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Introducing reflective strategies informed by problem-based learning to enhance cognitive participation and knowledge transference in graphic design education

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ABSTRACT

This paper will outline and review a curriculum approach under development in the Graphic Design undergraduate program at the University of Wollongong.

The curriculum approach in the past has drawn on a blending of studio-based and project-based learning, common approaches in many graphic design tertiary programs (Davies & Reid 2000). Our concern with these approaches is the emphasis on project outcomes, marginalising the design process and the important learning opportunities it presents.

A potential solution the authors have explored is a greater formalised engagement with reflection (Boud, Keogh & Walker 1985; Schön 1987) informed by problem-based learning (Koschmann, Myers, Feltovich & Barrows 1994). A reflective learning framework has been introduced that encourages the student to stand back from the outcomes of the design project itself, facilitating enhanced engagement with design concepts and processes.

The authors describe an approach that is designed to encourage greater cognitive participation and establish a platform for enhanced knowledge transference for the graphic design student.

I. BACKGROUND

The pedagogical approach employed in the Graphic Design and New Media program at the University of Wollongong has in the past been based on a considered blending of project-based and studio-based learning.

A. Project-based learning

Project-based learning is a common practice employed in graphic design higher education (Pearson, Barlowe & Price 1999; Davies & Reid 2000; Ehmann 2004). This framework has been identified as a "comprehensive approach to classroom teaching and learning that is designed to engage students in investigation of authentic problems" (Blumenfeld, Soloway, Marz, Krajcik, Guzdail & Palincsar 1991:369). By placing students in realistic, contextualised problem-solving environments, project-based learning can serve to establish bridges between knowledge gained in the classroom and real-life experiences (Blumenfeld et al. 1991:369).

The principles of project-based learning have been identified as follows: learning goals that connect activity and conceptual development; learning scaffolds; formative feedback and revision; participation; encouraging the acquisition of content and skills; and assisting students take greater responsibility and ownership of their learning. However, a concern reported, which the authors share, is the danger of activity for the sake of activity, rather than undertaking activity and learning with understanding (Barron, Schwartz, Vye, Moore, Petrosino, Zech & Bransford 1998).

B. Studio-based learning

Studio-based learning is traditionally situated in a design studio environment under tutelage of a master designer (Lackey 1999). Studio-based learning encourages 'learning by doing' in a professional environment similar to one students would experience in industry (Carbone, Lynch, Arnott & Jamieson 2001). In the studio, the design teacher engages the student in action-based activity (Kvan 2001) with the relationship in this setting between teacher and student framed by the master-apprentice approach (Schön 1987).

Kvan (2001) describes four fundamental steps in the traditional studio-based learning process (figure 1). First, there is the formulation of the design problem, then exploration of solutions through 'action-based activity', followed by problem re-examination. The student cycles through these steps before the student proceeds to the final step of examination by jury.

While traditional studio-based learning is informed by the master-apprentice learning approach and has close links with industry practice, it lacks formalised reflection after completion of the design project. This has the effect of emphasising the project or product outcomes leaving the student at risk of not learning from the design process itself (Kvan 2001; Lawson 2006).
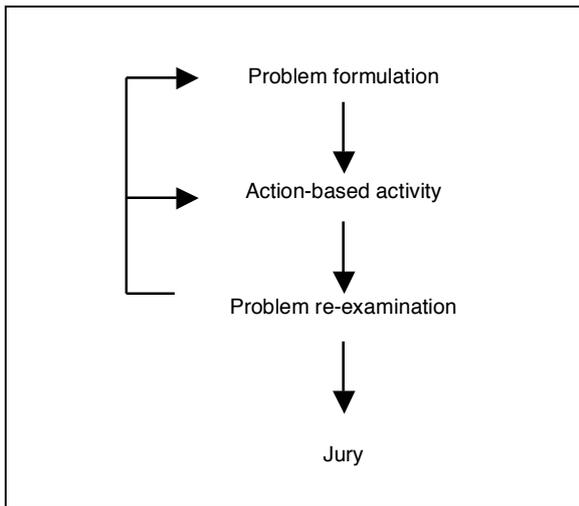
Figure 1: Studio teaching cycle (Kvan 2001)

Informed by Kvan and based on the student project outcome reviews, the authors identified that their students appeared to have a strong grasp of technical and production issues, however they felt their cognitive engagement at a conceptual level, and demonstrated ability to articulate the design outcomes and process could be improved. Engaging with the literature and drawing on their teaching experience, they felt that a greater formalised engagement with reflective practice, informed by problem-based learning, could establish an environment to encourage greater cognitive participation and knowledge transference by graphic design students.

