

GRADE EXPECTATIONS: ASSESSING DESIGN THINKING. THE DEVELOPMENT OF AN ONLINE EVALUATION SYSTEM.

G.Baxter and N.Laird

ABSTRACT

Within the debate concerned with the advancement of design as a discipline or body of knowledge, the design process has continued to defy comprehensive description or definition. Despite attempts to map the process -usually seen as a negotiation between problems and solution involving the three activities of analysis, synthesis and evaluation- the most inclusive and accurate outline is often generalised to a point which essentially contributes to the mystique surrounding the process of designing.

Given this and the status of design as an emerging discipline, or at least as partial studies seeking an interdisciplinary common ground, design education within universities presents a unique and complex pedagogy. Assessment protocols however may be among the mechanisms which can potentially help to demystify the design process.

This paper describes the design and development of a prototype, on line marking system (with Assessi as a working title) which aims to provide tools to academic staff which help develop rigor and consistency in the assessment of design projects across design disciplines.

Importantly one of the objectives of the system is to help demystify or “make visible” the design process to students by presenting the criteria for measurement of design competence for any given project in a linked interactive package.

Keywords: common ground, design process, wicked problems, evaluation, assessment, language

1 INTRODUCTION

The development of this prototype is posited in the context of dynamic change evident in contemporary design education and design practice. The changes are characterized in ongoing debates within academic and industry sectors. These discussions could be broadly summarized as being concerned with developing strategies which seek to find new potentials through exploration of common ground between disparate bodies of knowledge.

2 COMMON GROUND

2.1 Design as an emerging academic discipline

The status of design as emerging discipline presents special problems in developing an evaluation tool. Obvious obstacles are those regarding the level of shared perspectives theories methodologies and terminologies. Despite exploration to discover the corner

stones of design thinking within natural science, fine arts, and most currently in social science disciplines, no one definition of design suffices.

In considering the current breadth and variety of design research it could be said there can be no collective agenda but rather, “a plurality of researchers engaged in multiple research streams” (Friedman 2004). The issues regarding an interdisciplinary, shared language and perception of design in this situation are apparent.

2.2 Design as a strategic resource

Design is increasingly recognised as a strategic resource within industry. The change in the role of design and designers from that of a service industry evolved from craft based specializations to that of an integrating and guiding intelligence within the innovation process is shaped the development of the Assessi project. One contemporary role of designers that has been proposed in the context of radical design driven innovation (Verganti 2003) is that of designers as brokers of languages. The notion of designers as mediators and translators within a multidisciplinary development teams has strong resonances with the prompts and expected student performance within interdisciplinary design programmes.

2.3 Design programmes and labels

Design programmes which are informed by interdisciplinary research and which utilise converging information technologies have also challenged and blurred boundaries of traditional craft based design disciplines. The strategic and creative competencies involved in for example, graphic design and product design are now broadened, linked and made more sophisticated to encompass holistic concepts of interaction design, communication design and experience design. This development can be seen as a move towards a common ground especially when design thinking and the paradoxical nature of design processes are considered.

3 DESIGN PROCESSES AND WICKED PROBLEMS

3.1 Design processes

Despite the increasingly dynamic and evolving character of design education programmes the ability of students to deal with the paradoxical nature of design opportunities is of lasting and paramount importance particularly in terms of the potential of interdisciplinary design education programmes, and more holistic design practice perspectives. This intelligence involves the balancing of strategic thinking and creative thinking or expressed another way the capacity to deal with the determinate and indeterminate aspects of design opportunities.

3.2 Wicked Problems

One theory which can inform the design process in terms of its characteristics, stages and “rules of engagement” is The Wicked Problems Theory of Design (Rittel and Webber 1973). The theory goes some way to framing the relationship between determinacy and indeterminacy inherent in design processes. The framework also provides a useful starting point for students to engage with and navigate the complexity and multilayered nature of the design process.

4 ASSESSMENT OF DESIGN OUTCOMES

If the design process itself is described as complex and multilayered (Lawson 2000) then assessing components of that process and its outcomes is similarly complex. One conventional strategy is to try and compartmentalize the design process and assess the constituent parts in light of the relative success in performance of the final outcome. This assessment strategy runs the risk of either reducing the design process to an over simplified map or producing endless checklists of identifiable quantitative measures at the expense of any meaningful commentary on qualitative aspects or indeed the holistic outcome of the process. In this regard the wicked problem framework also provides a means of organising formative and summative assessment of student performance.

