior research in generational differences seemed to have acknowledged the significance of attending to unique characteristics of each age generation (Aro, Rinne, Lahti, & Olkinuora, 2005; Borrero, McGinnis, McNeil, Frank, & Conigliaro, 2008; Hammill, 2005; Mishler & Rose, 2007; Waddell, 2004).

This quantitative inquiry was designed to investigate generational differences in the (a) learner's technology ability (TA), (b) learning (activity) preference (LP), (c) attitude toward use of technology (e.g., email) that are commonly used in learning online (ATT), and (d) instructional strategy orientation (IS) within a Hispanic-serving institution (HSI) on the southern border with Mexico. These four constructs were emerged from reviewed

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literature (see Literature Review) to build a theoretical framework for this inquiry. The investigation was initially attempted to synthesize findings and extrapolate implications for practitioners and researchers interested in similar fields.

Besides the four latent factors previously mentioned, Hispanic learners' demographic information (e.g., age) was taken into account in this research study. Generational differences in this quantitative study may refer to any cognitive, psycho-motor, affective, and interpersonal discrepancies of learning online due to age differences. These differences among generations (e.g., Baby Boomers, Generation X, and Net Gen) appear to raise an instructional design issue for professors who teach online and instructional developers who assist the faculty in developing online courses (Feiertag & Berge, 2008). The issue is deemed multi-faceted. Two aspects of the issue, which the authors hoped to address, can be framed as follows.

1. Are there any differences between age groups in their respective perceptions or beliefs of online learning?
2. To what extent do these differences in the four factors affect the decision-making process of the course design and development?

The results of this research were expected to inform online course developers and cyber-instructors of potential instructional strategies that may be taken into account in the design and development of a course with an online component integrated. It was also anticipated that their students will better enjoy their learning experience in an online environment in light of this study.

LITERATURE REVIEW

Using language acquisition as an analogy, Prensky (2001) used two terms, "digital natives" and "digital immigrants" in an attempt to explain the contrast between those who grew up with the Internet and digital devices and those who were born before the Internet was created. Native speakers acquire their first language or mother tongue effortlessly compared to those who speak the language as a second or foreign language. In this context, digital natives are characterized as those who are relatively comfortable or proficient in terms of interacting with the computer and other technology devices. Such comfort or proficiency is so pronounced that it can be associated with speaking a native language. Digital immigrants are those who did not grow up with the Internet, so the way they interact with the computer or the Internet may not be similar, possibly not even as comfortable, as their generally younger counterparts (Prensky, 2001). Furthermore, Prensky (2005) claimed that younger learners are now able to achieve learning through a mobile phone (e.g., Dunn, Richardson, Oprescu, & McDonald, 2013). Older learners would not normally consider such an activity or behavior to be a typical, commonplace behavior for learning in everyday life other than possibly calling "411" for information. Despite that fact that empirical findings seemed missing from Prensky's (2001; 2005) arguments, this noticeable dichotomy has suggested that as more and more digital natives are going to college, a study on whether or not college courses ought to be redesigned in an attempt to address the dichotomy is not only timely, but has gained further traction and attention (Carlson, 2005; Dunn, Richardson, Oprescu, & McDonald, 2013).

Are digital natives and digital immigrants so different? There seemed to be a generational difference in learning soft skills (a.k.a. people skills) across "Traditionals," "Baby Boomers," "Generation X," and "Generation Y" (Tolbize, 2008). Tolbize (2008) found that younger workers prefer assessment and feedback whereas older generations favor classroom instruction. Even so, strategies such as "on the job training, discussion groups, peer interaction and feedback, and one-on-one coaching" are popular across the four generation groups (Tolbize, 2008). On the other hand, Tolbize (2008) contended that

when it was concerned about hard or technical skills training, these workers prefer a similar instructional design. This is one observation from the workforce. Another observation came from a report by Reeves (2008). Reeves (2008) stated, "Generational differences are evident in the workplace, but they are not salient enough to warrant the specification of different instructional designs or the use of different learning technologies" (p. 21).

