



## Using a collaborative investigation and design strategy to support digital resource development in an online unit of study

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This paper presents the research design and preliminary findings from a study on supporting online students in a collaborative design project. The Collaborative Investigation, Design, Evaluation and Revision (CIDER) approach was used to scaffold the learning activities. CIDER is a learn-technology-by-design approach for collaborative resource design and development. This phase of the study was conducted in a Graduate Certificate in Higher Education unit at an Australian university. Participants, working in small groups, collaboratively developed electronic teaching resources, including a digital story and a website. Data sources for this study include student artefacts, evaluation data, survey data and peer-review feedback from two unit cohorts. The results indicate that geographical proximity was not the key factor in the group's success; rather, a shared disciplinary area was a better indicator of the students' ability to develop an online resource. Moreover, the results indicate that formative evaluation via a peer review process offered a practical way of determining the quality or potential quality of a web-based learning resource before it is published.

Keywords: computer-supported collaborative learning, learning by design, higher education

### Introduction

Learn-technology-by-design activities carried out in groups have helped students understand how to use technology in many educational contexts, including higher education (Howard, McGee, Shin, & Shia, 2001; Kali & Ronen-Fuhrmann, 2011). Through a collaborative design approach, students have the opportunity to develop a deeper understanding of both content and technology through the experiences of dialogue and reflection in action (Mishra & Koehler, 2006). Building on existing studies (see, for example, Galstaun, Kennedy-Clark, & Hu, 2011; Hu & Fyfe, 2010; Kennedy-Clark, Galstaun, & Anderson, 2011), the lecturers adopted a collaborative learn-technology-by-design strategy named CIDER (Collaborative Investigation, Design, Evaluation and Revision) in an online unit where groups were to design a web-based teaching resource (Kennedy-Clark, Everett & Wheeler, 2012). The current study was undertaken as part of the redesign of this unit where there was away from an individual approach to learning to a collaborative project-based approach. In this paper we outline the study and present the preliminary findings.

## Research design

### Context

The context of this study is a core unit on 'Contexts and Issues in Higher Education' in the Graduate Certificate in Higher Education, offered online to staff at Australian Catholic University, and externally. Unit cohorts are small, with enrolments from staff employed across the University's six campuses in Queensland, New South Wales, Victoria and the ACT and a limited number of enrolments from staff at related higher education institutions, such as theological colleges. The study is part of the curriculum redesign of the 'Contexts' unit which was undertaken to ensure the issue of student diversity (for example, strategies for students from low socio-economic backgrounds, or first-in-family, or mature-aged students) was included. The unit had previously been delivered in the form of readings and online discussion, providing large 'chunks' of information with little consideration given to how learners will actually process this information (O'Donnell et al., 2006). Feedback on the unit of study was that there was a need to redesign the unit for pedagogical quality rather than the supply of information alone.

In light of this feedback, the authors adopted a learn-technology-by-collaborative-design approach, working in conjunction with colleagues at the University of Sydney where this approach has been embedded in the standalone ICT in Education units of study (Galstaun et al. 2011). The 'Contexts' unit was divided into three modules: a module on ICT in Education that provided the background and practical skills for using ICT in education, a module on university policies, and a module on diversity. The focus of the unit was to support the collaborative design and development of a digital resource (a website) to provide colleagues with learning and teaching information for an area of diversity. Teaching staff were available online for weekly 'sync' sessions using web conferencing software (Adobe Connect). Students were able to join these sessions to discuss issues raised in the weekly notes and readings as well as to discuss the collaborative process and assigned tasks. Thus, the focus shifted from a passive approach of transmission of information to the incorporation of active learning activities via the adoption of a learn-by-design approach.

### The CIDER Model

Kali and Ronen-Fuhrmann (2011) outline two approaches to structuring learn-by-design activities. The first approach is an open-ended reflective approach where lectures and tutorials are dedicated to students' working on their design projects, providing feedback to their peers, and refining their design artefact based on peers' and instructor's input. The second approach, which is more structured, centres on the use of a design scaffold, such as the ADDIE model (analyse, design, develop, implement, evaluate) (Dick, Carey, & Carey, 2001). More recently, there has been a move towards synthesising these two approaches to provide the structure of a model or design scaffold with the openness of reflective practitioners and the precision of peer review and support (Barab, 2004; Kali & Ronen-Fuhrmann, 2011). The CIDER model melds these two approaches. The CIDER model is a five-stage model that we used to scaffold a learn-by-design task. The first stage is *Collaboration*, which is the establishment of the collaborative team (e.g. groups, dyads). The second phase is *Investigation*, which is a collaborative investigation of the task and the development of an agreed project plan that identifies group member roles and responsibilities. The third stage is *Development*, which is the development of a prototype or draft artefact – this may be complete or partially complete. The fourth stage is *Evaluation*, which is a scaffolded peer review and evaluation. The fifth stage is *Revision*, which is the reflection, response and revision of the final product.

In our study, emphasis was placed on the use of peer evaluation. The *Evaluation* stage enables students to receive formative feedback from peers prior to the development of the final artefact. A number of studies (for example Budge, Beale & Lynas, 2013; and Ng, 2013) have found peer evaluation to be an integral part of the design process. In our earlier research (Anderson, Kennedy-Clark & Galstaun, 2012), students in a collaborative web design project used video feedback in reciprocal critiques of the website designs of their peers. Hu et al. (2010) found that as students became too familiar with their own products, they were unable to detect the inadequacies of their design. In both these studies, the researchers observed that the feedback obtained from peer assessment helped students to modify their design, and argued that this formative evaluation offered a practical way of determining the quality or potential quality of a newly developed web-based learning resource before it was implemented in the classroom.

