

What makes technology “risky”? An exploration of teachers’ perceived risk in the context of technology integration

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This paper presents an exploration of teachers’ perceptions of risks related to technology integration in teaching. As teachers implement new teaching practices they take risks. Developing an understanding of teachers’ perceived risks related to technology integration could help make technology-related change initiatives more effective. Data on teachers’ risk perceptions was collected over one year in the United States and Australia through a mixed-methods design. It was found that teachers perceived similar risks when considering technology integration, but that these risk perceptions varied in intensity depending on teachers’ beliefs regarding technology’s role in teaching and their conception of quality teaching. This trend suggests implications for targeted technology integration change initiatives and related teacher training.

Purpose

As technology use in the wider community grows, teachers and schools are expected to prepare students for future careers using technology (Ertmer, 2005; Hargreaves, 2009). When teachers leave proven teaching practices for new methods, they are taking risks. This study explored teachers’ risks perceptions associated with integrating technology in the classroom. In the language of teachers, phrases similar to “the students won’t benefit” and “it’s not worth the effort” were often employed to explain why they do not use technology in the classroom. The concepts “worth” and “benefit” relate to the balancing of gains and losses in an individual’s risk assessment. These types of statements suggest student learning and the teachers’ time and effort are perceived to be at risk when integrating technology. Research has shown perceived risks to be systematic and predictable when examining risk management and related controversies (Slovic, 2000), such as change initiatives.

Theoretical framework

Research has defined *risk* as “the possibility of unwanted events,” (Rohrman & Renn, 2000, p. 14). Individuals take risks when they feel favourable toward an item or event (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic, Finucane, Peters, & McGregor, 2004). This preference has little to do with the actual risk; it is about perceived potential benefit. What is considered a positive or negative risk outcome is determined by an individual’s values and beliefs (Slovic, 2000; Slovic, et al., 2004; Yates & Stone, 1992). Research has shown that teachers value, and derive self-worth through, student learning (Darby, 2008; Hargreaves, 1998).

Pelgrum’s (2001, p. 173) Second Information Technology in Education Study (SITES) identified several obstacles perceived by teachers when planning to integrate technology into their teaching. The top three obstacles identified were:

- 1) Insufficient number of computers
- 2) Teacher lack of knowledge/skills
- 3) Difficult to integrate into instruction

Teachers’ perceptions of barriers or risks associated with technology integration are rooted in individuals’ social knowledge, past experiences, and values. When teachers consider changing their practice to integrate technology, they will base decisions on their perceived value of technology, the role of technology in teaching (Ertmer, 2005), as well as past experiences using technology (Todman & Drysdale, 2004). Perceived risks must be identified to assess risk-taking behaviours (Vose, 2008). Educational research has cited a need for teachers to be risk-takers and take risks (e.g. Ertmer, 2005; Hargreaves, 2009); but what these risks are – what is perceived to be a risk – remains unidentified.

Data collection

Prior research examining risk perceptions has typically utilized psychometric models, but the analysis tends to aggregate over individual differences (Slimak & Dietz, 2006). Therefore, to gather detailed data on individuals’ risk perceptions, this study employed a two-phase mixed-methods design. Phase 1 was a descriptive cross-sectional survey questionnaire, giving average means of teachers’ risk-taking potential on four indicators: teaching-efficacy (TE; Lee, Dedrick, & Smith, 1991), computer-efficacy (CE; Compeau & Higgins, 1995), playfulness & anxiety (Play&Anx; Heinssen, Glass, & Knight, 1987), and school culture (SCu; Moles, 1988). The measures were averaged to create the risk-taking potential scale (RTPS) score (see Table 1). Participants in this phase were a purposive sample identified through the IntelTeach program in Australia and Florida (USA), as well as Florida State University and the New South Wales Department of Education and Training. Using a snowball method, schools were identified and asked to participate in Phase 1 until enough responses were gathered.

Phase 2 was a constant comparison case study including two schools, four teachers at each school, totalling eight teachers. The schools were chosen from the Phase 1 sample based on their participation in the Intel Teach program. Teachers were then identified in the school by their high or low RTPS scores. The selected teachers who agreed to participate in the study completed three interviews and three classroom observations between April 2007 and March 2008. Interview excerpts illustrating teachers’ technology integration-related risk perceptions and were used to validate questionnaire results. Interview and observation data were member-checked and validated in each round of collection in Phase 2.