What about higher education? According to Garcia and Qin's (2007) findings, the Net Generation (i.e., digital natives) and non-Net Generation (i.e., digital immigrants) may differ from each other with regard to the ability to operate a technological device in favor of the natives. However, both groups showed no difference in their perception of an effective instructional activity; both desired more interaction with the instructor through class lectures and discussions. Going along with the age differences, Oblinger (2003) claimed that Millennials (born in or after 1982) seem to adopt learning styles or preferences different from their counterparts and suggested that the younger group prefer a work environment that is more collaborative, more hands-on, more organized, and more technological. This claim is not congruent with the findings by Garcia and Qin (2007), though. Stapleton, Wen, Starrett, and Kilburn (2007) found that Millennials (i.e., Net Gen) have a tendency to interact or collaborate with their peers through various technologies, but when it comes to their own perceptions of learning in online courses, there is not any difference than other age groups. The four researchers warned that the age differences should not be considered the only single factor that determines students' successful learning or satisfaction with online learning. Billings, Skiba, and Connors (2005) compared the undergraduate nursing students' (i.e., mostly Net Gen) perception of experiences in Web-based courses to their graduate nursing students (i.e., primarily Generation X). As a result, they discovered that Net Gen likes to carry the responsibility for their own learning and develops a similar perception for the use of technology and a similar concept of professionalism, just like other generations, regardless of some differences in educational practices. Ke and Kwak (2013) investigated whether online learning interaction participation, perception, and satisfaction would be consistent across varied age and ethnicity groups. Their results indicated that non-traditional students' age was not associated with online learning interaction participation and perception. Opponents of the dichotomy argued that the assertions about differences between digital natives (referring to Millennials or Net Gen) and non-digital natives lack empirical support as their basis is unfounded and dismissed the phenomenon as "academic moral panic" (Bennett, Maton, & Kervin, 2008, p. 782). Koutropoulos (2011) even called for a stop of such "fetish" (p. 532) in labeling the particular age group.

Therefore, thus far, the research on age factor and/or generational differences has not clearly shown much significant difference between Net Gen and non-Net Gen with respect to a favored learning environment and yet age is always an important factor for instructional design consideration (Hoskins, 2014). This is one of the motivations behind this investigation. Moreover, since most of the e-learning studies in the literature targeted primarily non-Hispanic student population (e.g., Lu & LaVaglio, 2014) or overlooked the age factor in exploring Hispanic student's learning (e.g., Lu & Cavazos, 2014; Pan & Garcia, 2015), another motivation of this paper lies in a question, "How do the two age groups differ in the e-learning environment that predominantly services a Hispanic student body?"

In the e-learning environment technology plays a critical role. Learners' (end users') rejection or acceptance of e-learning system depends on their technology ability or self-efficacy for technology to a substantive degree (Pan, 2008). This learner-perceived ability to have a good command of various technology is similar to the notion of computer self-efficacy as Hsia, Chang, and Tseng proposed (2014). Yet, Holden and Rada (2011) differentiated computer self-efficacy from technology self-efficacy and argued in their

general linear model study that technology self-efficacy is a construct that focuses on a specific technology system and is deemed a significant (compared with computer self-efficacy that measures end users' confidence in computer skills in general) indicator of user acceptance of technology. The nexus between self-efficacy and attitude is well documented in the technology acceptance literature (e.g., Kulviwat, Bruner, & Neelankavil, 2014; Li, 2012). Students' attitude toward technology use is also factored into the examination of technology or information system adoption (see Pan, Sivo, & Brophy, 2003; Heinz, 2013). Morris and Venkatech (2006) studied age differences in technology adoption and reported that younger workers are more likely to be affected by their own attitude toward technology use while older workers' decision on adoption is more impacted by subjective norm and behavior control.

This cursory review of the relevant literature disclosed that (a) in the generational differences literature the research findings of whether learner preferences in instructional activities and strategies differ by age groups appear elusive and (b) in light of Technology Acceptance Model (Davis, 1980), technology ability (similar to technology self-efficacy) and attitude toward technology are two useful factors used to explain end-user adoption of technology. Therefore, there is a potential gap in the literature regarding the possible effect of ethnicity, possibly compounded by age in students' effective participation in online learning. The present investigation was intended to explore this generational difference issue by targeting Hispanic learners, specifically Mexican American learners. One primary question investigated in this research effort reads as follows, "Is there any significant difference between age groups in the four factors (i.e., TA, LP, ATT, and IS)?" Three follow-up questions were attempted to further the inquiry related to e-learning:

1. Is there any significant difference among three course delivery modes in the four factors?
2. Is there any significant difference between academic status groups (graduate vs. undergraduate) in the four factors?
3. Does the effect of age on the four factors remain significant when controlling for course delivery mode and academic status?

