Risk-aversion: understanding teachers’ resistance to technology integration

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Risk-aversion: understanding teachers’ resistance to technology integration

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Teachers who do not integrate technology are often labelled as ‘resistant’ to change. Yet, considerable uncertainties remain about appropriate uses and actual value of technology in teaching and learning, which can make integration and change seem risky. The purpose of this article is to explore the nature of teachers’ analytical and affective risk perceptions, and how these influence decisions to integrate technology in their teaching practice. These ideas are explored through an in-depth qualitative analysis of teacher interviews focusing on experiences with, and beliefs about, technology and teaching. Results suggest decisions to integrate technology in teaching are influenced by negative affective responses to technology, general risk-aversion in teaching, and the perceived value of technology in teaching. The risk analysis framework and findings presented in this paper can be used to support communication with teachers to minimise perceived risks and, where appropriate, help support future technology use.

Keywords: risk perception; technology integration; professional development; teaching practice; teacher beliefs

Introduction

‘One of the most lively areas of theoretical debate in social and cultural theory in recent times is that addressing the phenomenon of risk and the role it plays in contemporary social life and subjectivities’ (Lupton, 1999, p. 1). In contemporary education, a particular area of change and risk continues to be technology integration. Over the last decade, the availability of technology has significantly increased in schools, but teachers continue to struggle with, and at times seem resistant to, integrating technology in their practice. This is an important issue, as the potential benefits of technology integration to student learning are still emerging and not entirely clear. This uncertainty has led teachers to feel they may be risking teaching time and student achievement when using new technology in their teaching (Lei, 2010; Lei & Zhao, 2007; Zhao & Frank, 2003). In addition to student learning, teachers’ identities are at stake when they are asked to make significant changes to their teaching practice. This uncertainty introduces possible risks of lower teaching efficacy and reduced motivation, which can result in negative experiences using technology (Darby, 2008; van Veen, Sleeers, & van de Ven, 2005). Research has sought to understand how various factors such as beliefs about teaching, school

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leadership and professional community influence or limit teachers’ use of technology in teaching. These factors have been presented in terms of barriers (see Ertmer, 2005; Hew & Brush, 2007), through holistic (see Ertmer & Ottenbreit-Leftwich, 2010; Law, Pelgrum, & Plomp, 2008) and ecological models (see Zhao & Frank, 2003). In this paper, I propose considering these factors in relation to teachers’ perceived risks influencing decisions to integrate technology in their practice and the classroom. Specifically, I seek to explore some of the complexities within teachers’ resistance to technology integration. A more complete understanding of teachers’ perceived risks related to technology integration can help to reduce anxiety and worry about technology use, as well as help to motivate action through supporting improved communication (Atman, Bostrom, Fischhoff, & Morgan, 1994; Fox & Irwin, 1998; Renn, 2004).

To do this, I present a theoretical framework of teachers’ risk perceptions and their impact on decisions to integrate technology in the classroom. The framework is based on individuals’ combined analytical and affective evaluation of risk. The analytical evaluation of risk involves rational assessment of risks; while affect is more of an emotional response to risk. Affect has been identified as a way to help explain bias and less-rational choices in decision-making (Slovic, Finucane, Peters, & McGregor, 2004; Slovic, Kunreuther, & White, 2000). These concepts have not previously been used in educational technology research. To present how the framework can be used in this area, I will first discuss relevant key concepts in risk theory and analysis, the concept of risk attitude and how individuals perceive and evaluate risk. Second, I will illustrate how the concept of risk perception has been present, but not specifically addressed, in current research and existing models used to understand technology integration in learning and teaching. In the final section of this paper, I use Lazarus’ (1991, 1999) version of appraisal theory and the semantic image of cost–benefit ratio to identify teachers’ perceived risk, through a brief analysis of teacher interview data. The analysis illustrates how the concept of risk perception can be used to understand the influence of perceived risks on teachers’ decisions to integrate technology in teaching. Results suggest the decision not to integrate technology is related to a combination of negative feelings about technology, as well as an aversion to risk-taking in teaching. This decision is further justified through teachers’ social beliefs about the usefulness of technology in their subject areas. These findings raise a number of questions about how teacher training and development can be structured to help teachers rationally address uncertainty and risk in technology integration to support effective learning, experimentation and possible change.

