

# I can't understand why I didn't pass: Scaffolding student activities

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This paper presents a critical analysis of the multi-semester attempt to improve a second year unit in authoring within a multimedia course. The unit has a reputation for being difficult, has a significant failure rate and multiple students repeat the unit before passing it. Based on the authors' previous success implementing more authentic activities in a first year unit, this represents the first of two articles describing two planned stages of increased application of the principles of scaffolding. It was our judgement, supported by a literature review, that judicious application of the constructivist principles of scaffolding in particular were going to be a fruitful approach and that these were critical to improving the previous levels of student satisfaction and performance. The reasons for this judgement and the planned solution are presented, as well as a summary protocol for assessing the likely changes.

**Keywords:** scaffolding, multimedia, constructivism, online

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## Introduction and aim

Have you ever recognised a flat spot during a long meeting you were chairing, and then wondered how to address it? Sadly we know that recognising something needs to be done does not also generate the solution, and so it is with teaching. Recognising that a particular unit from a multimedia degree course was not working as well as it might, led the authors to investigate alternative approaches to its improvement.

This paper reports the search for alternatives and the proposed solution within a paradigm Reeves (1999) calls development research. The authors (the unit lecturer and an instructional designer) describe plans for sufficient alterations to improve some measurable outcomes like student pass rates, satisfaction and drop out rates. A second retrospective paper is planned to report the results. Such an approach is not new, but represents a theme that has occurred in research settings over many years, eg, Campton, (2003) at a previous ASCILITE conference. The methodology is justified because it publicly records planning before the moment is lost, and before hindsight obliterates all but the successful planned improvements.

## The setting

The unit in question is a second year unit in an interactive multimedia major within an undergraduate Communications Degree. Each year approximately 160 students take the course and regularly report that is one of the more difficult units, mainly because of its authoring/object oriented programming orientation. The unit runs in face to face mode with both a lecture and workshop each week, with carefully but linearly structured workshop activities provided each week. Most of these resources and assessments are available online. There were no group activities and no planned learning interactions in either the workshops or the assessments.

The student reputation of the unit is that it is one of the harder units in the course with a high dropout rate and significant failure rate. The unit was recently taken over by one of the authors, and after teaching it relatively unchanged the opportunity to further adjust the learning environment now presents itself. One way to improve the pass rate would be to make the unit and its assessments simpler, but this seemed inappropriate in the circumstances.

University statistics for 1999–2002 period for the undergraduate program done by most of the students who take this particular unit (or course) give an average failure rate (excluding withdrawals, dropouts and incompletes) of around 14%. This multimedia unit itself has had a rate of around 20–24% over the last three years (personal communication, Harry Leith, 29 July, 2004). It was in this context that the authors

decided to plan some restructuring of the activities, assessments and interactions of the students enrolled in the unit.

## Literature

As educators embrace the sentiment of constructivist, 'self directed' and 'authentic' solutions to teaching and learning, it seemed reasonable to turn to the literature for guidance in how these approaches might be implemented. Contemporary literature abounds with reference to constructivist approaches to teaching and learning, but it is not always consistent. Luca & Oliver (2003) suggest that authentic assessment, situated learning and metacognitive structures are successful in tertiary settings, but Bain (2003), a keynote at an international conference, argued that classic classroom testing is easier for a teacher to manage and thus more appropriate in today's climate. On balance there is far more literature reporting the benefits of constructivist philosophies in learning activities (eg, Bruner, 2001) and this includes blended and online settings (Palloff & Pratt, 1999). Constructivism, nearly forty years after being described by Jerome Bruner (1996), is regarded as a broad philosophy rather than a series of instructions. There is wide agreement that constructivist environments emerge from authentic tasks that engage learners in meaningful problem based thinking, require negotiation of meaning and reflection on what has been learned (Jonassen, Davidson, Collins, Campbell, & Haag, 1995). Constructivist environments have been demonstrated to be more effective than traditional settings (Johnson, 1991), they extend students beyond the information presented to them (Bruner, 2001), lead to enhanced cognitive development (Glassman, 2001; Panitz, 1997) and increase motivation (Slavin, 1990), perception of skill development and solution satisfaction (Benbunan-Fich, 1997).