4.1 Formative assessment

Formative assessment for example takes place continuously in the manner of day-to-day studio achievements, project progress, critical discussion groups, peer group feedback and tutor student communication. This type of assessment is a powerful guide to students and runs across all aspects of the design process from brief formulation to refined design.

4.1 Summative assessment

Summative assessment is based solely on design outcomes or programme deliverables and is essentially a final holistic judgment. While the conventional jury system of debating and assessing student design outcomes goes some way to addressing the interdisciplinary and multilayered nature of the assessment process this is both time consuming, resource intensive, to a large part invisible to students and usually thinly documented.

Summative assessments undertaken by different individual tutors are also prone to inconsistencies across the tutorial or studio groups.

5 THE ASSESSI PROJECT

5.1 Briefing statements

The challenge of this research project with regard to the above discussion was to devise a flexible prototype assessment tool to be used by design teachers, students and administrators. The following:

- The prototype should provide a narrative space or common ground for the development of an accessible, shared and consistent assessment language.
- The prototype should act as both a learning and a teaching tool.
- The prototype instrument would accommodate interdisciplinary educational contexts and audiences and be sensitive to both determinate and indeterminate aspects of the design process.
- The prototype should reflect the multilayered complexity of the design process.
- The prototype should streamline the assessment process and integrate with institution wide assessment policies, grading systems, tracking and recording administrative systems.
- The prototype should be enjoyable to use.

The Assessi project is a research project in progress. Currently the prototype is being piloted and tested over the 2004 academic year. The pilot involves 8 academic staff

members from different disciplines, some 85 students engaged in a range of design projects and 2 academic administrators. Their responses to user survey questionnaires will be used to refine the design of the prototype interface.

5.2 A short description of the system

Assessi is driven from the Design Studies Intranet and takes advantage of its inherent security and integration with wider institutional systems and users. The system is built on the simple idea of an electronic mark sheet which is constructed from layered elements. There are 3 element types [Fig. 1]



Figure 1. Assessment elements

1. Static text fields which provide common spaces for the final wording of design assessment criteria to be agreed on and refined by assessors (Fig. 2)
2. Input text for any individual or custom or open ended comment necessary
3. Sliding scales providing common spaces for the development and refinement of descriptors relating to levels of performance within formative or summative assessment criteria. Each level of performance has its own common space. (Fig. 3)
4. Check boxes to allow tracking of work submitted (Fig 4)