Background: risk analysis

The following section outlines key concepts in risk analysis relevant to this discussion, particularly focusing on perceived risks and potential implications for teachers’ decision-making. A common definition of risk is the ‘the possibility of unwanted events’ (Hansson, 2009; Rohrmann & Renn, 2000, p. 14). When researchers discuss risk they often mean perceived risk. Actual risk can only occur from risk-taking behaviour, while perceived risk is an individual or group’s prediction or estimation of risk (Rohrmann & Renn, 2000, p. 15). What one person or culture perceives as a risk may not be a concern for another; therefore, risk perception is derived from culture and context (Lupton, 1999; Slovic, Finucane, Peters & McGregor, 2004;
Wildavsky & Drake, 1990). The field of risk analysis focuses on determining the probability or the relative uncertainty about risks, as well as individuals’ and society’s response to risk (Löfstedt & Boholm, 2009). The ultimate goal of risk analysis is ‘to recognize explicitly the existence of uncertainty and how to deal rationally with it’ (Slovic, Fischhoff, & Lichtenstein, 2000). The goal of this discussion is to ‘recognize’ perceived risks related to technology integration, and to provide a way for teachers and schools to ‘rationally’ communicate about technology use in learning and teaching.

**Risk-aversion**

An area of great interest in risk analysis is what individuals and groups judge to be risks, and how they make decisions in the presence of these risks. Cultural theory, which considers group risk perceptions, states that every group or culture has ‘different social principles that guide behaviour and judgement of what dangers should be most feared, what risks are worth taking, and who should be allowed to take them’ (Douglas & Wildavsky, 1982, p. 6). These values and beliefs are part of a person’s risk attitude. Risk attitude falls between being risk-averse and risk-seeking. Risk-aversion is the tendency to prefer a sure outcome rather than taking a gamble, while risk-seeking is a preference to take risks (Slovic, Fischhoff, Lichtenstein, Corrigan, & Combs, 2000). This attitude was previously considered an individual trait, but Weber, Blais, and Betz’s (2002) work has more recently shown it to be domain-specific. Their findings show the decision to take risks is associated with the perceived benefits of an activity or task, rather than a general attitude towards risk.

In the context of technology integration, benefit would be assessed in relation to whether student learning is improved (Howard, 2011). The possible benefits or risks of an activity or task are assessed through a combination of rational and affective responses. These responses come through the rational and experiential systems of thinking (Epstein, 1994). Individuals engage in a cognitive dance using both modes of thinking when they evaluate risks to make decisions (Finucane, Peters, & Slovic, 2003). Slovic (2004) has renamed the rational system the analytic system, which is the term I will use in the following discussion.

**The analytic system and expected utility**

Historically, the analytic system has been ‘placed on a pedestal and portrayed as the epitome of rationality’ (Slovic et al., 2004, p. 313). This system of thinking includes rational and economic determinations of the maximum benefit in a given situation, theoretically this is explained through the theory of expected utility (e.g. Fishburn, 1982; Savage, 1954; von Neumann & Morgenstern, 1947). Expected utility assumes that individuals make decisions in the presence of risk based on an assessment of quantifiable consequences. The complexity of this assessment is often simplified through semantic images, such as cost–benefit analysis (Rohrmann & Renn, 2000). Loewenstein, Weber, Hsee, and Welch (2001) believe a weakness of this theory is that it is not possible to know all the consequences of a choice. Slovic and collaborators (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic et al., 2000a; Slovic et al., 2004) have shown that, in fact, perception of risk and hazards have little to do with the consequences, rather perceptions are influenced by
dimensions of the risk itself. They identify two main dimensions: risk of the unknown and dread (Slovic, 2000b). Risk of the unknown relates to the extent to which severity of risks are unobservable, unknown or new. Dread includes perceived lack of control, feelings of dread, perceived catastrophic potential, and inequitable distribution of risks and benefits. Dread relates to the experiential system which is primarily based on affect and emotion.