METHODS

As aforementioned, this quantitative study was designed to study how age can affect TA, LP, ATT, and IS using a Hispanic student population.

SETTING

The setting of this quantitative study was located in the online learning environment, empowered by Blackboard Course Management System within a state university in South Texas, U.S.A. According to Santiago (2006), the university was a Hispanic-serving institution (HSI) with approximately 94 percent of total undergraduate Hispanic full-time equivalent student enrollment?

PARTICIPANTS

Target population was the entire student body at the HSI, including both graduate and undergraduate, that was enrolled in any class that had an online Blackboard component in it. The accessible population consisted of those students whom investigators were given instructor permission to survey. The surveyed students must be at least 18 years old and participate in this study on a voluntary and anonymous basis. As suggested by Hartman, Moskal, Dziuban (2005), participants are divided into three age groups: (a) those born before 1965 (a.k.a. the Baby Boomers), (b) those born in 1965 through 1980 (a.k.a. the Generation X), and (c) those born after 1980 (a.k.a. the Net Gen).

This dataset was initially collected in 2008. Initially, there were 177 students that had successfully responded to the questionnaire. Of all, 140 are Hispanic learners, with 11 identified as baby boomers, 54 as of Generation X, and 75 as of Net Gen. Data were collected using a password-protected computer server through an online questionnaire.

INSTRUMENTS

The questionnaire was composed of six instruments, but for the purpose of this phase of investigation, the Behavior Pattern Instrument was excluded. The five instruments are as follows:

1. Demographics Instrument (9 questions), measured on a nominal scale (see Appendix A);
2. Technology Ability Instrument (25 questions), measured on an interval scale (see Appendix B);
3. Learning Preference Instrument (27 questions), adapted from the work by Loo (2004), measured on an interval scale (see Appendix C);
4. Attitude Instrument (20 questions), adapted from the work by Ajzen and Fishbein (1980), measured on an interval scale (see Appendix D);
5. Instructional Strategy Instrument (8 questions), adopted from the work by Tapscott (1997), measured on an interval scale (see Appendix E).

Demographics Instrument dealt with variables, such as sex, birth year, and academic major, as Appendix A depicts. Technology Ability Instrument included questions that deal with respondents' perceived ability in technology use, such as "f2: 2. I can use Google Docs Spreadsheet" and "f8:8. I can download photos from a digital camera." The Technology Ability construct of interest was aligned with what Holden and Rada (2011) called, technology self-efficacy (as opposed to computer self-efficacy). The TA instrument was centered on two general concepts: target e-learning system and skills necessary for e-learning, an approach endorsed by Park (2009). See Appendix B for more information of the instrument.

The Learning Preference Instrument was concerned with respondents' preference in the classroom activity. Of all, two questions were, "g2:2. I like in-class group projects as a class activity" and "g12:12. I like writing reflection as a class activity." See Appendix C for more information of the instrument. The Attitude Instrument was composed of questions in regard to respondents' attitude toward technology use. Two of the questions/ statements included were, "h5:5. All things considered, my use of Blackboard is negative vs. positive" and "h15:15. All things considered, my use of electronic devices is negative vs. positive." See Appendix D for more information of the instrument. Instructional Strategy Instrument encompassed questions with respect to respondents' preference of strategies commonly used in the instructional setting. Two sample questions/statements from that instrument were, "i3:3. All things considered, my preference of instructional strategies below is teacher-centered vs. learner-centered" and "i7:7. All things considered, my preference of instructional strategies below is school as torture vs. school as fun." See Appendix E for more information of the instrument.

Technology Ability and Learning Preference Instruments both were measured on a five-point Likert scale with "1" as strongly disagree, "5" as strongly agree, and "3" as neutral. The higher the composite scores are on each of the two instruments, the more agreeable the respondents are. The highest and lowest possible scores on Technology Ability Instrument are 125 and 25, respectively. The highest and lowest possible scores on Learning Preference Instrument are 135 and 27, respectively.

On the other hand, Attitude and Instructional Strategy Instruments both adopted a five-point bipolar semantics scale. The higher the composite scores are Attitude Instrument, the more favorable or positive the responses are. For Instructional Strategy Instrument, the

higher scores, the more learner-centered. The highest and lowest possible scores on Attitude Instrument are 100 and 20, respectively; and the highest and lowest possible scores on Instructional Strategy Instrument are 40 and 8, respectively.

