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Theoretical Perspective

Critique the author's conceptual framework.

Lai, Yang, Chen, Ho, & Chan expanded upon Dewey (1938) by exploring how experiential learning interacted with mobile technologies (personal digital assistants-PDAs). The authors also drew their conceptual framework partly from Kolb's experiential learning theory (ELT) (1984) and an understanding of mobile technology's affordances in learning environments. They referenced mobiled learning as expedient, immediate, authentic, accessible, efficient and convenient (Curtis et al. 2002; Kynäslahti 2003; Ogata & Yano 2004). The authors adequately introduced a conceptual understanding of mobile technology's role in previous research as well as its affordances (Gibson, 1977). However, the study did not include a comprehensive explanation of experiential learning; while it was mentioned that numerous experiential theories have been proposed (pg. 327, par. 3), the authors did not provide any sort of reasoning for dismissing their influence in constructing the research design.

Comment on the need for this study and its importance.

The authors claim they wanted to address two weaknesses of experiential learning noted by critics: its incapacity to focus awareness and the inability of students to abstract from experience. They sought to prove that mobile technology affordances, integrated within an experiential learning flow, might foster knowledge creation. While the authors stated these needs, they did not provide evidence that these issues were pressing. Further, while they argued that mobile technology had potential to be "authentic" and "accessible" they did not convincingly convey the essential importance of this project.

How effectively does the author tie the study to relevant theory and prior research?

The authors referenced Kolb's ELT, which articulated four learning stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation (1984) and they discussed PDAs as exploratory tools for guided learning (Liang, *et al*. 2005). While there was no shortage of scholarly references for experiential learning and mobile technology, the relativity of some works that the authors referenced strayed from the study's objectives: to explore how PDAs can be incorporated into learning flow and to what extent experiential learning could be facilitated (pg. 327). They cited several projects where mobile technology had been applied to learning (G1:1 project; M-learning project), but gave no further explanation of the relatedness of these projects to their study design.

Evaluate the clarity and appropriateness of the research questions or hypotheses.

The authors presented an overt hypothesis: "that mobile technologies can increase the level of knowledge creation through experiential learning beyond that which is achieved with traditional methods." Yet the authors never explicitly articulated a clear research question. Throughout the conceptual framework, the authors referenced multiple goals that lacked coherence with the hypothesis, ranging from developing a mobile system to supporting experiential learning to evaluate knowledge creation, yet they never revisited what they aimed to answer. Because of this mishmash, the hypothesis stated in the methods section is not appropriate, as the rationale for evaluating 'knowledge creation' is not supported through the theoretical framework. The authors should have crafted a question that directly responded to criticisms of ELT, or better connected mobile learning research to their hypothesis.

Research Design

Critique the appropriateness and adequacy of the study's design in relation to the research questions or hypotheses.

It was stated that this was an experimental study (experimental condition: with PDA; control condition: without PDA). Information plaques measured levels of knowledge creation that students wrote at the end of the learning flow. The authors employed a pre/post-test to gauge students' knowledge acquisition and administered a questionnaire to gather information on learners' attitudes towards the PDA's functions.

Experimental design is not appropriate for this study because of the nature of the hypothesis, whose components were not attributable to causal relationships. This study more closely reflects a quasi-experimental design; the means of the two groups were analyzed, and condition assignment was not random. The questionnaire (attitude) and pre/post-test scores (knowledge acquisition) assessed measures not clearly connected to the hypothesis. While the use of information plaques was an appropriate measure of knowledge creation, the authors should have controlled for the learners' prior knowledge to strengthen the validity of the results.

Critique the adequacy of the study's sampling methods (e.g., choice of participants) and their implications for generalizability.

The authors claimed this was an experimental study and thus suggest a random sample. They provided for internal validity by using classes taught by the same instructor in the same school. However, we are given no additional information about the sample, such as why a group of 5th graders were the best case group, or why *this* specific group. It seemed that this was a purposive or voluntary sample, meaning that the study was quasi-experimental and less generalizable, compromising external validity. There could also be selection bias – were these

two groups really equitable in order to make a fair comparison? Without more detail as to the background of these two classes, it is difficult to see this sampling as adequate.

Critique the adequacy of the study's procedures and materials (e.g., interventions, interview protocols, data collection procedures).