The experiential system and the affect heuristic

The experiential system is reliant upon affect, which is a subtle form of emotion. It is less rational, but it is thought to have a strong effect on risk perception and decision-making (Slovic et al., 2000a). The influence of affective responses in individuals’ risk perception has been identified as the affect heuristic, which is comprised of conceptualised and conditioned emotional responses based on previous experiences and perceptions (Finucane et al., 2000, 2003; Slovic et al., 2004). The research of Finucane et al. (2000, 2003) considering the affect heuristic has shown that individuals having a positive affective response to an activity are likely to perceive it as less risky and of greater benefit. An activity invoking a negative affective response will be seen as threatening and of low benefit. This phenomenon demonstrates an inverse relationship between risk and benefit, which is opposite to how benefit and risk actually occur in nature. In nature, benefit and risk have a positive relationship; high risk results in high benefit (Finucane et al., 2000). Affective responses are not necessarily based on complete information, they are often drawn from past experience and subject to strong bias (Loewenstein et al., 2001).

In this section, I have presented risk analysis, the concept of risk-aversion, and the two systems of thinking through which risks are evaluated. The critical aspects of risk perception are that they are socially constructed, domain specific and strongly influenced by emotion. I will now briefly discuss how some of these ideas can be used to re-analyse existing research in educational technology to identify aspects of perceived risk.

Application: Educational change and risk perception

Two aspects of technology integration, frequently addressed in research, are revisited in the following section to illustrate their relationship to perceived risk: (1) personal knowledge and use of technology and (2) value in teaching. These two areas of focus are drawn from key aspects of teacher change identified by Ertmer and Ottenbreit-Leftwich (2010): knowledge and efficacy, which relate to the first aspect; and pedagogical beliefs, subject and school culture, which align with the second.

Teachers’ knowledge and use of technology has been widely addressed in educational technology research, and it is well known that teachers showing higher levels of confidence and competence using technology are more likely to integrate it in their teaching (see Darby, 2008; Mueller, Wood, Willoughby, Ross, & Specht, 2008; Pelgrum, 2001; Yeh, 2006). One of the most substantial confirmations of this fact were findings from the large-scale SITES 2006 study, including 22 countries and over 35,000 secondary mathematics and science teachers. The SITES 2006 study found that the best positive predictor of technology integration was
teachers’ competence and efficacy using technology (Law et al., 2008). Positive beliefs about personal efficacy when using technology were found to positively relate to knowledge of how the computer works. Individuals that feel they can confidently and competently perform a task are more likely to succeed, and the task is perceived to be lower risk (Byrnes, Miller, & Schafer, 1999). Further, research in the area of computer anxiety has shown that reduction of fear and anxiety of computers resulted in an increase of confidence in computing skills (Hackbarth, Grover, & Yi, 2003; Harris & Rutledge, 2010; Wilfong, 2006). Therefore, teachers feeling competent and confident using technology have lower anxiety, less fear and are likely to exhibit a positive affective response towards technology use. Thus, they are likely to perceive less risk when integrating technology in their teaching.

This line of argument is confirmed by Baylor and Ritchie’s (2002) research identifying that some teachers are more likely to take risks, innovate and change their teaching than others. They defined this as an openness to change, which they describe as a ‘predisposition for trying new instructional innovations, and the belief that they can take risks in teaching’ (Baylor & Ritchie, 2002, p. 399). They argue that openness to change is one of the most critical predictors of technology integration. Baylor and Ritchie did not address the phenomenon of risk directly in their research, but this concept suggests a risk attitude in the domain of teaching, as it presents a preference for taking risks. Therefore, I rephrase openness to change as openness to risk, as change is not possible without risk. Further, I propose we can understand its obverse as a preference to avoid risks or being risk-averse. Risk-aversion suggests that teachers’ resistance to integrating technology in their teaching may be a result of a preference for the ‘sure thing’ rather than a ‘gamble’ on unproven technology tools.

This leads us to the second aspect of technology integration under consideration, which is the value of technology in teaching and learning (e.g. Ertmer, 2005; Hew & Brush, 2007; Selwyn, 2011). Actual integration is still contingent on understanding the relevance of technologies in practice. Teachers’ beliefs about instruction and technology integration are strongly related to specific subject area learning outcomes, as well as norms of a subject area (Hennessy, Ruthven, & Brindley, 2005; Webb & Cox, 2004). This is particularly the case for secondary teachers, whose identity and conception of teaching closely align with their area of expertise. They ‘don’t just teach – they teach Mathematics, Reading, and Science’ (Spillane, Hallett, & Diamond, 2003). Differences in conceptions of effective teaching, student achievement and quality learning between subject areas are, in part, a result of the underlying principles of that discipline (Howard & Maton, 2011). Thus, when teachers engage in planning they will determine how well a particular strategy or tool will support the learning objectives. Technology tools that are unknown or not commonly used in the subject area will be unproven. This uncertainty is likely to invoke risks of the unknown in more risk-averse individuals (Slovic, 2000b). Conventions and culture of the subject area influence these decisions, thus teachers’ perceptions of usefulness and value of technology will be socially influenced by their faculty and colleagues (Zhao & Frank, 2003). This is confirmed by Fox and Irwin’s (1998) research stating that exposure to the biases of others in judgement of risks may influence bias in individuals. As a result, certain technologies may be outright devalued in a subject area and determined by individual teachers to be not worth
the risk of integration in their practice, or a technology may be over-valued in practice and inappropriately integrated in teaching.