PROCEDURES

The questionnaire was administered at one occasion in the beginning of the semester, which began in the third week and ended in the fifth week of the Fall and Spring semesters. In both Summer semesters in 2008 and 2009, the administration began in the second week and ended in the fourth week. With instructors' prior approval, investigators emailed the consent form through Blackboard email system. Data sets were exported from the password-protected computer server to Microsoft Office Excel before entered to the SPSS program. Due to the number of the participants, the baby boomers group and the Generation X group were combined. The merged group was then named, the Non Net Gen.

DATA ANALYSES AND PROCEDURE

The study was conducted, as regulated by the institutional review board that approved the project in May 2008. Statistical procedures, such as multivariate analysis of variance (MANOVA), analysis of variance (ANOVA) and multivariate analysis of covariance (MANCOVA), were conducted for further data analysis.

RELIABILITY OF INSTRUMENTS

A Cronbach's alpha reliability testing was conducted to test the reliability of the four instruments on the interval scale adopted or adapted from the literature. Alpha values were .92 for the Technology Ability (TA) Instrument, .85 for the Learning Preference (LP) Instrument, .93 for the Attitude (ATT) Instrument, and .77 for the Instructional Strategy (IS) Instrument. The results indicated that the four instruments were reliable and all were consistent with earlier studies with fewer participating students (e.g., Pan, Zhang, & Sullivan, 2009).

USE OF MANOVA, ANOVA, AND MANCOVA

MANOVA was first conducted as an overall shell test to determine if there were any differences in these four vectors of means. To further tell which of the four dependent variables might be significant factors, a follow-up procedure of ANOVA was conducted. To control for other factors (such as course delivery mode and academic status) and to factor out of possible noise of error that might have been introduced by the covariant, MANCOVA design over the simple MANOVA was conducted to answer Research Question 3 to detect the effect of age.

TEST RESULTS FOR RESEARCH QUESTIONS 1-3

In replicating the earlier phase of the investigation using exclusively Hispanic students, a slightly larger sample, and a different statistical procedure, MANOVA results showed there was an overall, significant difference in the four dependent variables based on a student's age group, with Wilks's $\Lambda = .86$, $F(4, 135) = 5.44$, $p < .0005$, $\eta^2 = .14$. The ANOVA was tested at the .0125 level of significance, and of all, the scores on ATT and IS were found significant, $F(1, 138) = 13.38$, $p < .0005$, $\eta^2 = .09$ and $F(1, 138) = 12.05$, $p = .001$, $\eta^2 = .08$.

To answer Research Question 1, "Is there any significant difference among three course delivery modes in the four factors?" MANOVA was used. There was a statistically significant difference in the four factors as a whole based on a student's preferred course delivery mode, $F(8, 264) = 3.49$, $p = .001$, Wilks's $\Lambda = .82$, $\eta^2 = .1$. With ANOVA as a

follow-up procedure and tested at the .0167 level of significance, of all, the scores on TA and IS were found significant, $F(2, 135) = 5.34$, $p = .006$, $\eta^2 = .07$ and $F(2, 135) = 7.69$, $p = .001$, $\eta^2 = .1$. Post hoc comparisons using Tukey's HSD showed mean scores for TA were significantly different between Fully Web-based group ($M = 111.29$, $SD = 10.93$) and Face-to-face group ($M = 102.46$, $SD = 13.45$) , $p = .008$ and means scores for IS were significantly different between Fully Web-based group ($M = 30.43$, $SD = 5.49$) and Face-to-face group ($M = 26.08$, $SD = 6.33$), $p = .001$ and between Fully Web-based group ($M = 30.43$, $SD = 5.49$) and Hybrid group ($M = 27.20$, SD = 4.77), $p = .011$.

To answer Research Question 2, "Is there any significant difference between academic status groups (graduate vs. undergraduate) in the four factors?" MANOVA was used, Wilks's $\Lambda = .85$, $F(4, 135) = 5.86$, $p < .0005$, $\eta^2 = .15$. With ANOVA as a follow-up procedure and tested at the .0125 level of significance, of all, the scores on TA, ATT, and IS were found significant, $F(1, 138) = 8.31$, $p = .005$, $\eta^2 = .06$, $F(1, 138) = 8.28$, $p = .005$, $\eta^2 = .06$, and $F(1, 138) = 14.09$, $p < .0005$, $\eta^2 = .09$. The results were in favor of graduate group.