Several measures did not address the hypothesis and were seeded into a lengthy learning flow and additional training session. Questions about baseline conditions and contamination bias arose because the protocol's scheduling was unexplained. The experimental group was provided a prep session to learn PDA functions while control students received nothing comparable. That could have alerted the experimental group to engage the task differently, causing a novelty effect. Further, if the protocol was delivered over multiple days, it is plausible that students in the experimental class alerted peers to their PDA use, prompting disengagement in the control's learning flow. Finally, the audio-recorded question prompting, the other measure of knowledge creation, did not yield data because of technical complications.

Critique the appropriateness and quality (e.g., reliability, validity) of the measures used.

The authors had a clear method for assessing knowledge creation through an open response scored with agreed upon criteria. The pre/post-tests, which evaluated knowledge acquisition, and the questionnaire, which assessed attitudes, demonstrated internal validity. They also produced t-scores for both the open response and the pre/post-tests. As such, the quality of the measures is generally sound. Yet some of these measures seem inappropriate. Neither the pre/post-test nor the questionnaire directly addresses the research hypothesis. Also, one of their planned methods for evaluating knowledge creation, the question proposing process, had to be eliminated, demonstrating a quality control issue that limited a key measure of their hypothesis.

Critique the adequacy of the study's data analyses. For example: Have important statistical assumptions been met? Are the analyses appropriate for the study's design? Are the analyses appropriate for the data collected?

This study analyzed each dependent measure by running t-tests for each dependent measure. The authors reported a significant difference between the experimental and control groups regarding knowledge acquired and created. They also concluded that photo-taking and audio note-taking were advantageous in increasing learning efficiency. Running t-tests for differences was appropriate because of the experimental intent. Self-reporting, however, should have prompted caution in analyzing the questionnaire. Although the authors suggested that students found photo-taking educationally beneficial, they did not contemplate possible interacting factors on student reporting (novelty, prior experience using devices) when arriving at this conclusion. It was also stated that drawing sketches placed a larger cognitive load on students relative to those using cameras. The authors' work from this logic to conclude that

drawing is a less efficient method of retention (pg. 333). There is no theoretical support for this assumption discussed.

Interpretation and Results

Critique the author's discussion of the methodological and/or conceptual limitations of the results.

The authors suggested a potential motivation bias regarding student use of PDAs that may be better understood in a longitudinal study and they also discussed probable confusion about presenting a trick question on the questionnaire. Lastly, they mention there may have been an influence of unequal comparison regarding motivation and reflection between photo-taking and sketching as forms of note taking, and proposed using library photographs in the future.

All three limitations were legitimate methodological concerns. Suggestions for improvement for future research are adequately stated for issues of motivation interactions and unequal measures (photo-taking and sketching). The authors provide no suggestions to improve upon the limitation of the trick question, and this issue, while conceded, was inadequately discussed.

How consistent and comprehensive are the author's conclusions with the reported results?

The authors were somewhat consistent when discussing results, specifically when addressing concerns with student motivation (both novelty and enthusiasm loss in the experimental group) and the trap questions. Yet, they are not completely consistent, nor are they comprehensive. While their detailed observations of the major complications with PDA components, was warranted, they offered befuddling insights when explaining that students in the *control* maintained motivation better after sketching during the protocol's *sensory* (ELT) experience. Therefore, we feel they unsatisfactorily argued that the PDA was optimal for experiential learning. Further, they mentioned no possible confounding variables with the protocol design or administration. While they may have believed none existed, the omission of any discussion seems limiting.

How well did the author relate the results to the study's theoretical base?

The authors referenced the language of the affordances of mobile technology, by discussing the potential reflective influences PDAs may have had on the students during the learning flow. There is no reference or tie between the results and Kolb's ELT, the experiential learning theory they highlighted. The issue does not stem from an inappropriate connection between results and theoretical base, rather, there is a lack of discussion regarding the implications of the results regarding any theoretical framework.

In your view, what is the significance of the study, and what are its primary implications for theory, future research, and practice?

This article's significance comes from its field test of mobile technology affordances. As mobile technology becomes ubiquitous, understanding implementation nuances in a classroom context was particularly valuable. The complications within this study, such as the audio function failure, the trap questions and the variation of motivational responses, provide an opportunity for future researchers to build from this pilot. Finally, because we believe this research design was quasi-experimental and not operating with a randomized sample, the knowledge cannot yet be generalized, indicating the need for a follow-up study.

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