C. Reflective Practice

Of particular importance to design pedagogy is establishing an environment in which the student engages in professional context and activity. Schön (1987) outlines the concept of the 'reflective practitioner' as a means of engaging in professional activity. This provides a framework for understanding and plotting the process of design practice and activity. Schön's theory is based on a constructivist view of human perception and thought processes; that the designer constructs their view of the world based on their experiences (Valkenburg & Dorst 1998).

Valkenburg and Dorst (1998) apply Schön's reflective practice theory to outline the process of practice in an industrial design studio. They articulate the mechanism of reflective practice based on Schön's reflective practicum (figure 2) in four stages: 'naming', in which the problem is articulated; 'framing', the context of the problem; 'moving', the design activity; and 'reflecting', in which the designer assesses the design development within the frame (problem context).

Valkenburg and Dorst conclude the descriptive method provides a framework that allows the breakdown of the design process for observation and discussion. They suggest this approach could be beneficial in the education environment as it provides a framework in which to articulate the activity of design. Adams, Turns & Atman apply Schon's theory of reflective practice to gain a better understanding of

industrial design students' developing design abilities. They conclude, "problem setting and engaging in a reflective conversation across problem setting and problem solving activities are important features of effective design practice" (2003:292).
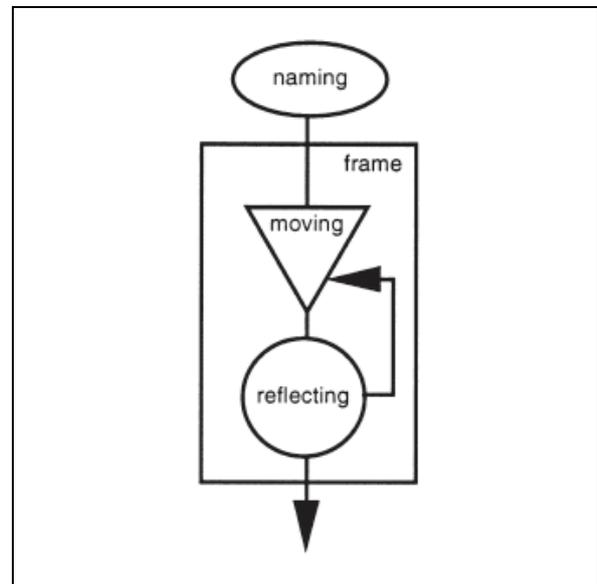

Figure 2: The mechanism of reflective practice (Valkenburg & Dorst 1998)

D. Problem-based learning

Problem-based learning has been described as an instructional educational methodology in which students engage with contextualised problems and look to discover meaningful solutions (Rhem 1998). An essential aspect of problem-based learning is the use of 'real-world' problems to frame the approach to learning (White 1996). It is through this discovery that the students identify what they know and importantly what they don't know, establishing a framework in which to approach the problem (Duch 1997; Major & Palmer 2001).

Five fundamental steps in problem-based learning have been identified;
• problem formulation,
• development of a solution through a self-directed learning approach,
• a re-examination of the problem to test the proposed solution,
• abstraction where the solution is contextualised with other known cases, and
• a final reflection stage where the students reflect and critique their learning process seeking to identify areas for future improvement (Koschmann et al. 1994).

The student group circulates through the first three stages until a satisfactory solution is developed before moving to the stages of abstraction and reflection (figure 3).
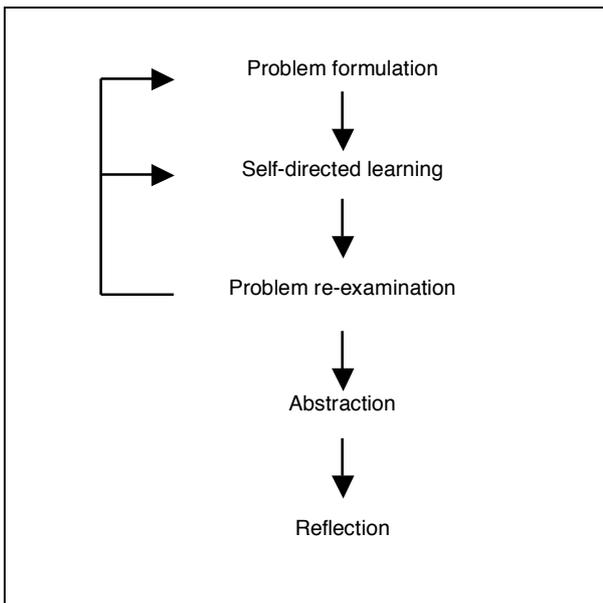
Figure 3: Five steps in problem-based learning (Koschmann et al. 1994)

Comparing problem-based learning and studio-based learning, Kvan observes that problem-based learning appears to emerge from the principals of studio-based learning and makes the important point, that in light of problem-based learning practices "opportunities for learning are omitted in the studio setting" (2001:95). Kvan points to the deliberate focus on process in problem-based learning compared to a design project emphasis in studio-based learning.