To answer Research Question 3, "Does the effect of age on the four factors remain significant when controlling for course delivery mode and academic status?" The MANCOVA result indicated that the effects of age on the four factors remain significant when controlling for course delivery mode and academic status, Wilks's $\Lambda = .93$, $F(4, 133) = 2.56$, $p = .042$, $\eta^2 = .07$. The ANOVA was tested at the .0125 level of significance, and of all, the scores on ATT were found significant, $F(1, 136) = 7.07$, $p = .009$, $\eta^2 = .05$. Post hoc comparisons using Tukey's HSD showed mean scores for ATT were significantly different between non-Net Gen group ($M = 92.12$, $SD = 8.31$) and Net Gen group ($M = 85.96$, $SD = 11.17$) , $p = .009$. See Conclusions for interpretations of the results reported above.

CONCLUSIONS

The primary purpose of this phase of quantitative investigation with a larger sample (N=140) was to study the effect of age on four dependent variables: Technology Ability, Learning Preference, Attitude, and Instructional Strategy, measured on four distinct instruments, using Mexican American students at an Hispanic-serving institution in the south of U.S.A. The exploratory, survey study was centered on one primary question, "Is there any significant difference between age groups in the four factors?"

The MANOVA results indicated that age has a significant effect on these students' attitude toward technology use and their preference of strategies commonly used in the instructional setting. Both outcomes were in favor of non-Net Gen group, which is congruent with the earlier findings (see Pan, Zhang, & Sullivan, 2009). The finding suggested that non-Net Gen group has a more favorable attitude toward technologies such as Blackboard, email, and electronic devices (in general) than the Net Gen group. It also suggested that the non-Net Gen group prefers an instructional strategy that is more non-linear, discovery-type, and in line with the learner-centered approach, than the Net Gen group. These outcomes are not consistent with what Prensky (2005) described about the Net Gen group. One of the possible explanations is the non-Net Gen group is more technology-savvy than their counterpart in order to take online courses. Another possibility is the non-Net Gen group learners are mostly adults who tend to be more mature and know more of what they want in school (and with the instructor, too) and thus enjoy school more. There appeared to be some likelihood that participants' preference in course delivery mode (i.e., fully Web-based, hybrid, and face-to-face) and their academic status (i.e., graduate and undergraduate) have interacted with the age factor in affecting the four studied factors. Further analysis in this regard was deemed necessary.

Following the initial inquiry of whether the four dependent variables each varies by age level, three specific research questions were introduced. These questions were concerned with the respective effect of delivery mode (in Question 1) and academic status (in Question 2), and the influence of age on the four factors while controlling for both delivery mode and academic status (in Question 3).

The attempt to determine whether course delivery mode (i.e. fully Web-based, hybrid, and face-to-face) has an effect on the four dependent variables was made using MANOVA. Post-hoc analyses to the ANOVA test for the Technology Ability scores showed that Fully Web-based group significantly scored higher than the Face-to-face group. This may have also been the fact that those who prefer to take online courses carry a higher self-efficacy for use of technology such as Google Docs and Microsoft Office in comparison with students preferring face-to-face classes. The analyses also revealed that Fully Web-based group performed significantly better than two other groups on Instructional Strategy. This result could be attributed to the fact that students taking Web-based courses are self-selected and self-directed in learning, compared to their counterpart students taking hybrid or face-to-face courses who prefer a more linear, less active learning style and view the instructor as the sole source of knowledge.

Another MANOVA result indicated that academic status (i.e., graduate and undergraduate) has a significant effect on Technology Ability, Attitude (toward technology use), and Instructional Strategy, suggesting graduate students are more confident in technology use pertaining to online learning, more positive toward technology use, and more in favor of the learner-centered approach when compared with undergraduate students. This observation could have been the fact that the majority of the surveyed students in Fully Web-based group are graduate students that are more mature than their counterpart Face-to-face group. With more experiences in higher education, the graduate students may have expressed their learner-centered learning orientation more. These e-learning (graduate) students may have subscribed to a set of learning strategies that are oriented toward notions such as teacher as coach and lifelong learning. To succeed in e-learning, graduate students may have cultivated a technology attitude that is more pleasant by comparison with surveyed undergraduate students and also built a level of confidence in using learning technologies that is more significant than undergraduate students'.

