Epistemological beliefs and learners in a tablet classroom

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Abstract

Using studies reporting evidence that a learner's personal epistemological beliefs may influence their acceptance and success in learning, this small study compares learner satisfaction with their epistemological beliefs, gender and age to investigate their adaptation to the use of new mobile technologies for learning. Very early indications from an ongoing study of a mobile tablet classroom are that this learning environment has the potential to service all students regardless of their individual characteristics.

Keywords

mobile learning, epistemological beliefs, blended learning

Mobile learning: A new environment

Mobile and web technologies are transforming learning environments in all sectors of education, requiring learners to develop new literacies and learning approaches (Brown, 2002). Typically, web and other hypermedia resources are heavily utilised to "situate learning in more authentic contexts, emphasise the exchange of ideas between participants, and rely on the active engagement of the learner" (Hartley & Bendixen, 2001). In this changing learning environment, it is critical that we have a better understanding of how different learners are advantaged or disadvantaged in formal technology enhanced classrooms. If we don't we are in danger of leaving some learners behind and creating another digital divide between those who can and those who can't operate in these new environments (Hartley & Bendixen, 2001).

In this paper we explore the influence of learner characteristics, such as epistemological beliefs, gender, and age in two first year Information Technology wireless enabled tablet classrooms. Do these learner characteristics significantly influence perceptions of and success in the tablet classroom? Very early findings from an ongoing study are reported.

Epistemological beliefs

Epistemological beliefs are those concerning the nature of knowledge and knowing, including definitions of knowledge, how knowledge is constructed, and how knowledge is evaluated. These beliefs are linked to cognitive processes such as reading comprehension, learning in complex and ill-structured domains (Schommer, 1994), a wide variety of reasoning skills, including argumentation skills, moral reasoning and problem solving (Hofer, 2001) as well as learners' active participation and persistence in learning (Schommer, 1994). Not surprisingly, "[a] growing body of work provides evidence that personal epistemology is an important component of student learning" (Hofer, 2001, p. 377).

According to Schommer (1990) personal epistemology may be described as a system of five dimensions, conceptualised as beliefs about:

- the organisation of knowledge: from simple and compartmentalised to complex and highly integrated
- the certainty of knowledge: from certain and absolute to tentative and constantly evolving
- the source of knowledge: from handed down by omniscient authority to derived by reason
- the control of knowledge acquisition: from the ability to learn is innate and fixed at birth to ability to learn is acquired through experience
- the speed of knowledge acquisition: from learning is quick or not-at-all to learning is acquired gradually.

Learners with simple epistemological beliefs view knowledge as absolute, black or white, handed down by authority, acquired quickly or not at all and that the ability to learn is fixed at birth. With sophisticated epistemological beliefs learners "embrace knowledge as complex and tentative" and the "source of knowledge shifts from the simple transfer of knowledge from authority to processes of rational thinking" (Schommer, 1994, p. 295). Further these abilities can be learnt over time. Certain epistemological beliefs

may constrain the opportunities learners have in mobile and web based learning environments. The links to additional information available and the increased number of choices are often at the control of the learner and so their decisions and beliefs are likely to shape how the technology is utilised. Students with simple epistemological beliefs had difficulty with the nonlinear nature of an ill-defined system ((Hartley & Bendixen, 2001).

The tablet classroom

During the last eighteen months, a mobile classroom using tablet PCs has been used to teach a number of Information Technology units. With mobile technology as the enabler, the aim is to create a learning environment that recognises the importance of learning in and through social contexts, emphasises the active engagement of the learner, situates the learning in more authentic contexts, and promotes the exchange of ideas between participants. To work towards this goal, the teaching structure was reorganised and separate lectures, tutorials and practicals were replaced with an integrated three-hour workshop where the time is used flexibly to include some direct teaching (lecture style), hands on practice in collaborative groups, and problem solving discussions. In some cases these workshops are supplemented by a one-hour lecture that is used for organisational purposes. This approach has similarities to the studio teaching model reported by Wilson (1994).

To support the change in focus from predominantly lecturer-centred to a more inclusive learning environment the layout of the learning space was also changed from rows of desks all facing the front of the room to grouped tables. A blended learning approach is also used in these workshops with units relying heavily on content focused web sites developed to support the teaching of each unit. A more complete descriptions of the workshop, including student responses and outcomes, has been reported elsewhere (Tutty, White, & Pascoe, 2005).

Description of the study

This study investigated how a student's epistemological beliefs, gender and age influence perceptions of and success in the tablet classroom. Thirty-one students in two first year IT classes were surveyed during the last week of Semester 1, 2005.

In order to measure students' epistemological beliefs, the Schraw, Bendixen and Dunkle (2002) Epistemic Belief Inventory (EBI) was used. This scale is modelled after Schommer's (1990) instrument and measures the five dimensions of personal epistemology. The questionnaire has 28 statements that students are asked to respond to on a 5-point Likert scale from strongly agree to strongly disagree. The answers are then combined to give scores for the five dimensions:

- *Omniscient authority*, e.g. people shouldn't question authority.
- *Certain knowledge*, e.g. the moral rules I live by apply to everyone.
- *Quick learning*, e.g. working on a problem with no quick solution is a waster of time.
- *Simple knowledge*, e.g. instructors should focus on facts instead of theories.
- *Innate ability*, e.g. how well you do in school depends on how smart you are.

Satisfaction with the tablet classroom was measured with responses on the same 5-point Likert scale to: *I prefer the workshop mode integrating lecture, tutorials and practical activities to separate lectures, tutorials and practicals*, while success in the unit was measured by the marks achieved by students.