In summary, this section has demonstrated how risk perception can be used to explain some of the commonly identified factors relating to teachers’ technology integration. It is important to note, possible perceived risks are both socially constructed and domain specific, and they are judged through both affectively guided emotion (experiential) and analytical processes. Once risks have been identified, it is possible to better understand how they influence decision-making processes, which can then guide how to best help teachers develop their teaching practice. The following section presents a method of identifying and analysing teachers’ perceived risk related to technology integration. The method is applied to examine one teachers’ choice not to use technology in her practice. Through this analysis, I will demonstrate how risk perceptions can be analysed to better understand risk-aversion and technology integration.

Theoretical approach: using appraisal to examine risk

Traditionally, analysis of risk perceptions has utilised psychometric models, but this method has had a tendency to aggregate over individual differences (Slimak & Dietz, 2006). For research questions considering ‘deeper understanding of specific issues’, a qualitative approach based on interview is appropriate (Slovic, 2000a). While qualitative approaches are recommended for deeper risk analysis, the body of risk literature does not provide a clear approach to the qualitative analysis of risk perceptions (Hawkes & Rowe, 2008) nor a way to determine affective or analytical evaluations of risk. To address this issue, I have drawn from the research of van Veen et al. (2005) using Lazarus’ (1991, 1999) version of appraisal theory to study teachers’ emotions. I use this theory to examine teachers’ positive and negative responses underlying their evaluation of perceived risks related to technology integration.

Lazarus’ (1991, p. 6) work theorised emotion as the appraisal of beneficial or harmful person–environment relationships. The person–environment relationship is an individual’s internal response to external elements. Appraisal of relationships gives significance and relevance to what is happening. The appraisal process occurs in two parts. First, primary appraisal determines if what is happening is personally relevant, e.g. ‘is there harm or threat, or am I to be benefited?’ Lazarus further subdivides primary appraisal into three components: goal relevance, goal congruence (or incongruence) and goal content. This appraisal often occurs quickly and in the ‘heat of emotion’. The secondary appraisal evaluates the available knowledge, options and resources for coping with a situation, e.g. ‘how will this work out?’ or ‘am I helpless?’ (p. 145). This could be considered a more analytical process determining resources and knowledge, rather than responding to emotion. The secondary appraisal also has three components: blame or credit, coping potential and future expectancy. Not all emotions have a secondary appraisal, and they do not necessarily include all three components.

Lazarus (1991, p. 217) identified negative emotions arising from appraisal as anger, fright/anxiety, guilt/shame, sadness, envy/jealousy and disgust. Positive emotions were happiness/joy, pride, love/affection and relief (p. 264). For each emotion, the general patterns of appraisal are related to harm, loss, or threat and benefit, which are the core relational themes (p. 87). Table 1 presents two emotions relevant
to technology use and core relational theme, primary appraisal of goal congruence and secondary appraisal.

The analysis presented in this paper focuses on the concept of goal congruence in primary appraisal, to help understand individuals’ affective and analytical evaluations of, and responses to, technology-related risk. Responses are determined positive or negative based on their congruence, or agreement, with teachers’ goals. A goal must be present and relevant to produce a response – no goal, no emotion.

Method: using appraisal to evaluate perceived risk

The analysis presented in this paper is exploratory, as the method of analysis has not been previously used in educational technology research. The main research questions addressed were: (1) What are teachers’ risk perceptions related to technology integration, and (2) How do teachers’ risk perceptions impact on their decisions to integrate technology in teaching?

