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The Role of Technology Identity among Students in Rural Areas using a Web-based Tutoring System

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Abstract: This paper looked at the relationship between the student's technology identity and how it affects their performance in a web-based tutoring system over a 12-week period. Technology identity covers one's beliefs on four areas: opportunities and constraints to use technology (access), technology skills (abilities), role of technology on one's life (importance), and one's own motivation to learn more about technology (opportunities). Results showed that access factors such as frequency of access, owning a computer at home, and owning a personal computer/laptop do have an impact on their ability to use computer applications. A significant difference was found in the number of problems completed (higher) among students who were able to frequently access and use a computer and the Internet for free in school. This could be an indication of the importance of the role of educational institutions to provide computer and Internet access to students who can't afford to have their own at home or rent. Also, 99% of the students, including those who did not solve as many problems, viewed technology as an essential part in education, business, personal development, and their future profession. All (100%) the participants expressed willingness to learn more about technology. However, when it comes to the fourth are (opportunities), almost half (47%) believe that they don't have sufficient opportunities and access to technology to be used in education.

Keywords: Technology Identity, ASSISTments

1. Introduction

The use of Information and Communications Technology (ICT) in education has become an important pedagogical technique in the 21st century (Sarkar, 2012) where students have become more engaged in the meaningful use of computers (Sanchez & Aleman, 2011). It paved way on the enhancement of the quality of education with advanced pedagogical methods, improvement of learning outcomes and reformation for better management of education systems (Sarkar, 2012). Because of these, the adoption of different learning environments has become global and ICT access of developing countries has increased (Nye, 2015). As stressed in Kam et al. (Kam, Mathur, Kumar, & Canny, 2009), educational software can make a positive impact on the learning needs of underserved communities. However, much of the existing educational software are developed in the West (Blanchard, 2012; Ogan et al., 2012) and software, technology tools and other applications that are accustomed in developed countries may cause some challenges in the developing world, so it is not safe to assume that one size can fit all or that a single technology design may be effective for all context and setting (Keengwe & Bhargava, 2014). Since further research is needed in identifying the impact of the technology background of learners in the adoption of educational software (Khan, Hossain, Hasan, & Clement, 2012; Nye, 2015; Rodrigo, Sugay, Agapito, & Reyes, 2014), this study investigates the learning experience of students from rural areas in a developing country. Specifically, this study aims to answer the question: what is the relationship between a student's technology identity and experience in a tutoring system?

2. Technology Identity

Based on the theoretical construction of student's identity of Martin (Martin, 2000), Goode (Goode, 2010) described a student's technology identity as shaped by their beliefs about one's ability to use technology, the essence of typical computer uses in the context of opportunities, the level of importance attributed to technology and motivation to learn more about computing. Moreover, she argued that exploring the spectrum of beliefs within each of these four categories provides a more nuanced description of individual's identities around technology. Although in today's trend, having technology knowledge is implicitly required for college success and career pathways (Goode, 2010), it is not safe to assume that all students were given equal opportunities to develop their computer skills. In the study of Hargittai (Hargittai, 2010), it was shown that socioeconomic status is an important predictor of how people are incorporating the use of technology in their lives with those from more privileged backgrounds using it in more informed ways for a larger number of activities. For many college students, not having a strong technology identity is a product of an unequal high school education and disparities in home resources, yet the consequences of one's technology identity has a powerful influence on the attitudes and decisions students make regarding their academic and life plans. Examining the technology identity of individuals informs our consideration of how beliefs about oneself and technology are developed, shape daily social interactions and influence future life plans(Goode, 2010).

3. Experiment

Eighty-eight (88) freshmen students from a state university in southern Philippines were asked to use ASSISTments and complete 12 problem sets in 12 weeks. The 12 problem sets were selected based on the lessons designed for College Algebra in the Philippines. The students were divided into 2 groups: Sequential Group (SG) which were assigned 12 problem sets in sequential order (weekly released) based on how they are delivered in the classroom and the Non-Sequential Group (NSG) where all the 12 problem sets were made available to them where they can decide the order of solving the problems. The students were asked to answer a pre-test prior to using ASSISTments and a post-test after the 12-week period. ASSISTments provided a proficiency report for each student.

The participants were asked to answer a questionnaire before they used ASSISTments. This self-assessment method was based on the conceptual framework discussed in Goode (Goode, 2010). The questionnaire was divided into 4 areas: fluency, experience, importance of technology, and feelings toward technology. These areas are based on the theoretical construction of student's identity (Martin, 2000). Fluency is based on their beliefs about one's ability to use technology; experience as the typical computer use in the context of opportunities; importance based on how they see the use of computers to improve lives; and whether they are interested or motivated to learn more about technology (Goode, 2010). A Likert scale was used for the responses in each area and the participants were then classified based on their responses. The results were taken into consideration in examining the relationship of one's technology identity and performance in ASSISTments.