### Collaborative design task

The students were assigned to groups according to the area of student diversity they 'voted' for via the Learning

Management System (LMS). Once all students had made their selection, the lecturers introduced the group members to each other via email, and this became an important channel for group activities. Students had to submit three assessment tasks during the unit, the first being the collaborative design plan for the final assessment, a collaboratively developed website on teaching strategies that account for student diversity. The purpose of the project plan was to enable students to identify their roles, area of diversity, and the desired website ‘look and feel’, and the plan was shared on the LMS for group use and lecturer feedback. Since the students were not, in many cases, located on the same campus, much of the design work was remote, and scaffolds were provided for tasks to guide the collaboration and the design. The second assessment was a ‘draft’ website that was evaluated by peers: the peer evaluation was formative, and was not weighted. Each group reviewed two draft websites: the areas for the review were scaffolded, and used the same criteria as the final assessment rubric. The reviews were anonymised by being forwarded via the lecturers to each group. The third assignment, the final published website, reflected the elements of the peer evaluation which the group had responded to in revising their site. These multiple stages in the product development meant that in the final rubric, there were three columns: the peer evaluation, the group’s response, and feedback from the teaching team.

### Data Collection and Analysis

The data reported on in this paper represents two iterations of data collection from an ongoing study in learning-by-collaborative design that is using a design-based research approach (Collins, Joseph, & Bielaczyc, 2004; Reeves, Herrington, & Oliver, 2005). A mixed-method approach was used, with data sources including student design plans, student evaluation forms and responses, the final website design, and student feedback.

### Results

The final digital resource submissions covered a range of support strategies for areas of diversity in higher education, such as international students, mature-age students and indigenous students. The content and support strategies were adapted to specific contexts (e.g. faculty or location). There was considerable variation in the resources, a couple included videos made by the students whilst other included links to YouTube or embedded Prezis, some relied on visual representations, such as charts, whilst others relied more heavily on text. All of the groups achieved the specified outcomes for the project.

Preliminary results from the first two cohorts of this unit (Groups 1 and 2) provide some indications on the success or otherwise of the use of the CIDER model in an online setting. We determined that measures of success could include the degree of collaboration, quality and use of peer feedback, and whether the published websites were fit for use. One indication of successful collaboration in the design task was the submission of the final product. Although a deadline was suggested, the dates that each group managed to submit their draft for peer review varied widely (Figure 2). Where group members had more characteristics in common, and particularly when dyad members were from the same faculty, their submission was more timely. (The small cohort of Group 2 had different deadlines in a subsequent semester.) Peer review feedback also varied, ranging from simply counting the presence of an element in the rubric to a functional evaluation of its fitness-for-use, and this range was demonstrated by the text choices made.

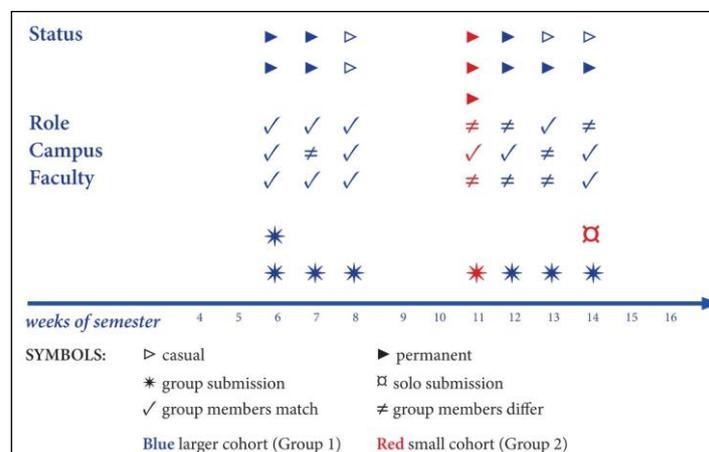


Figure 2. Time (week) when draft was submitted for peer review

Student feedback in the course evaluations indicated that the students liked the challenge of the course and the clear organisation of the project. Students also indicated that the accompanying lecture notes and recorded sessions were useful resources. However, feedback indicated that the actual workload of building a website resource was considerable and that face-to-face technical support would be helpful.

## Conclusions

In this paper, the preliminary findings of the re-design of an online unit were provided. The re-design focused on a move away from an individual content driven approach to a web-design project which was underpinned by a collaborative design strategy. While student feedback on their experience in this unit was very positive, the lecturers' reflections were mixed. The teaching team were pleased with the motivation and commitment displayed by the dyads/groups, and the depth of content they researched and presented: but we acknowledged that a greater improvement in technical skills and design literacy might have been achieved with one or more additional drafts or opportunities for peer or lecturer review.

The use of peer feedback provided a valuable step in the revision of the final websites and provided students with clear strategies to revise their designs that were not influenced solely by the perspectives of the teaching team. Subsequent offerings of the unit will encourage students to share draft artefacts or parts of the design more regularly with a greater range of unit colleagues, using conferencing and screen sharing to overcome the restrictions of practising collaborative learning by design in an online setting.

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