Could the two factors, course delivery mode and academic status, interact with age in the studied context? Due to this legitimate concern and to reduce the error terms, the authors examined Question 3.

While controlling for course delivery mode and academic status, age alone did not seem to exert a substantial influence on all of the four dependent variables. That is, statistically speaking, the Net Gen and non-Net Gen groups do not differ significantly from each other in Technology Ability, Learning Preference, or Instructional Strategy even though the non-Net Gen group seemed to outperform the Net Gen group across the four variables. This could have been the fact that generally speaking, those who participated in this survey study were either younger undergraduate students who were taking non-fully Web-based courses or relatively older graduate students who were taking fully Web-based courses. Besides, the non-Net Gen group could have demonstrated a perceived affinity for technology, a construct that helps to explain student success (see Pan, Sivo, & Goldsmith, in press). Regardless, the findings of this paper echoed previous studies by Billings, Skiba, and Connors (2005), Garcia and Qin (2007), Stapleton, Wen, Starrett, and Kilburn (2007). Although there may be nuances between the two age groups, the differences are too subtle to warrant any redesign of the e-learning courses solely based on the findings of this paper.

Having said all that above, the findings of this quantitative investigation are by no means expected to apply to the entire Hispanic college student body around the country. This was due to its relatively small sample size, the volunteered convenience sampling,

and the accessible population, Mexican American students. It is recommended that the sample be enlarged using stratified random sampling for further analysis.

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APPENDEX

A: *DEMOGRAPHICS INSTRUMENT*

Please enter a most proper answer to each question unless you are asked otherwise.
*d1: 1. Sex
Please choose *only one* of the following:
-Female
-Male
* d2: 2. Birth Year
Please write your answer here:
* d3: 3. Racial/ethnic Groups
Please choose *only one* of the following:
-Non-Hispanic African American
-Alaskan Native
-American Indian (Native American)

-Asian American
-Non-Hispanic Caucasian
-Hispanic
-Pacific Islander
-Other
* d4: 4.Academic Status
Please choose *only one* of the following:
-Freshmen
-Sophomore
-Junior
-Senior
-Graduate
-Other
* d5: 5. What online communication applications do you use?
Please choose *all* that apply:
-Facebook
-MySpace
-Blog
-Second Life
-Other
* d6: 6. What is your major?
Please write your answer here:
d7: 7.Marital Status:
Please choose *only one* of the following:
-Single
-Married
-Divorced
-Widowed
-Other
* d8: 8. How many courses have you taken so far that use Blackboard (excluding the courses that
you are currently taking)?
Please write your answer here:
* d9: 9. Given the same class, which class delivery mode do you prefer?
Please choose *only one* of the following:
-Face-to-Face (f2f)
-Fully Web-based
-Hybrid (f2f + Blackboard)
-Others

B: TECHNOLOGY ABILITY INSTRUMENT

* f1: 1. I can use Google Docs Document (word processing).
* f2: 2. I can use Google Docs Spreadsheet.
* f3: 3. I can use Google Docs Presentation.
* f4: 4. I can use Microsoft Office Word.
* f5: 5. I can use Microsoft Excel.
* f6: 6. I can use Microsoft PowerPoint.
* f7: 7. I can set up a Local Area Network (LAN).
* f8: 8. I can download photos from a digital camera.
* f9: 9. I can use a webcam.
* f10: 10. I can set up a scanner to a computer.

* f11: 11. I can set up a printer to a computer.
* f12: 12. I can search the World Wide Web for an article for a class.
* f13: 13. I can search the World Wide Web for an ebook for a class.
* f14: 14. I can search the World Wide Web for any other information for a class.
* f15: 15. I can search the UTB/TSC online library databases for an article for a class.
* f16: 16. I can search the UTB/TSC online library catalogue for a book for a class.
* f17: 17. I can search the UTB/TSC online library for any other material for a class.
* f18: 18. I can check an email message sent to me by another person.
* f19: 19. I can send an email message to another person.
* f20: 20. I can send an attachment file via email.
* f21: 21. I can save a file to a pen drive.
* f22: 22. I can open a file from a pen drive.
* f23: 23. I can copy and paste information from one file to another.
* f24: 24. I can create a file folder.
* f25: 25. I can sort files according to common characteristics (such as name, type and date modified)