A strength of constructivist approaches to teaching and learning appears to rest with the notion of scaffolding, where through social interactions, learning supports and carefully structured learning settings, more knowledgeable others help the inexperienced learner develop new skills and understandings (eg, Pressley & Hogan, 1997)

Of interest in this research were the social interactions involved in the learning and the particular interactions around the gradual development of new skills and knowledge of participants in a blended learning environment as they learned about and acquired skills in authoring with a multimedia authoring tool.

Two influential theorists who advocate social interaction in the construction of knowledge are Vygotsky and Dewey (Glassman, 2001). While Vygotsky emphasises the importance of social history, Dewey stresses the importance of individual history. Vygotsky places a heavy emphasis on the role of culture and social history in education suggesting that the process of education works from the outside in. Dewey with a heavy emphasis on the importance of the social history of the individual sees the process as coming from the inside out. Notwithstanding this philosophical difference, both theorists stress the importance of social interaction in the learning process.

Leading theorists argue that the role of social interaction in the learning and problem solving process appears not to be a haphazard affair (Laurillard, 1997). Through social interactions, structures and learning supports a more knowledgeable individual might support the learning of the novice.

### The role of scaffolding

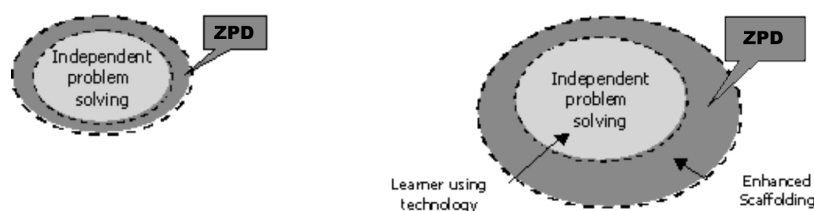
Vygotsky argues that cognitive development is enhanced through collaboration and social interaction in the Zone of Proximal Development (ZPD). The ZPD is seen as the gap between what a learner can accomplish independently and what can be accomplished in collaboration or with the guidance of a more experienced other (Brinner, 1999). Through increased interactions and involvement the learner is able to extend themselves to higher levels of cognition (Brinner, 1999). The guidance provided by the more knowledgeable other in the ZPD in the form of structures and support mechanisms is known as scaffolding (Bruner, 1984). As the learner takes on more control of the task the scaffolding is gradually removed allowing the student full control and responsibility. Scaffolding occurs best in environments where the learner is provided with the opportunity to communicate their thoughts through conversations, the most productive of which are termed learning conversations (Roehler & Cantlon, 1997). In learning

conversations individuals take responsibility for their own learning and the learning of others (Roehler, M., & Svoboda, 1993).

The ZPD and the scaffolding process provide an explanation of how learning is promoted within the social milieu. Contemporary literature reports many benefits associated with social engagement in learning settings spanning the academic, social and psychological domains (Panitz, 1997). It has been suggested that collaborative learning settings promote increased motivation (Slavin, 1990), promoting learning achievement (Bruner, 2001; Johnson, 1991; Maxwell, 1998) and perception of skill development including satisfaction (Benbunan-Fich, 1997). Additionally, social factors such as a sense of connectedness have been shown to influence student success and satisfaction in online learning (Barab, Thomas, & Merrill, 2001). There is also a suggestion that these benefits may be supported or even enhanced in learning communities that promote more active and increased intellectual interaction, create a sense of common purpose (Kellogg, 1999) and have a positive influence on the socialisation of students and learning outcomes (Maxwell, 1998).

### Related online factors

In a Web setting Dodge (1998) suggests that scaffolding for Web users involves: Modelling performance whilst thinking out loud; Pairing advanced learners with developing ones; Providing prompts, links, guides & structures; Fading when appropriate. This ignores the role of ICT itself; Robertson, Fluck, & Webb (2003) points out the value of ICT as a mediating factor, namely that the use of ICT enhances the scaffolding when the user is competent. In other words, the use of ICT can expand the Zone of Proximal Development (see fig. 1).



**Figure 1: Effect of ICT usage on a user's zone of proximal development, from Webb (2002)**

These characteristics were considered in the redesign and led to a series of desired outcomes (see Table 1), which it is planned might be met by this redesign. A review paper in twelve months will follow up this project.