Other observations have been made regarding problem-based and project-based learning, and it is not unusual to witness the two frameworks being discussed together (Esch 1998; Thomas 2000). The defining features of project-based learning; "centrality, driving question, constructive investigation, autonomy and realism" (Thomas 2000:6) are also present in problem-based learning, however the separation between the two lies in the end focus. It is the final artefact/project that drives the planning, production, and evaluation process in project-based learning, whereas, the primary focus of problem-based learning revolves around the inquiry and research of the problem (Esch 1998).

II. IMPROVED LEARNING FRAMEWORK

The development of the improved learning framework for the University of Wollongong graphic design program occurred over a three-year period, and is the subject of an ongoing process of trial and review. The reviews took the form of student feedback and staff reflection, analysis and proposition.

The new framework (figure 4) builds from a foundation of project-based learning and studio-based learning. It is informed by Schon's reflective practitioner (1987), the mechanism of reflective practice articulated by Valkenburg and Dorst (1998), and includes the final two phases of problem-based learning (Koschmann et al. 1994); abstraction and reflection.

The framework commences with an authentic problem, the frame or design context is established, and students then engage in a cyclic process of action-based activity (learning by doing) and reflection-in-action (problem re-examination) before submitting the final design artefact. The significant shift from the previous learning framework occurs after the completion of the design artefact where the students enter the additional stages of abstraction and reflection.
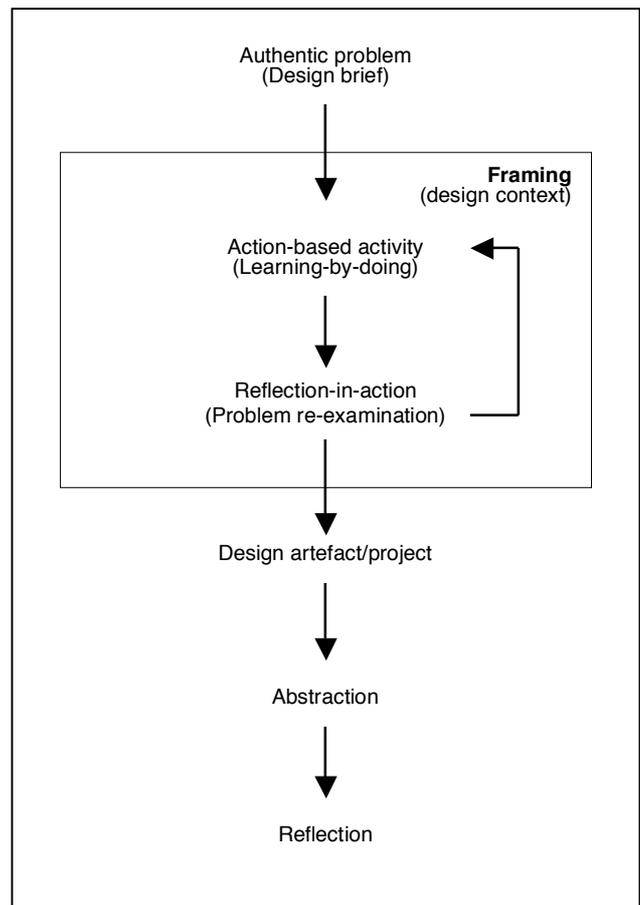

Figure 4: New learning framework (Ellmers 2006)

The authors have found it important to clearly contextualise the purpose and format of the subject, including the abstraction and reflection stages, in the initial subject briefing with the students to guide the framing of their approach to research and project work. The students are asked to look for meaningful solutions (Rhem 1998) by considering their own interests, including their strengths and weaknesses and where they would like to position themselves in industry on graduation.

The subject is broken down into four assessment tasks; project proposal, interim design submission, final design submission, and a written report incorporating abstraction and reflection. The first three assessment tasks involve presentations by the student, which provides opportunities for critique and formative feedback from peers and design staff.