To keep it simple, I have limited the analysis to the two emotions, identified above, and their core relational themes: anxiety (e.g. uncertainty, threat) and happiness (e.g. gain, benefit). Computer-anxiety is directly related to knowledge and experience using technology, and it is a mediating factor for technology up-take and use (see Hackbarth et al., 2003; Wilfong, 2006). Happiness is primarily concerned with goal congruence and benefit. Research has shown that a critical factor in teachers’ use of technology in teaching is belief that it supports learning outcomes in their subject area (see Baylor & Ritchie, 2002; Hennessy et al., 2005; Webb & Cox, 2004), therefore how well a technology tool is expected to support the goal of student learning and teaching. Potential risks are related to the core relational themes of harm, loss or threat and benefit, which relate to cost–benefit analysis, where risks are understood in terms of gains and losses (Rohrmann & Renn, 2000). This type of sematic image helps to reduce the complexity of risk (Renn, 1998). Individuals’ evaluation of possible risk, gains and losses could be analytical, affective or a mixture of both (Finucane et al., 2003). The coding scheme used in this analysis, based on this theoretical framework, is presented in Table 2.

These themes are explored through a close qualitative analysis of one Australian secondary school mathematics teacher’s beliefs about, and experiences with, technology integration. The data presented in this paper include three one-hour semi-structured interviews conducted over one year (2008). The interviews were part of a larger mixed-methods study of two case-study schools, one in Australia and the other in the United States. The study was conducted between 2006 and 2008. It explored how ‘teachers’ personal and cultural values and beliefs influence their risk perceptions and risk-taking behaviours in the context of ICT-related educational change’ (see Howard, 2009). A total of eight teachers participated, resulting in a

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Core relational theme</th>
<th>Primary appraisal: goal congruence</th>
<th>Secondary appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>Uncertain existential threat</td>
<td>Negative</td>
<td>No role</td>
</tr>
<tr>
<td>Happiness</td>
<td>Gained or are gaining what we desire (benefit)</td>
<td>Positive</td>
<td>Positive future expectancy</td>
</tr>
</tbody>
</table>

Table 1. Emotions, core relational themes and appraisal.
total of 24 one-hour interviews and 12 classroom observations, as well as education policy document analysis from both countries. The interviews explored teachers’ levels of teaching and computer-efficacy when integrating technology, their anxiety and playfulness when using technology, their beliefs about school culture and risk perception, through a combined episodic and critical incident design (see Flick, 2006). The second and third interviews were informed by the previous interview (e.g. ‘in the first interview you were not using technology in your teaching, has your teaching practice changed?’). Member checking of the interview was conducted during the second and third interviews for validation. The interviews were digitally recorded and transcribed verbatim. Use of technology discussed in the interviews was triangulated with classroom observations.

The teacher, Judith (pseudonym), included in this paper was selected as an illustrative example to show the influence of risk perception on decisions to integrate technology in teaching. The steps for analysis of her interviews were:

1. A theoretical analysis to explore Judith’s teaching and computer-efficacy, beliefs and risk perceptions related to technology integration, which created a story of Judith’s technology integration.
2. Risk perceptions were then grouped in relation to perceived ‘cost’ (harm, loss or threat) or ‘benefit’ of the risks.
3. Affective responses to technology integration were then coded in general terms of positive (happiness) or negative (anxiety) emotions.
4. A second theoretical analysis to code her risk perceptions as affective (primary appraisal, relevance) or analytical (secondary appraisal, knowledge and options).

In the following sections, I will present Judith’s story of technology integration, including her beliefs about teaching and technology use. This will be followed by an analysis of her risk perceptions in relation to her appraisal of technology integration, and how these responses impacted on her decisions to use technology in teaching.
Results: Judith’s experiences with technology and teaching

Judith had been teaching mathematics at the secondary level in New South Wales (NSW), Australia, on and off, for over 30 years. At the time of this data collection, she had been teaching continuously for six years at a rural school on the Central Coast of NSW. Access to technology to support teaching at the school was good. Each faculty had their own computer lab and three to four additional computers in a small annex. Judith did not have computers in her regular teaching classroom.

Judith taught a range of grade levels, from Years 8 to 12, and abilities from remedial to Extension 2 (highly advanced study of mathematics in NSW secondary schools). She had been teaching the same way since the 1970s and was quite satisfied with her approach. She believed her method of teaching was the ‘most effective way to teach maths’, especially for higher-achieving students (Interview 1). She found lower-achieving students to be a ‘nuisance’ (Interview 2).