Phase 1 results

In total, 136 participants completed the questionnaire: 51 Australian teachers, 40 teachers from the United States, and 45 New South Wales technology coordinators¹. Data collected from technology coordinators was included in the reliability analysis, but not participant selection; their CE and Play&Anx scores were significantly higher than the teachers. Kline (1999) states, good reliability has an alpha of over .7. The RTP questionnaire (45 questions) was found to have possessed adequate reliability (alpha = .74). Internal measure reliability allowed further analysis based on the indicators (all alpha > .7).

From the 91 participating teachers, eight case study participants were selected from two rural schools participating in the IntelTeach program: East Middle School (EMS) in Florida and North High School (NHS) in New South Wales. The eight Phase 2 teachers’ averaged indicator means did not prove to be statistically significantly different from the larger sample ($p > .05$; see Table 1). Therefore, the Phase 2 participants were representative of the larger sample in this study. This does not mean that results were generalizable to the larger teaching population.

¹ Technology coordinators in NSW would typically have responsibility over technology programs integrating technology in schools, but they were not IT system administrators.

Table 1
Demographic data on Phase 2 participants

			Years teaching	Curriculum area	TE ^a	SCu	CE ^b	Play&Anx ^c	RTPS ^d
LRB	Florida	Kerry	16-20	Career Planning	4.00	4.45	2.60	2.51	3.39
LRB	NSW	Judith	20+	Maths	4.17	3.91	2.80	2.67	3.39
LRB	Florida	Kelly	11-15	Reading	4.33	3.91	2.00	3.52	3.44
LRB	NSW	Simon	20+	English	3.67	4.45	2.50	3.20	3.45
MRB	Florida	Beau	1-2	World Civics	4.00	3.55	4.00	4.00	3.89
MRB	NSW	Elizabeth	11-15	ESE**	4.83	3.55	4.60	3.94	4.23
MRB	Florida	Danielle	3-5	ESE	4.83	4.00	4.50	3.63	4.24
MRB	NSW	Molly	6-8	Science	4.50	4.55	4.60	4.27	4.48

a The teaching-efficacy, and school culture measures used a 5-point Likert-type scale ranging from 1 = “strongly disagree” to 5 = “strongly agree.”

b The computer-efficacy measure was a 6-point Likert-type scale ranging from 0 = “couldn’t do that” to 5 = “totally confident.”

c Playfulness and anxiety measures were combined and averaged to create the Play&Anx indicator. The calculated scores are 1 = “less likely to show playfulness” to 5 = “more likely to show playfulness.”

d RTPS is a five-point scale, 1 = less risk-taking behaviours (LRB), and 5 = more risk-taking behaviours (MRB).

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Molly, Elizabeth, Danielle, and Beau, were identified as potentially showing more risk-taking behaviour (MRB). Kelly, Simon, Kerry, and Judith were classified as potentially showing less risk-taking behaviour (LRB). Participants’ individual risk perceptions regarding teaching, technology, and school culture are presented in the following section.

Phase 2 results

The following discussion presents excerpts from teachers’ Phase 2 interviews. Teachers’ comments illustrate values and beliefs relating to risk perceptions and the RTP indicators.

Perceived risks

Findings show that the over-arching cultural value perceived by teachers, and therefore the main area of risk perceived in relation to technology integration, was student learning. This finding is consistent with research identifying that teachers value and derive self-worth through students achievement (Darby, 2008; A. Hargreaves, 1998). Teachers identified several risks that they perceived would threaten student learning, when integrating technology into teaching:

- How technology supports notions of effective and quality teaching
- Loss of classroom control
- Time: lost instruction time and lesson preparation time
- Fulfilling cultural expectations

Phase 2 teachers expressed different conceptions of quality teaching and student learning. The MRB teachers discussed teaching in terms of accommodating different learning styles and enriching students’ experiences. The LRB teachers discussed teaching goals in terms of grade level expectations and test scores. Further, MRB teachers felt that technology supported quality teaching and student learning; generally, LRB teachers did not share this belief. The following sections will briefly present excerpts from Judith and Danielle’s interviews, who were both teaching between grades 6-8 Maths at the time of the study. Their comments illustrate some of the differences between MRB and LRB teachers’ conceptions of teaching and technology.

