RELATIONSHIP OF MOBILE LEARNING READINESS TO TEACHER PROFICIENCY IN CLASSROOM TECHNOLOGY INTEGRATION

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ABSTRACT

Mobile learning readiness as a new aspect of technology integration for classroom teachers is confirmed through the findings of this study to be significantly aligned with well-established measures based on older information technologies. The Mobile Learning Readiness Survey (MLRS) generally exhibits the desirable properties of step-wise increases in readiness as teacher competence grows. The MLRS and other measures are presented as a basis for beginning the development of a classification framework to assist in targeting types of professional development to ensure effective integration of mobile learning into classroom environments.

KEYWORDS

Mobile learning readiness, professional development, technology integration

1. INTRODUCTION

Mobile learning in the classroom has become increasingly common throughout the world. The ways in which mobile learning devices are implemented vary greatly, from school provided devices for each student to "bring your own device" programs. Determining the best strategies for successfully implementing mobile devices in order to improve learning is an important topic needing systematic research. How best to empower teachers to guide student learning with mobile devices is an urgent problem to be addressed.

A paradigm shift is required for teachers to effectively integrate mobile devices in classroom learning. Simply owning mobile technologies does not guarantee effective use in education by students and teachers. Teachers must have supportive training on the pedagogy of integrating these devices as well as useful strategies for classroom management that will enable the teachers to feel confident in their classroom instructional environment. "Current pedagogical approaches are not appropriate for mobile learning and for the new generation of learners. There must be an instructional paradigm shift that promises to fundamentally change the way students learn" (UNESCO, 2012). Successful teacher implementation of emerging technologies in education requires well-planned, on-going professional development and support (Muir, Knezek, and Christensen, 2004) guided by data-driven decisions.

Researchers have demonstrated that teacher quality is dependent on effective and ongoing professional development (PD) opportunities (Desimone, 2009). The learning environment, especially regarding technology, has changed in the last decade and teachers who have been in the classroom for many years may not have the PD support needed to transform their practices to meet the needs of the newer learning environments (Johnson, 2013). While online PD programs have an important role in the professional development of teachers (Dede, et al 2009; Surrette and Johnson, 2015), determining which teachers may or may not be successful in that type of learning environment is important for effective PD leading to successful implementation of a classroom-based mobile learning environment.

This paper examines emerging mobile learning constructs and their relationships to teachers' abilities to integrate technology into the classroom. The relationship of four dimensions of mobile learning readiness and preference for face-to-face, blended, or online professional development are also explored, along with associations with years of classroom teaching. Aggregate findings are suggested as useful toward the development of a framework that will aide the identification and measurement of attributes important for guiding educators in extending traditional technology integration skills into the realm of mobile learning.

2. THE STUDY

2.1 Methods

2.1.1 Participants

Educators from grades K-12 in a large school district in the southwestern US were invited to submit data related to mobile learning readiness in the fall of 2015. Of the 1,430 respondents, slightly fewer than half (n = 640, 44.8%) reported teaching at the elementary level with the remainder representing middle school (n = 370, 25.9%), high school (n = 404, 28.3%), or undesignated (n = 16, 1.1%). Almost two-thirds of the respondents (61.5%) had been teaching seven or more years.

2.1.2 Instrumentation

Participants were administered a battery of instruments including the Mobile Learning Readiness Survey (Christensen and Knezek, under review) designed to measure whether teachers feel prepared to introduce and teach with mobile devices in their classrooms. Twenty-eight (28) Likert-type items representing four factors were responded to by participants on a scale of 1 = Strongly Disagree to 5 = Strongly Agree. The reliabilities for four scales produced from this instrument, for this set of data are listed in Table 1.

Table 1. Internal Consistency Reliabilities for Four Scales of the MLRS

	Cronbach's Alpha	No. of Items
Factor 1 (Possibilities)	.92	8
Factor 2 (Benefits)	.91	10
Factor 3 (Preferences)	.79	5
Factor 4 (External Influences)	.61	4

Stages of Adoption of Technology (Christensen, 1997) is an instrument also administered to the teachers. Stages is a self-assessment of a teacher's level of adoption of technology, There are six possible stages in which educators rate themselves: Stage 1 - Awareness, Stage 2 - Learning the process, Stage 3 - Understanding and application of the process, Stage 4 - Familiarity and confidence, Stage 5 - Adaptation to other contexts, and Stage 6 - Creative application to new contexts.