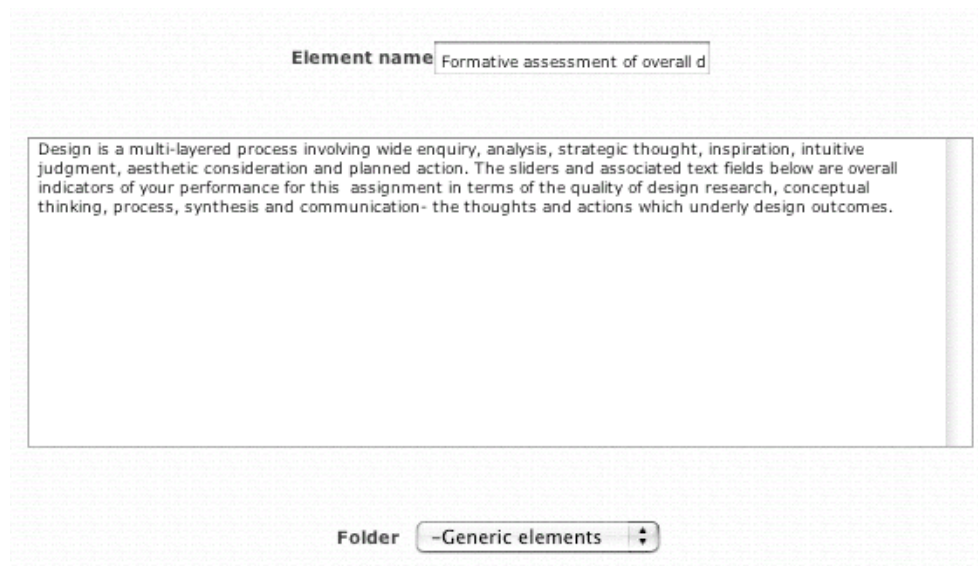


Figure 2. Static Text fields. Formative Assessment Statement

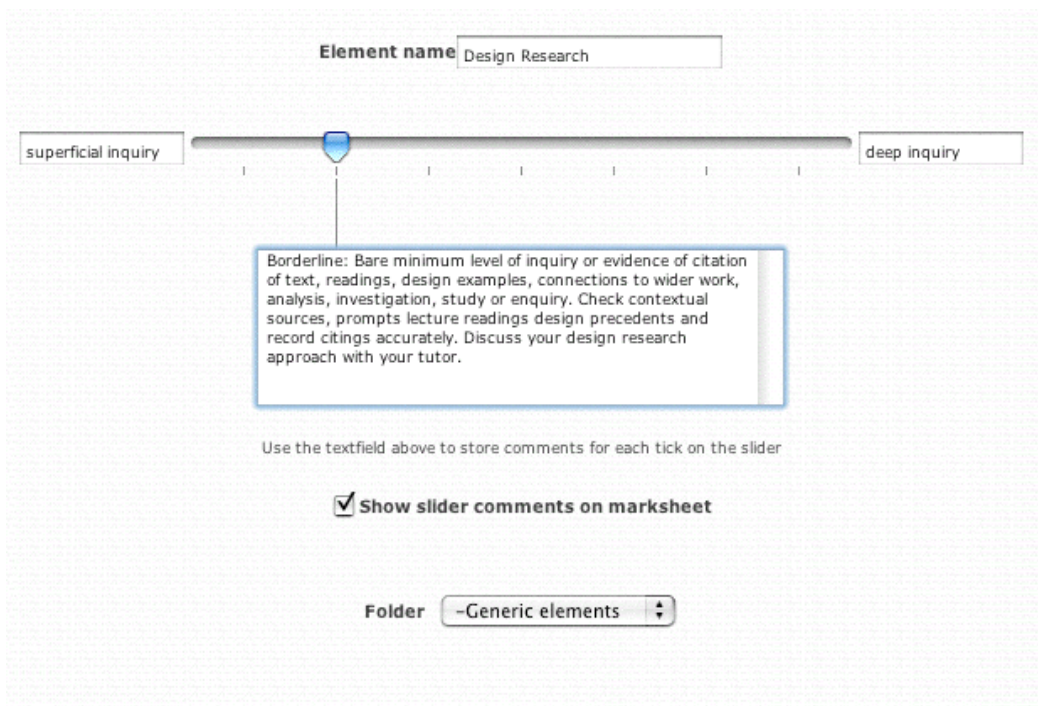


Figure 3. Sliding Scale. Formative Assessment

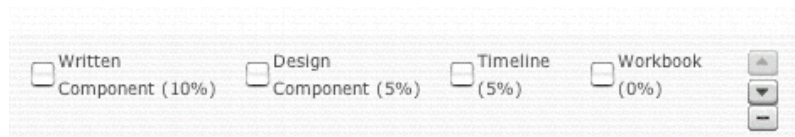


Figure 4. Checklist for submissions for any one project

The elements can be customised according to any specific projects. Sliding scales for example can be configured to any of the wider university grading protocols. The ability to manipulate elements to create and display a layered assessment framework of design out comes mimics the multilayered nature of the design process itself. The flexibility afforded with both formative and summative assessment strategies also provides a framework for assessing the determinate and indeterminate aspects of design outcomes—a means of dealing with wicked aspects of the design process. [Figs.5, 6]

The elements are pooled in central folders and can be used as is modified or refined in any combination of layers. A security hierarchy related to accessing the common spaces allows wording to be locked in at any time. Completed electronic mark sheets can be emailed in PDF form to students or viewed through the departmental assessment web site, which will also carry assessment policies and protocols. The mark sheets are also integrated to a database which displays complete student records and statistical analysis of relative student performance.