This helps to ensure the design project remains aligned to their stated learning aims and career aspirations. Students are encouraged to remain open to being influenced by their research and design process, and it would not be uncommon for the project and/or the aims to be modified in response to this exploration.

The seminar and presentation format provides an opportunity to identify significant aspects/outcomes of the design process and design project, assisting the student to recognise critical moments in their learning. In other words, "make sense of an action after it has occurred and possibly learn something from the experience which extends one's knowledge base" (Eraut 1994).

Interceded into the program are focused instructional workshops, informed by student learning needs and enhanced with input from industry practitioners. These workshops and an ongoing dialogue between staff and students incorporates the mechanism of reflective practice as articulated by Valkenburg and Dorst (1998)(figure 2) and 'action-based activity' as articulated by Kvan (2001) (figure 1). Experience suggests that students also benefit from formalised engagement with the process of reflection and how it can be applied within design practice.

The submission of the design project is the last step in traditional project-based and studio-based learning models and where, in the past, the subject curriculum has concluded. Adding the process and reflective written report as the final assessment task engages with the abstraction and reflective steps of problem-based learning as articulated by Koschmann et al. (1994) and has similarities with the research and development summary assessment task articulated by Ehmann (2004).

Abstraction is identified as crucial to problem-based learning. It provides "an objectivity in relation to the initial learning experience, which has the effect of clarifying it and fostering the ability to work with it, so the learner can draw out potential learning" (Walker 1985:63). To encourage abstraction the students are asked to reiterate their concept, primary references, and outline their design process in a written report as part of the final assessment task.

The final stage of reflection directs the students to think back over the project outcomes and, in light of the abstraction process, articulate the successful and unsuccessful aspects of the final design outcomes. Drawing on these reflections the student is then asked to discuss how they might approach a similar design problem in future, positioning them to transfer their learning to other situations. This encourages the student to take knowledge from an implicit to explicit position, leading to the identification of generalisable principles supporting a platform to facilitate knowledge transfer.

The framework has been primarily developed in a subject positioned in the students' final session of undergraduate study where they develop their major portfolio design work. This is intended to encourage the student to focus on the next stage of their engagement with design. It also gives staff an opportunity to draw attention to the potential of further learning opportunities presented by postgraduate engagement. The final project report provides the basis for the student's postgraduate proposal.

III. FUTURE DIRECTIONS

The authors have observed that a number of issues would benefit from further investigation, in particular:

- Enhancing cognitive participation and knowledge transference through improved reflection strategies. One strategy could involve improving the student's ability to identify critical incidents in the design process. Tripp notes "incidents happen, but critical incidents are produced by the way we look at a situation, it is an interpretation of the significance of the event" (1993:8). It is reflecting on and analysing these critical incidents that "assist the practitioner in moving their practice forward and obtaining expert status" (Ghaye & Lillyman 1997:80).
- Further developing of learning activities specifically engaging with reflective practice.
- Gaining a more detailed perspective of the framework's effectiveness from students and staff through the employment of additional detailed data collection.
- Considering the positioning of the framework in the design program. Now the framework has been articulated, should it be deployed earlier in the undergraduate program to allow students to benefit further from the new teaching and learning approaches? If so, should it take the same form?
- Improving assessment procedures. While significant improvements in the assessment procedures have been made during the implementation, it would be beneficial if the current procedures could be further explored within the broader context of contemporary assessment practices.
- Benchmarking the subject against comparable offerings in other institutions to ensure adequate time allocation and credit point weighting. An emerging concern is the new developments in the curriculum have increased expectations on the students, which might now exceed the credit point weighting allocated to the original subject. Should there be a separate subject specifically engaging with reflective practice, for instance?
- Collaboration between RMIT and UOW. The framework development predominately occurred while the authors worked together at the University of Wollongong. Potential exists to not only benchmark, but also explore collaborative teaching and learning opportunities between staff and students at the two institutions.

IV. CONCLUSION

The three-year development and implementation of the improved learning framework in the graphic design program at the University of Wollongong has provided considerable material in which to review and assess this model. One immediate success of the new approach is evident in the significant increase in engagement with the postgraduate program from one or two annual enrolments to thirty over the last three years.

While further work is required to refine the new learning framework, the authors believe the current model provides a platform to promote greater cognitive participation and knowledge transfer by the graphic design student. They hope that engaging in a dialogue around this model, and reviewing other pedagogical approaches, will provide key solutions for the refinement of contemporary design pedagogy.

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