2.2 Results

2.2.1 Teachers' Levels of Technology Integration

As shown in Table 2, the greatest number of educators (n = 454, 31.7%) reported being in Stage 4 followed by a large number in Stage 5 (n = 397, 22.4%). The mean Stage for this group of respondents was 4.51 (SD = 1.10) out of maximum of 6. There were very few in Stage 1. The group mean values for Stages by elementary, middle school and high school levels were: elementary teachers = 4.45 (SD = 1.06), middle school teachers = 4.41 (SD = 1.12), and high school teachers = 4.68 (SD = 1.13). These group mean values were significantly different (p = .001) with high school teachers being significantly higher than elementary and middle school teachers in post hoc analyses (p < .05).

Table 2. Frequencies of Stage of Adoption for 1,430 Participants

Stage	Frequency	Percent
Stage 1 - Awareness	6	.4
Stage 2 - Learning the process	40	2.8
Stage 3 - Understanding and application of the process	213	14.9
Stage 4 - Familiarity and confidence	454	31.7
Stage 5 - Adaptation to other contexts	397	27.8
Stage 6 - Creative application to new contexts	320	22.4
Total	1430	100.0

2.2.2 Association of Mobile Learning Readiness and Levels of Technology Integration

An analysis of variance contrasting Mobile Learning Readiness by Stages of Adoption of Technology determined that all four factors were significantly different ($p < .0005$) based on the Stage of Adoption of Technology reported by the teacher. The Pearson Product Moment Correlations of Stages with each of the mobile learning readiness factors were F1: *Possibilities* = .28 ($p < .01$), F2: *Benefits* = .16 ($p < .01$), F3: *Preferences* = .21 ($p < .01$), and F4: *External Influences* = .13 ($p < .01$). The development of higher MLRS attributes was found to have a linear relationship with Stages of Adoption for all four factors, as shown in Figure 1. Factors 1-3 had relationships in the range of small to moderate according to guidelines by Cohen (1988) while Factor 4's relationship is significant although the strength of the relationship was small (Cohen, 1988).

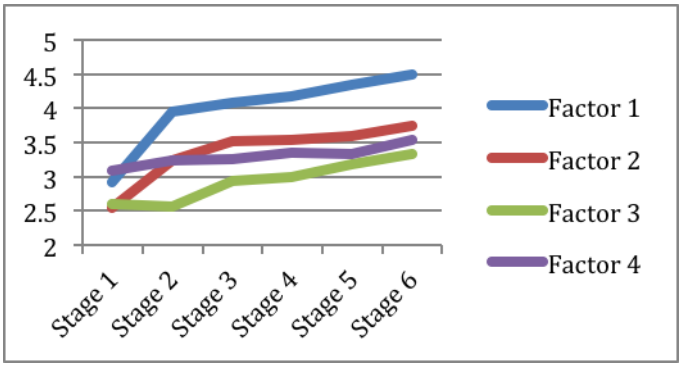

Figure 1. Teachers' Mobile Learning Readiness by Stages of Adoption of Technology

2.2.3 Association of Mobile Learning Readiness and Preference for Style of Professional Development

Participants were asked to select their preference for professional development related to technology integration. Their selection options were face-to-face, blended and online learning. The majority of respondents (53%, n = 755) preferred a blended style of professional development with the next largest percentage being face-to-face (28%, n = 395) and only 20% (n = 279) preferring online.

Analysis of variance was computed for the four factors of the MLRS by preferred professional development format. There were significant ($p < .01$) differences based on style of preferred learning for each of the four factors. A series of three regression analyses using dummy-coded variables for face-to-face, blended, and online professional development preference confirmed not all constructs contributed equally to preference for a specific form of professional development (PD). For face-to-face preference, Factor 1, *Possibilities*, (p = .021, Beta = -.082) and Factor 3, *Preference*, ($p < .0005$, Beta = -.186) contributed significantly while for Blended PD preference, only Factor 3, *Preference*, contributed significantly ($p < .05$, Beta = .080). For Online, Factor 3, *Preference*, ($p = .002$, beta = .111) contributed significantly. Note that for the group who preferred face-to-face PD, their areas of significant association with mobile learning readiness were negative. The trend across these findings is that F3: *Preference* is an important discriminator (positive or negative) for each of the types.