Teaching and technology

In the context of technology integration, two sets of values will influence teachers’ decisions: teaching and technology (Ertmer, 2005). Interview excerpts show how teachers’ conceptions of student learning and quality teaching (i.e., test scores vs. student experience) influence their choice to integrate technology:

“...there [is] different packages that we can show kids different graphs...I really can’t see the benefit of that, when in an exam they have to write a graph and analyze... I don’t see the time taken up by that as being a benefit. – Judith, LRB, Interview 3

“...I would like to implement anything [technology] that is going to work to help these kids learn. If someone came up with a new something and said, this is the best thing ever, I’d say, okay let me try it. All the help I can get.” – Danielle, MRB, Interview 1

Judith did not feel students would benefit from integrating technology into her teaching, while Danielle was willing to adopt “anything” that she felt would help the students learn. Danielle felt that technology could help her students learn; therefore, she was open to *experimenting* with new tools and teaching strategies.

Further, observations revealed, and validated through the interviews, that the LRB teachers generally used teacher-centred methods in the classroom. Judith felt that the way she taught “worked for students,” so she did not see any reason to change her practice. MRB teachers tended to use a combination of student and teacher-centred methods and group work in their teaching. Again, as stated by Danielle, they were more likely to experience with new teaching strategies and methods in an effort to improve student learning.

Time and expectations

MRB teachers were more likely to believe that costs (risks), such as loss of classroom control, were worth the benefit of improved student experience and learning. LRB teachers were more likely to feel that technology integration was not worth the cost of effort or time (risk), believing that it would not benefit student learning.

For example, Danielle typically rotated her students between several learning stations. One of the stations was using a maths game on desktop computers, and a second station was using learning software on Sony Playstations. She felt the benefit of using technology was worth the extra effort and time:

“... to transition from a whole math [maths] class to little groups [to use computers] they were a little more chaotic, but they just get in their seats and calm down, and get re-focused. It works. I’m okay with that. I do go like this sometimes (hide eyes).” – Danielle, MRB, Interview 2

Judith felt there was “more pressure to use computer skills and integrate technology” (Interview 1), but she felt the expectation to cover Maths curriculum was more important:

“...If there was more time in the course, maybe I would do something like that [use graphing software], but there isn’t. It’s tough to get through the course as is, so I don’t see the time taken up by that as being a benefit.” – Judith, LRB, Interview 3

Judith did not believe that technology supported student learning, so it was not worth the cost of instruction time. She identified that technology integration was becoming an expectation in teaching, but she felt expectations related to her curriculum area were more important. Danielle did believe that technology was worth the time because the students would benefit from the learning experience. The other MRB and LRB teachers expressed beliefs similar to Danielle and Judith.

Discussion

While teachers perceived similar risks (student learning, effort, and time), their risk-taking behaviours in their teaching were quite different. Variations in behaviours were strongly related to the teachers’ conceptions of quality teaching and student learning. Danielle was willing to experiment with her teaching in an effort to improve student engagement and learning experience. Her beliefs about teaching included trying new strategies to help students learning, which included technology tools and small group work. Her conception of teaching and technology were closely aligned. Therefore, she perceived a benefit from the use of technology and it was less of a risk in her teaching. Judith did not feel technology supported her conception of Maths teaching. For her, technology integration was not worth the time and effort and she felt her teaching practice was already effective. For Judith, the cost of time and effort was a risk, because she did not perceive that students would benefit from technology integration.

The teachers’ interview statements were consistent with their RTPS scores, which predicted that Judith would be less likely to take risks in the classroom (see Table 1). Findings were also consistent with prior research identifying relationships between teachers’ openness to change and technology integration in the classroom (e.g., Baylor & Ritchie, 2002; Subramaniam, 2007). Teachers’ risk perceptions and risk-taking behaviours are also consistent with research identifying that, for many teachers, teaching and technology represent different sets of values (e.g., Ertmer, 2005). While these findings are consistent with prior research, these types of findings have not been analyzed in relation to perceived risks or risk-taking behaviour.

Conclusions

This paper has presented a short overview of teachers’ perceived risks in the context of technology integration in teaching. The main risk perceived in technology integration was related to student learning. Specific risks perceived to affect student learning were: how technology supported teachers’ notions of quality teaching; loss of time and classroom control; and meeting cultural expectations. Through the identification of teachers’ risk perceptions, and thus a better understanding of their values and beliefs, schools will be able to better support teachers as they experiment with technology integration. Risk analysis starts with risk identification (Vose, 2008, p. 5). When risks have been identified, better-informed decisions can be made in change-related situations.

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