4. Findings

First, access to technology and how it affects the students' computer literacy in terms of using basic applications (e.g. word processor, spreadsheet) and troubleshooting skills was investigated. Factors such as length of experience in using a computer, frequency of access, owning a computer at home, and owning a personal computer/laptop do have an impact on their ability to use computer applications and computer troubleshooting skills. Next, the place of student's computer access and number of problems completed was looked into. Sixty of the 87 participants (70%) have no computers at home (family owned) and 50 (57%) have no personal computer or laptop. However, ownership of a computer system has no significant relationship in terms of the number of problems completed in ASSISTments (M=23, SD=20). To further understand this, a comparison was made in terms of where they actually frequently access or use the computer and the Internet, whether at home, in school, or in computer shops. The p-value corresponding to the F-statistic of one-way ANOVA is lower than 0.01 which strongly suggests that one or more pairs of treatments are significantly different. To pinpoint which of them exhibits statistically significant difference, Tukey's HSD test was applied to each of the 3 pairs. There is a significant difference in the number of problems completed among the students who answered "School"

as the place where they frequently use the computer and the Internet. This could imply the importance of the role of the educational institution to provide computer and Internet access to students so that regardless if they have their own computer or not, they can still take advantage of computer-based learning environments.

The second area on the TID framework is the beliefs about one's technology skills. The relationship of the students' computer literacy and length of experience with computers and the number of problems solved in ASSISTments were analyzed and found no significant relationship for both, r=0.01, p=0.92 and r=0.06, p=0.60, respectively. This indicates that the students' background in using the computer did not hinder them in using ASSISTments.

In the third area, 56 students (64%) believed that technology is "5 – very important", 30 students (35%) gave a rating of "4 – important". No significant relationship was found between these ratings and the number of problems solved in ASSISTments. A combined 99% of "very important" and "important" means that even those who did not solve as many problems in ASSISTments still believe that technology plays an important role in education, business, personal development, and their future profession.

The last area is the belief about one's own motivation to learn more about technology. All of the participants (100%) expressed willingness to learn more about technology and its many uses but almost half (47%) of the students believe that they don't have sufficient access to technology to be used in education. This belief, though, has no relationship with their performance in ASSISTments (rpb=0.15, p=0.16).

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References

Blanchard, E. G. (2012). On the weird nature of ITS/AIED conferences. *International Conference on Intelligent Tutoring Systems*, 280–285. Springer Berlin Heidelberg.

Goode, J. (2010). The digital identity divide: how technology knowledge impacts college students. *New Media & Society*, *12*(3), 497–513.

Hargittai, E. (2010). Digital Na(t)ives? Variation in Internet Skills and Uses among Members of the "'Net Generation.'" *Sociological Inquiry*, *80*(1), 92–113.

Kam, M., Mathur, A., Kumar, A., & Canny, J. (2009). Designing digital games for rural children: a study of traditional village games in India. *SIGCHI Conference on Human Factors in Computing Systems*, 31–40. ACM.

Keengwe, J., & Bhargava, M. (2014). Mobile learning and integration of mobile technologies in education. *Education and Information Technologies*, *19*(4), 737–746.

Khan, M., Hossain, S., Hasan, M., & Clement, C. K. (2012). Barriers to the Introduction of ICT into Education in Developing Countries: The Example of Bangladesh. *International Journal of Instruction*, *5*(2), 61–80.

Martin, D. (2000). *Mathematics success and failure among African-American youth: The roles of sociohistorical context, community forces, school influence, and individual agency*. Routledge.

Nye, B. D. (2015). Intelligent tutoring systems by and for the developing world: a review of trends and approaches for educational technology in a global context. *International Journal of Artificial Intelligence in Education*, *25*(2), 177–203.

Ogan, A., Walker, E., Baker, R. S., Rebolledo Mendez, G., Jimenez Castro, M., Laurentino, T., & De Carvalho, A. (2012). Collaboration in cognitive tutor use in Latin America: Field study and design recommendations. *SIGCHI Conference on Human Factors in Computing Systems*, 1381–1390. ACM.

Rodrigo, M. M., Sugay, J. O., Agapito, J., & Reyes, S. J. (2014). Challenges to transferring western field research materials and methods to a developing world context. *Research and Practice in Technology Enhanced Learning*, *9*(1), 71–82.

Sanchez, J. J. C., & Aleman, E. C. (2011). Teachers' opinion survey on the use of ICT tools to support attendance-based teaching. *Computers & Education*, *56*(3), 911–915.

Sarkar, S. (2012). The role of information and communication technology (ICT) in higher education for the 21st century. *Science*, *1*(1), 30–41.