C: LEARNING PREFERENCE INSTRUMENT

* g1: 1. I like out-of-class group projects as a class activity.
* g2: 2. I like in-class group projects as a class activity.
* g3: 3. I like brainstorming as a class activity.
* g4: 4. I like group discussion as a class activity.
* g5: 5. I like class activities that involve problem solving.
* g6: 6. I like considering both sides of the story as a class activity.
* g7: 7. I like comparing and contrasting desired situations with actual ones as a class activity.
* g8: 8. I like looking at advantages and disadvantages of a given issue as a class activity.
* g9: 9. I like making interpretations based on research findings as a class activity.
* g10: 10. I like providing recommendations according to interpreted results as a class activity.
* g11: 11. I like textbook chapter reading as a class activity
* g12: 12. I like writing reflection as a class activity.
* g13: 13. I like reading print materials as a class activity.
* g14: 14. I like reading web materials as a class activity.
* g15: 15. I like web search as a class activity.
* g17: 17. I like instructional games as a class activity.
* g18: 18. I like writing papers as a class activity.
* g19: 19. I like multiple choice questions on an exam.
* g20: 20. I like true-false questions on an exam.
* g21: 21. I like fill-in-blank questions on an exam.
* g22: 22. I like short answer questions on an exam.
* g23: 23. I like essays on an exam.
* g24: 24. I like case studies on an exam.
* g25: 25. I like lab activities.
* g26: 26. I like field-based learning.
* g27: 27. I like service-based learning.

D: ATTITUDE INSTRUMENT

* h1: 1. All things considered, my use of Blackboard is:

Time Consuming <--> Time Efficient
* h2: 2. All things considered, my use of Blackboard is:
Foolish <--> Wise
* h4: 4. All things considered, my use of Blackboard is:
harmful <--> Beneficial
* h3: 3. All things considered, my use of Blackboard is:
Unfavorable <--> Favorable
* h5: 5. All things considered, my use of Blackboard is:
Negative <--> Positive
* h6: 6. All things considered, my experience of UTB courses is:
Time Consuming <--> Time Efficient
* h7: 7. All things considered, my experience of UTB courses is:
Foolish <--> Wise
* h8: 8. All things considered, my experience of UTB courses is:
Unfavorable <--> Favorable
* h9: 9. All things considered, my experience of UTB courses is:
harmful <--> Beneficial
* h10: 10. All things considered, my experience of UTB courses is:
Negative <--> Positive
* h11: 11. All things considered, my use of electronic devices in general is:
Time Consuming <--> Time Efficient
* h12: 12. All things considered, my use of electronic devices in general is:
Foolish <--> Wise
* h13: 13. All things considered, my use of electronic devices in general is:
Unfavorable <--> Favorable
* h14: 14. All things considered, my use of electronic devices in general is:
harmful <--> Beneficial
* h15: 15. All things considered, my use of electronic devices in general is:
Negative <--> Positive
* h16: 16. All things considered, my use of email is:
Time Consuming <--> Time Efficient
* h17: 17. All things considered, my use of email is:
Foolish <--> Wise
h18: 18. All things considered, my use of email is:
Unfavorable <--> Favorable
* h19: 19. All things considered, my use of email is:
harmful <--> Beneficial
* h20: 20. All things considered, my use of email is:
Negative <--> Positive

E: INSTRUCTIONAL STRATEGY INSTRUMENT

*i1: 1. All things considered, my preference of instructional strategies below is:
Linear (sequential) <--> Nonlinear (hypermedia) learning
* i2: 2. All things considered, my preference of instructional strategies below is:
Instruction (by teachers) <--> Construction / discovery (by yourself)
* i3: 3. All things considered, my preference of instructional strategies below is:
Teacher-centered <--> Learner-centered
* i4: 4. All things considered, my preference of instructional strategies below is:
Absorbing materials <--> Learning how to learn
* i5: 5. All things considered, my preference of instructional strategies below is:

School (as the primary source to knowledge) <--> Lifelong (sources other than schools)
* i6: 6. All things considered, my preference of instructional strategies below is: One size fits all <--> Customized instruction
* i7: 7. All things considered, my preference of instructional strategies below is: School as torture <--> School as fun
* i8: 8. All things considered, my preference of instructional strategies below is: Teacher as knowledge transmitter <--> Teacher as learning facilitator