### The educational design: Desired outcomes

It was the intention of the authors to structure the unit to adjust the level and type of student learning and hence to improve student performance. A similar aim was successfully implemented in a previously documented unit (Clarkson & Brook, 2003, 2004) using situated learning principles and especially authentic assessment structures. This approach to the evaluation has been characterised as design evaluation (Bain, 1999) whose intention is to substantiate planned changes through literature, plausibility and peer review.

It was evident that this unit already utilised some relatively authentic assessments and used a very structured learning setting, but made little use of interactions. For this reason scaffolding was identified as a major focus of this project (Clarkson & Brook, 2004).

Key characteristics identified seem to underscore the need for social interactions, structures, learning supports and collaborative constructions. It is important to remember that these are already taking place in a rich ICT environment, which means that the enhanced scaffolding support of Robertson et al (2003) could be expected to apply. This is not a change or strategy, but it arguably may be more effective in the more interactive setting which is now planned.

Three strategies are proposed that will reflect the value of scaffolding. Firstly, maximising the level of social engagement and interactions through the use of Forums; secondly we will provide some specific group work, group presentations and shared assessment activities in workshops, and other ways of encouraging learning conversations, peer support and improved access to problem solving support; and thirdly we will attempt to ensure that tutors provide and model scaffolded assistance during workshop activities, providing greater initial but fading support during the unit.

Possible outcomes include seeking greater student participation, changed learning structures, and ultimately improvements to the pass and/or dropout rates. An appropriate measure might be changes in dropout rates (which could imply that, during the running of the unit, students feel better supported and hence less likely to fail and therefore drop out at a lesser rate) and also changes in failure rates. It would be useful to gather student behaviours and perceptions as well, and even though these have not been directly collected in previous instantiations of the unit, there is some data that could proxy for this, namely participation on a bulletin board (called Forums in the LMS – Learning Management System – used by the students). The Forums were used for the first time in the previous semester when the course was run largely unchanged.

## Proposed evaluation plan

Table 1 summarises the planned structures and outcomes sought. Note that not all the strategies are equally measurable, but that they are all intended to contribute in their way to the achievement of the overall outcomes in the final row.

**Table 1: Planned strategies, methods and outcomes sought for the redesigned unit**

Strategies	Method/Tools	Outcomes sought	Measures
Increasing the level of social engagement and interactions	Usage of the Forums between the two semesters	Participation rate on Forums increases	Greater Forum usage, by more students using the same Forum structure as before
Specific group work, group presentations and shared assessment activities in workshops	Re-designed assessments requiring group planning and presentation	Groups present solutions in workshops fortnightly	Attendance, tutor comments, analysis of Forums
Tutors provide and model scaffolded assistance during workshop activities	Instruct tutors in changes, plan, model and discuss new approach	Good student performance in workshops, assessments	Tutor feedback, student comments via email, Forums, questionnaire.
Overall	End of semester questionnaire, normal unit feedback, unit stats	Improved pass rate; fewer dropouts; improved learning, feedback by students, tutors	Better unit evaluation scores than before, and Dropout rate, Pass rate

## Data collection challenges and problems

The unit is currently running so results are not yet available. Collection will process as indicated in Table 1, and any further categories of data that also present themselves will be used to help provide a richer description of these planned changes. It is planned to present some available quantitative and qualitative results during the conference to demonstrate any progress in these measures as a result of the plans.

It is important to consider in advance any problems that will cause inconsistencies in the data or reduce the value of the comparison between these two instantiations of the unit being researched. Many basic characteristics of the two will be unchanged, like the lecturer, course materials and the tutors, and even the same Forum headings will be used.

Possible problems expected include the fact that the populations vary across different semesters and it may be that different types of students enrol in semester 1 and semester 2. Thus we may need to compare both semester 2, 2003 and semester 1, 2004 with semester 2, 2004. Even so, a single semester's set of data is likely to provide supportive data rather than conclusive evidence, but it may be enough to contribute to further plans and adjustments.

## Conclusions

The authors felt concerned by the comment of the student who complained, "I can't understand why I didn't pass". This started a reflective journey, but we felt it was important to record the processes, feelings and plans as we went into the planning of significant changes to a unit. The journey uses critical analytical research to inform our teaching, and to improve the quality of the processes and also student results. We have argued that some of that recording should be public, as such research processes may be too easily tempered by time and that important insights may be lost to the natural improvements that hindsight can cause to the truth.

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