Generally, Judith did not use computers or mobile phones. She consistently rated her ability to use technology as a ‘2 out of 10’. Her comments clearly illustrated her anxious feelings about general computer use:

The biggest problem that I had with it [computers] actually, was the lack of time I had to sit down and come to terms with it. That is why I’m not all that comfortable. It’s fine if things go to plan and the computers work. If there is something wrong with the computers, or something you can’t get out of it, I don’t have the tools to cope with that … I would feel quite stressed. Anxiety. (Interview 2)

Much of Judith’s discomfort and stress came from being unfamiliar with the computer and having a low sense of her computer-efficacy. Her anxiety illustrated a negative affective response to computer use, which was in agreement with other research on computer-anxiety (e.g. Harris & Rutledge, 2010; van Veen et al., 2005; Wilfong, 2006). It is important to note that Judith did feel confident troubleshooting and problem-solving issues with scientific calculators, with which she was very familiar and had been using since her teacher training in the 1970s. This confirms that her lack of confidence and anxiety were not general traits, but specific to her unfamiliarity with computers.

Her feelings of anxiety carried directly over into her teaching:

And, okay, that’s it if there is a problem. Another thing that turns me off, when something goes wrong and the computer is not [working] … Unless there is another teacher to call on for support I wouldn’t be able to sort out the problem. That’s why I don’t take the class to the computer room. (Interview 2)

It makes me feel anxious, yes. I worry something will go wrong, whether the lesson will progress smoothly or not, will there be problems. Yeah, I think I would be wary (laughs). (Interview 3)

As one may expect, Judith’s reflections on technology use in teaching exhibited the same anxieties and uncertainties as when using the computers for general purposes. Therefore, her comments illustrate how her anxious and negative affective response to technology influenced decisions to use technology in teaching. Classroom observations confirmed that Judith did not use technology in her teaching. She did not have computers in her classroom and she rarely took classes to the computer lab.
In addition to her anxiety using technology, Judith did not believe students significantly benefited from technology integration in mathematics. This belief is illustrated through her discussion of two different software programs:

When we are doing graphs, I know there is a computer program where you can type in the equation and it will graph it for you, showing thousands of points. I can’t really see the value in that because that’s not how they are going to be graphing in a normal classroom or in an exam situation. So, its fine that it pops up quickly and I can see what it looks like, but that’s not the way we are going to graph it [on an exam]. (Interview 1)

We have been shown different programs, like a [testing] bank of multiple choice questions that kids can work through at their own pace. But, I don’t see the value in that, as opposed to them actually sitting down and actually doing the problems themselves. (Interview 2)

Judith’s judgement of the two technology tools was fairly ambivalent. More importantly, she did not seem to believe they were relevant to her teaching. In both cases, Judith did not believe the software would provide significant gain or benefit to support her goal of student learning and achievement on assessments. She felt students would be better prepared for exams if they practised mathematics by hand. When asked about integrating other types of tasks, such as internet-based research, she said, ‘They can’t go off and look at maths they have never seen before and figure it out themselves’ (Interview 3). She believed this type of task has little value or relevance in her teaching. Further, when asked what technology or different task she would want to use in her teaching, if there were no limitations, she said she would not change her practice. She saw no need to change her practice.

Judith felt her decision not to use technology was validated by the social norms of her faculty:

Other faculties make much more use of technology than maths. A lot of other faculties show videos and PowerPoint presentations, those sorts of things, which I don’t think applies all that much to maths. I don’t really know of anyone in our faculty [using technology], apart from the computer requirements, I don’t really know if there is really that much technology in their teaching. (Interview 2)

Judith was certain the mathematics faculty at her school did not, as a group, integrate technology in their teaching. Like many secondary schools, individual faculties at this school managed their own teaching with relative independence. At the time of this data collection, the school did not have explicit requirements for technology integration in teaching, although Judith did indicate that the faculty conformed to the NSW requirement of teaching students to use spreadsheets. This suggests the faculty would meet explicit expectations if required to use technology in their teaching, but Judith did not believe they valued technology integration in teaching. This group belief, combined with Judith’s confidence and satisfaction in her proven method of teaching, provided justification for her decision not to integrate technology.