Results and discussion

Ten women and 21 men participated in the study. The average age of the women (34 years) was 10 years greater than the men (24 years), with an overall average age of 27 years. This demographic is consistent with recent University demographics over the last few years, where the average student age is around 30.

Age and gender

Table 1 shows that the level of satisfaction with the tablet classroom was generally high and is consistent with results reported in similar studio teaching classrooms (Carbone, Lynch, Barnden, & Gonsalvez, 2002; Wilson & Pipes, 1996). The level of satisfaction was unaffected by age (see Figure 1) but differs slightly between women and men (see Table 1). In this sample, men appear to feel more strongly — positively and negatively — about the tablet classroom than women but, overall, women probably slightly preferred the format.

Table 1: Satisfaction levels

Response	Men	Women	Total
5 strongly agree	10	2	12
4	2	6	8
3 neutral	4	1	5
2	2	1	3
1 strongly disagree	3	0	3

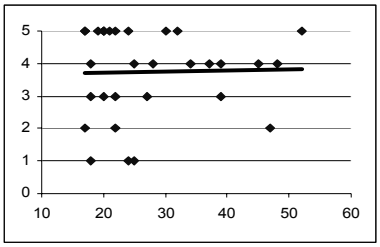

Figure1: Satisfaction against age

The age–satisfaction result was slightly surprising as it is often assumed that younger students are more comfortable and au fait with the digital environment than their older compatriots. Anecdotally, some of the older students were slower initially on the uptake in class, but we continue to be amazed at the uptake and acceptance of this technology by all students. The slightly stronger preference of women for the tablet classroom may be partly explained by the increased interaction that occurs in a tablet classroom. Alternatively, this student population contained four mature-age female teachers who, due to their professional context, might have been more comfortable and supportive of a collaborative classroom learning context.

Epistemological beliefs

The epistemological beliefs of the students sampled were not particularly sophisticated with the results on the dimensions of the EBI converging on the midpoint of the likert scale. The epistemological dimensions were then compared with perceptions of the tablet classroom. No relationships were found between the dimensions, simple knowledge, certain knowledge and quick learning and perceptions of the tablet classroom. With the other two dimensions, innate ability and omniscient authority, a weak correlation was found. Students with simpler beliefs in these dimensions tended towards more positive perceptions of the tablet classroom, as shown in Figures 2 and 3.

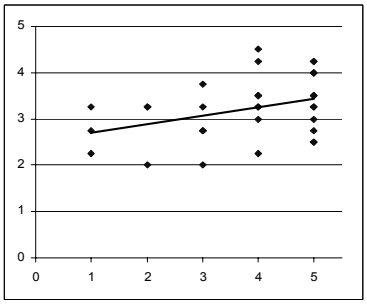

Figure 2: Omniscient authority vs satisfaction

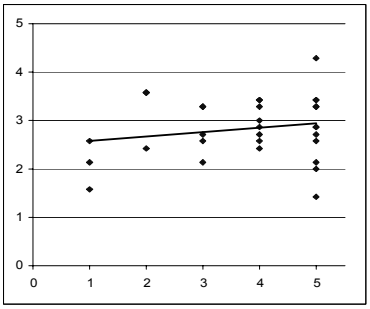

Figure 3: Innate ability vs satisfaction

One explanation for this outcome is that the tablet classroom may be more structured than a traditional lecture, tutorial and practical approach. Students with simple omniscient authority beliefs are more likely to depend on authority and not criticise authority while those who believe the ability to learn is fixed at birth see control of learning acquisition as outside their control to influence. In a structured environment students are more likely to "know", or at least *think* they know, where the authority resides (i.e. with the lecturer). If the tablet classroom is so structured that it is "spoon-feeding" students, this result is worrying. Alternatively, if the tablet classroom is providing a supportive, non-threatening, social environment for students to learn in and engage with the materials, this result is positive.

Perceptions and achievement

Consistent with the literature (e.g. Hofer, 2001), more sophisticated epistemological beliefs correlated weakly with higher results. However, there was no correlation between the students satisfaction with the learning environment with their overall results. Regardless of how well they performed in the unit, students reported high satisfaction with the technology enhanced learning environment.

Conclusions and future directions

The number of participants in this study was small and so all results are clearly tentative. Further, this study reports on students self-reported satisfaction levels with the tablet classroom and as other studies (Albert, 2004) have shown, students' good opinions do not always correlate to successful learning strategies. With these limitations the conclusions drawn below are necessarily speculative in nature.

The tablet classroom is popular among students with most during the last eighteen months actively preferring this format to traditional delivery (see above, Tutty et al., 2005). Early indications from this study are that this preference is independent of age and gender, though possible weak correlations to epistemological beliefs may exist.

Schraw (2001, p. 460) writes: "the existing [epistemological belief] research invites the conclusion that schools should make the effort to change beliefs in positive ways, although it is less clear how those changes should occur". Further Schraw (2001, p. 462) suggests that "teachers who strive for change … [create] the disequilibrating conditions necessary for lasting change. He notes that: "[u]nfortunately, there is evidence that some teachers emphasise recall rather than deeper thinking and may promote acceptance of naive beliefs rather than promote critical thinking that supports conceptual change". We would speculate that the tablet classroom might be one learning environment conducive to creating these disequilibrating conditions.

In conclusion, early indications from this study are that this new mobile learning environment has a high level of acceptance from students regardless of their individual characteristics and so has the potential to serve them all. The challenge is now to utilise these environments to their full potential and to ensure that students' high level of satisfaction with the tablet classroom is also translating into improved outcomes. Further research is also required to understand what is it about this technology enhanced learning environment that regardless of performance, students reported high satisfaction.

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