2.2.4 Association of Mobile Learning Readiness and Years of Teaching

A regression analysis was used to determine the strength of association of the MLRS factors with years of teaching. The overall association was significant ($p = .030$) and F2, *Benefits*, was an individually significant contributor ($p = .007$) with an inverse relationship (Beta = -.115). Apparently the greater the number of years in teaching, the lower the perceived benefits of mobile learning in the classroom. This point was reconfirmed with the calculation a Pearson r for the two of r = -.079 ($p = .003$), and could possibly be an indicator of age due to the relationship between age and years of teaching (Christensen, Knezek and Tyler-Wood, 2016).

3. CONCLUSION

Mobile learning readiness as a new aspect of technology integration is confirmed through the findings of this study to be significantly aligned with well-established measures based on older information technologies and generally exhibits the desirable properties of step-wise increases in readiness as teacher competence grows. Different demographics and professional development preferences align more closely with subsets of the four constructs measured by the MLRS; in particular, F3: *Preference* is an important discriminator (positive or negative) for teachers who prefer face-to-face, blended, or online professional development, and F1: *Possibilities* has the highest Pearson Product Moment Correlation ($r = .28$ ($p < .01$), with Stages of Adoption of Technology, the general measure of level of technology integration used in this study. These and other relationships would occur so rarely by chance that we conclude they are real although the magnitude of the associations are typically in the range that would be considered a small to moderate effects according to the guidelines provided by Cohen (1988).

These findings are noteworthy because teachers will be charged with creating a learning environment to accommodate multiple types of mobile devices that will be constantly changing. These changes in the way instruction occurs require a great deal of professional learning by the educators. Preference in the way teachers acquire professional development for the integration of mobile learning in the classroom is an important factor in the success of the effectiveness of classroom learning with mobile devices. Because many school administrators are beginning to offer more online professional development for their educators, it is useful to know which teachers may not be open to learning in that type of online environment. When planning PD, a needs assessment should include indicators such as the ones presented in this paper as a guide to delivering the most effective PD. Future research in this area might include the comparison of gender and preferences for online PD as well as the grade level in which educators are teaching.

This study is considered just the first step toward the construction of an explanatory framework that will eventually incorporate the rapidly expanding field of mobile learning into traditional technology integration schema. One step is to be able to measure different aspects of the domain and show that those aspects relate in expected ways to established measures. This paper reports on positive initial indications toward that broader goal.

REFERENCES

Christensen, R., 1997. *Effect of technology integration education on the attitudes of teachers and their students*. Doctoral dissertation, University of North Texas.

Christensen, R. and Knezek, G, under review. Validating the Mobile Learning Readiness Survey.

Christensen, R., Knezek, G., and Tyler-Wood, T., 2016. Age differences in teacher confidence in integrating technology in STEM classrooms. In *Proceedings of the Hawaii International Conference on Education*, Honolulu, HI.

Cohen, J., 1988. *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.

Dede, C. et al, 2009. A recent agenda for online teacher professional development. *Journal of Teacher Education*, Vol. 60, pp 8-10.

Desimone, L., 2009. Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, Vol. 38, No. 3, pp 181-199.

Johnson, C.C., 2013. Educational turbulence: The influence of macro and micro policy on science education reform. *Journal of Science Teacher Education*, Vol. 24, No. 4, pp 693-715.

Muir, M., Knezek, G., and Christensen, R., 2004. The power of one to one: Early findings from the Maine Learning Technology Initiative. *Learning and Leading with Technology*, Vol. 32, No. 3, pp.6-11.

Surrett, T.N., and Johnson, C.C., 2015. Assessing the ability of an online environment to facilitate the critical features of teacher professional development. School Science and Mathematics, 115(6), 260-270.

UNESCO, 2012. *Working paper series on mobile learning: Turning on mobile learning in North America*. UNESCO, Paris: 2012.