These findings illustrate three main aspects of Judith’s beliefs about, and experiences with, technology. First, she experienced high anxiety and uncertainty when using technology, which suggested a strong negative affective response. Second, she did not believe technology was relevant to her teaching. Finally, she was not
motivated to change her practice and there was little social pressure for her to change. In the following section, I explore Judith’s feelings of anxiety and beliefs about the value of technology in teaching, in relation to her technology-related risk perceptions and their relationship to her decision not to integrate technology in the classroom.

**Results: Judith’s risk perceptions**

Over the course of the year, Judith consistently defined *risk-taking* in teaching as: trying something you are either not comfortable or familiar with, and doing something different to what you would normally do. In relation to risk and technology use, she said:

I am not very comfortable with risk-taking, especially with computers in a classroom situation. Something only I’ll do if I have to. Particularly because I don’t feel I have the necessary knowledge myself to teach it adequately. (Interview 1)

It’s [technology] something I have not used, other than taking the class to the computers to do work on spreadsheets. Um, so yeah, it’s not something I am familiar with or part of my normal teaching style. So it would be a risk in that sense. (Interview 2)

Judith’s comments suggest *risk-aversion* in the domains of teaching and technology use. She was uncertain and anxious about her ability to use technology, and she felt it was risky to deviate from her ‘normal teaching style’. She would only use technology if she had to, which was the case with spreadsheets. Again, this suggests some influence of social pressure and explicit expectations in her decision to use technology. The following illustrates how these perceptions come together in Judith’s justification for not using technology in her teaching:

Um … well apart from computers for spreadsheet lessons I don’t use any other technology tool in the classroom. I work off of the whiteboard, the textbook, overheads. I don’t use PowerPoints, stuff like that. I can see the relevance, but the risk of impending failure … the amount of time you would spend doing something like that is not in proportion to the volume [benefit]. I am sure there are other reasons (laughs). (Interview 1)

It is possible to see that Judith has identified risks in two domains, teaching and technology. First, she stated that her teaching does not include technology. She then identified the risk of impending failure when using technology. She justified her choice through stating an inequitable distribution of risks and benefits; the gain of using technology was not worth the perceived risk of failure and lost time. Both perceived risks (failure and lost time) relate to the risk domain of *dread*, which is based on affect and emotion. Table 3 demonstrates a deeper analysis of these risks using appraisal.

Her primary appraisal in the domain of teaching and technology integration was that technology use was not significantly relevant. She did most of her work on the whiteboard, textbooks, and the overhead projector. Her secondary appraisal exhibited the belief that her teaching would not significantly benefit from technology integration and there would be a loss of time. Her appraisal and cost–benefit estimation showed negative goal congruence between teaching and technology integration. This evaluation was coupled with the fact that Judith felt technology
integration was not part of her ‘normal teaching style’ and was ‘risky’. In the domain of technology use, Judith’s primary appraisal was of definite risk and threat of failure. Her comments exhibited a strong negative affective response to technology use, which would be expected with high anxiety. She did not engage in a secondary appraisal of technology. While Judith initially appeared to be resistant to technology integration in her teaching, her actual decision not to integrate was based on strong feelings of dread and impending failure when using technology. As a result, she avoided the use of technology in her teaching.

Table 3. Judith’s evaluation of technology integration in her teaching.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Primary appraisal: relevance</th>
<th>Secondary appraisal: knowledge/options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>Not relevant:</td>
<td>Future expectancy:</td>
</tr>
<tr>
<td></td>
<td>‘I work off the whiteboard’</td>
<td>• Loss of time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No significant benefit</td>
</tr>
<tr>
<td>Technology</td>
<td>Definite threat:</td>
<td>No direct appraisal</td>
</tr>
<tr>
<td></td>
<td>• Risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Impending failure</td>
<td></td>
</tr>
</tbody>
</table>

Discussion: beginning to understand teachers’ risk perceptions

Using the framework of appraisal and cost–benefit analysis, this paper has demonstrated a different way to consider teachers’ decisions to use technology in the classroom. The most important conclusion to draw from this analysis is that ‘resistance’ to technology may in fact be risk perception and uncertainty, which can limit teachers’ ability to make full evaluations of technology integration.