Name	305 Handin Two	Description	Final Handin	Update
Checklist	<input type="checkbox"/> Final Designed Outcome (50%) <input type="checkbox"/> Workbook (0%)			
Expectations	The final design outcome must be suitable for exhibition or publication. Design is a multi-layered process involving wide enquiry, analysis, strategic thought, inspiration, intuitive judgment, aesthetic consideration and planned action. Your submission must reflect high standards in quality of design research, conceptual thinking, process, synthesis and communication- the thoughts and actions which underlay design outcomes. Consult with your supervisor and the 305 Exhibition Curator for detailed presentation strategies			
Formative assessment of overall design performance	Design is a multi-layered process involving wide-enquiry, analysis, strategic thought, inspiration, intuitive judgment, aesthetic consideration and planned action. The sliders and associated text fields below are overall indicators of your performance for this assignment in terms of the quality of design research, conceptual thinking, process, synthesis and communication- the thoughts and actions which underly design outcomes.			
Design Process	<input type="range" value="10"/> unrefined refined			
Design Research	<input type="range" value="10"/> superficial inquiry deep inquiry			
Design Communication	<input type="range" value="10"/> puzzling persuasive			
Conceptual Thinking	<input type="range" value="10"/> unconvincing compelling			
Design Strategy	<input type="range" value="10"/> weak / unfeasible strong / feasible			

Figure 5. Layered electronic mark sheet. Formative assessment elements

Summative assessment of specified design outcomes

Summative assessment will be based on assignment outcomes or deliverables and are weighted accordingly. Typically summative assessment will measure achievements in relation to learning outcomes as demonstrated by performance in assignments and/or essays projects seminars examinations or other events allowing measurable indication of students learning.

The Final Designed Outcome

unconvincing | | | | | | | | | | compelling

Workbook

thin | | | | | | | | | | rich

Individual Comments

Click on the plus button to add an assessment element to this marksheet. [+](#)

Enter the titles and percentages for mark components below (e.g. process, solution, communication):

Mark 1	Mark 2	Mark 3	Mark 4
Title <input type="text" value="Final Design"/>	Title <input type="text"/>	Title <input type="text"/>	Title <input type="text"/>
% <input type="text" value="100"/>	% <input type="text"/>	% <input type="text"/>	% <input type="text"/>
Type <input type="text" value="Grade"/>	Type <input type="text" value="Pass/Fail"/>	Type <input type="text" value="Pass/Fail"/>	Type <input type="text" value="Pass/Fail"/>

[Update](#)

Figure 6. Layered mark sheet. Summative assessment elements and mark entry

The finalized electronic mark sheets will eventually be developed to interactive versions for students who at the outset of a design project or assignment can engage with the multilayered assessment criteria of design, assess a hypothetical performance and receive the feedback and grades.

6 THE ASSESSI EXPERIENCE: A PILOT CASE STUDY

The first prototype version of Assessi was introduced to a third year course offered by the Design Studies Department at the University of Otago, Dunedin, New Zealand. This course was selected as a pilot for the use of Assessi because it involves self-navigated studies (inclusive of the framing of design problems and opportunities) and is supervised within an interdisciplinary research framework. It is also one of the courses where design specialisations are brought together.

The course involves 70 students working individually or in small teams co supervised by one design staff member and one other from a related academic discipline. This year interdisciplinary collaborations have linked Design with Chemistry, Computer Science, Biomechanics, Film and Media Studies, Anthropology, Visual Culture, Philosophy, Art History, Marketing amongst others. Other collaborations involve Australian design institutions.

6.1 Developing Evaluation Criteria Mark sheets as Teaching and Learning Tools.

The first step in setting up evaluation frameworks for the course was to establish common ground between interdisciplinary supervisors. Robust discussion about the nature of design, design processes and expectations regarding outcomes of the projects course resulted in an agreed statement about design which linked all the formative assessment criteria (figure 5)

Importantly the generic formative evaluation criteria regarding student performance in research, conceptualization, strategy, design process and communication was also agreed upon and added to the library. Similarly the summative assessment criteria were debated especially in regard to the weightings for each phase of the design process. Agreed milestones of the project were Project Formulation (broad research, understanding user experiences and imagining new opportunities and initial design responses), Formal Project Proposal (presentation, research initial concepts, “just enough” prototyping and basic strategy outline), Final Presentation (design solutions, detailed design and promotion), Report (post design evaluation and reflective practice)

These phases and delivery deadlines were the basis of the four electronic mark sheets constructed for the course. All four electronic mark sheets were demonstrated to students at the project outset and their opinions sought. In light of their comments a refined hard copy was distributed as a set of linked prompts, which serve as visual reminders of not only the evaluation criteria but also the multi-layered and dynamic nature of the design process.