In the case of Judith, her lack of technology integration was not necessarily based on a ‘resistance’ to technology integration. She perceived significant risk, dread and anxiety with the use of technology. The lack of specificity in Judith’s perceived risks (e.g. general ‘failure’, time and ‘other reasons’), suggest these judgements were not based on precise incidents, rational judgements or complete knowledge. Indeed, Judith clearly stated that she lacked knowledge about technology. Her choice not to integrate technology in teaching suggested strong influence of a negative affective response, perception of high risk and low benefit (e.g. Finucane et al., 2003; Kahneman, Slovic, & Tversky, 1982; Slovic et al., 2004). These beliefs were further compounded by Judith’s general risk-aversion in teaching. Further, she felt she was a successful teacher, and therefore did not think changing her practice would result in real learning gains. At the faculty level, she held the belief that her views were shared and supported. Ultimately, her decision not to use technology was not necessarily based in a rational evaluation of the risk related to technology integration in teaching. They were primarily based on anxiety, fear and dread of technology use. Lack of social pressure within her faculty to integrate technology provided further support for her decision. However, while this choice was predicated on an emotional response and may not have been fully informed, this does not mean her reasoning was not valid. Her anxiety was real and more complicated than simply being resistant to technology integration.
Recommendations, future research and conclusions

The use of this framework has shown how known factors in research on teachers’ use of technology, such as knowledge of technology and value in teaching, can be analysed for perceived risk to help explain teachers’ decisions to integrate. The question is then, how can teachers be supported to rationally address their perceived risks related to technology integration? One approach is to provide risk communication in professional development and through continuous school-based support. Thus, I make two recommendations to address the issue of risk perception in the domains of (1) teachers’ knowledge and use of technology and (2) the value of technology in teaching.

The first recommendation, in regard to personal use of technology, is the need to gain familiarity with technology tools to reduce feelings of dread and anxiety. Negative affective responses are stronger and more immediate than analytical responses (Slovic et al., 2004), anxieties need to be addressed before teachers are able to evaluate the possible teaching and learning benefits of technology integration. Primarily, teachers expressing high perceived risk related to technology integration need to have focused positive experiences using technology to gain familiarity and reduce anxiety (see Todman & Drysdale, 2004; Wilfong, 2006). This can be achieved through conscious risk communication about technology integration in training to include appropriate coping strategies, such as managing technology failure and off-task students. Through this type of communication and the creation of positive experiences, teachers’ negative affective response and perception of risk may ease. Only at this point will they be able to move past their primary appraisal of technology and engage in less emotional evaluation of technology integration in teaching.

The second recommendation to minimising risk perception is through alignment of technology integration with school and faculty aims and goals. This analysis has identified that, even if a teacher is risk-averse in teaching, their choices will still be influenced by faculty and subject area norms. Findings from Judith’s experiences with technology revealed that even with her strong risk-aversion and anxiety using technology, she would fulfil the requirement of integrating spreadsheets in her teaching. This finding is in agreement with research identifying the power of social pressure in schools (e.g. Ertmer & Ottenbreit-Leftwich, 2010; Zhao & Frank, 2003). This has significant implications for school leadership, particularly in relation to establishing clear and well-communicated expectations for technology integration throughout the school. Moreover, in secondary schools, expectations for technology use need to be closely aligned with learning objectives and the wider disciplinary culture (e.g. Artemeva & Fox, 2011; Howard & Maton, 2011). However, as identified in the SITES 2006 study, these expectations need to be accompanied by appropriate support (Law et al., 2008). Clear expectations and support can act as risk communication in schools by providing teachers with goal congruence and knowledge, in the form of support, to accomplish these goals.

Based on these findings, I reiterate that teachers’ low levels of integration or seeming resistance to integration is complicated. The framework presented in this paper presents exploratory work examining teachers’ risk perceptions related to technology integration in teaching. The framework needs to be expanded to identify a more complete model of teachers’ risk perceptions, as well as the influence of risk on decisions to use technology. Of particular interest will be the relative strength of positive or negative affective responses and influence of school and subject-area culture.
In conclusion, Pascal (1669/2006) stated, ‘it is uncertain if we will gain, and it is certain that we risk’ (p. 68). The uncertainties around technology, teaching and change are not likely to be resolved in the near future. In fact, it is certain that teaching and technology will continue to change, thus uncertainty will only increase; and, with change, risk will always be present. The key to helping teachers fruitfully engage with technology and change is to understand what is actually being risked, and what they perceive is at risk. Only with this understanding can teachers be helped to make clear decisions about technology and teaching, rather than resisting change with the heat of emotion.

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References