5.2 Evaluation of Project Formulation Phase

To date only the Project Formulation Phase involving a literature review of pertinent scholarly information, technical data and design precedents together with initial design responses and a possible strategy have been evaluated and results distributed.

While there is anecdotal evidence only at this stage- structured questionnaires for users are being developed- responses to the system have been promising. Teaching staff also find Assessi easy to understand and straight forward to use. They see the system as a

flexible tool rather than a rigid imposed system largely because it is based on building a shared language- something they feel they can own or have some influence over.

Staff report spending shorter times and experiencing less burdensome tasks marking student work, once the system has been mastered. There is agreement that the common shared descriptors of components of design thought and action give a clearer perception of the complexity of the design process. It follows that the staff feel that a much more comprehensive feedback can be given when a generic database is used in conjunction with individually tailored comments and common observations. The automatic calculation of totals and equivalent grades was universally appreciated.

In comparison to other evaluation systems students see Assessi as articulating the whole assessment process for the project duration. In this sense the electronic mark sheets act as a way finding system on a number of levels- the most helpful of which is to provide a tool to demystify and engage with the design process and issues of project management.

The importance of integrating scholarly and field research in ways that inform the design process has been also been clarified in the minds of the students. Similarly there is a heightened awareness of the design process and recognition of the value of the aspects of reflective practice.

Importantly the system has catalysed deep discussion between staff and students about use of the language to describe design outcomes and of formative and summative assessment criteria

From an administrative perspective Assessi has proved to be efficient. The hand-in of work and progress with evaluation, on site or at remote locations, is easily tracked by the course co-coordinator. Similarly the archiving and emailing of results is seamlessly integrated with the assessment toolkit. The results so far indicate that the assessment system is transparent, friendly, secure, personalised and with opportunities to further customize the user experience once more complete survey information is correlated.

8 CONCLUDING REMARKS

Problems which arise from the assessment of student design outcomes could be seen to emanate from the indeterminate and confusing nature of design problems or opportunities. While this complexity may be engaged with informally during the design process by student and staff, the formal assessment of the final outcome often avoids accurate and helpful description and analysis. Within an interdisciplinary design programme where there are a number of languages inherent in the assessment process, the need for an instrument to broker these languages and to streamline the feedback process is apparent.

Assessi, the working title of a prototype on line evaluation system, provides a means to develop and broker languages not only between disciplines but also between users of the system –academic staff, students, tutors, visiting practitioners and administrators.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the participation in this project of Research Assistant, Aimee Glensor, together with the teaching staff and students of the Department of Design Studies, University of Otago. Special thanks must go to Professor Terry Crooks of the Educational Assessment Research Unit, University of Otago for his advice and support.

REFERENCES

- [1] Darke, J. The primary generator and the design process. *New Directions in Environmental Design Research. Proceedings of EDRA*, 9, 1978, pp 325-337.
- [2] Friedman, K. What is relevant in design research? How do we decide? PHD-DESIGN@JISMAIL.AC.UK, March, 2004.
- [3] Lawson, B. How designers Think. *The Design Process Demystified*. 3rd edition Architectural Press, Oxford, 2000.
- [4] Markus, T.A. A doughnut model of the environment and its design. *Design Participation* London: Academy Editions, 1972.
- [5] Rittel, H., and M. Webber. Dilemmas in a General Theory of Planning pp 155-169, *Policy Sciences*, Vol. 4, Elsevier Scientific Publishing Company, Inc. Amsterdam, 1973
- [6] Verganti, R. Design as brokering of languages: Innovation strategies in Italian firms. *Design Management Journal*. Boston: Vol. 14, Issue 3, Summer 2003, p. 34.

Contact Information

Nick Laird
Department of Design Studies
University of Otago
Box 56
Dunedin
New Zealand
Tel 00 64 03 4797555
nick@design.otago.ac.nz

Co-author Information

Grant Baxter
Department of Design Studies
University of Otago
Box 56
Dunedin
New Zealand
Tel 00 64 03 4797569
grant@design.otago.ac.nz

