ASSESSING DESIGN ACTIVITY: ISSUES AND ACTIONS

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1. Introduction

1.1 The challenge

A major challenge in design education, particularly in higher education, is to not only achieve excellent design skills in students, but also to demonstrate quality of educational outcomes to an increasingly wide range of stakeholders. Students, graduates, employers, clients and the general community have increasingly legitimate stakes in what constitutes quality in educational outcomes. The high standing of a design programme and its graduates no longer depend only on the quality of teaching and professional accreditation: they increasingly depend on satisfying the various expectations of a wide range of stakeholders across the community [Institution of Engineers, 1996].
This paper outlines an extensive international collaborative research and development programme that set out to find a single framework that would integrate assessment [of students], evaluation [of teaching], accreditation and accountability criteria into a single framework that would allow quality of design education and its outcomes to be convincingly demonstrated to all stakeholders.

1.2 The problem

Design disciplines, particularly in higher education, are under increasing pressure from quality assurance and other accountability concerns. Engineering and architecture are perhaps the most prominent design disciplines in higher education, and both have been subject to severe criticism around the World, particularly from students, graduates, employers and education specialists.
A significant anomaly is that, despite the widespread criticism, accreditation of engineering and architecture courses [by their respective professions] has been maintained, even at high levels. This suggests that the expectations of the respective profession [accreditation] are inconsistent with those of other stakeholders [accountability].
Shortcomings in a profession are customarily blamed on the supporting education system, resulting in a concentration of pressure on faculty staff to improve the quality of teaching [or to conform to QA protocols]. There is no clear evidence, however, that design teaching quality is deficient in any of the design disciplines.
The problem, evidently, is that there is also very little evidence that design teaching quality is good, or even adequate [Eraut, 1995; Nicholls, 2001]. There is a wealth of anecdotes, opinions and myths, but there is little *evidence* that would *convincingly demonstrate* quality and satisfy both accreditation and accountability requirements across the whole spectrum of stakeholder groups.

1.3 Goals

The initial intention of the research programme was to identify the various stakeholders and to analyse their respective expectations of educational outcomes in design disciplines. The next intention was to define overlaps and contradictions in the expectations, and to indicate how design education strategies

could be developed so that the various expectations and educational outcomes could be mutually aligned. The problem was recognised as a universal problem and, as the design professions work in a universal environment, the research was undertaken in Europe, North America and Australia by a collaborative group of researchers specialising in design education.

1.4 Results

The research indicated that recognition of quality depends not only on good educational practices and on achieving high accreditation ratings, but also depends on demonstration of quality in terms of explicit criteria that are *understood and accepted by a wide spectrum of stakeholders* including faculty, educational institutions, accreditors, students, graduates, employers and various sectors of the community and government [Maister, 1997; Nicholls, 2001]. The research also indicated that competency standards, while intended to define universally-recognised standards expected in any graduate are, however, characterised by elemental simplification that is inconsistent with the complex integration of knowledge that characterises design and, therefore, do not satisfy the expectations of some stakeholders, particularly the design teachers and employers [Eraut, 1995].

A significant finding of the research was that the accreditation authorities' perceptions of what constituted quality education were invariably inconsistent with the perceptions of the practitioners and employers within the profession they represented. Another significant finding was that the accreditation authorities' perceptions of the wider community's views, of what constituted quality education, were also inconsistent with the actual views held by opinion leaders in the community. These findings indicated that accreditation was not an indicator of quality education outcomes, and could not satisfy accountability requirements [Maister, 1997; Nicholls, 2001].

The research programme then went on to identify, compare and relate the expectations of various stakeholders with respective programme objectives, and led to development of a framework that transitionally represented the various value systems of all the stakeholders.

This Transitional Framework enabled a design education provider to demonstrate how an educational programme addressed the expectations of each and every stakeholder groups. The remainder of this paper presents the rationale on which the transitional framework was based.

2. Defining "quality" in design education

2.1 Meanings of "design"

A significant obstacle to defining quality in design education is the term "design" itself, which has many meanings. Architects, engineers, graphic designers, industrial designers, interior designers, landscape designers, hardware and software designers [and many others] are all *designers*, that is, they all engage a *design process* and they all produce a product called *a design*. However, the design products that these various designers produce differ significantly, and the design processes they use also differ significantly. It is therefore necessary to define *for each case* what we mean by design before we can establish expected design education outcomes, what constitutes quality, the most appropriate teaching methods, assessment criteria, and accreditation and accountability requirements [Rowe, 1995; Lawson, 1997].

2.2 Differentiating between designers

In very general terms, the community distinguishes each design discipline primarily by the product designed. In general terms, the community expects engineers to design machines, roads and bridges, but not hospitals and houses, while architects are expected to design hospitals and houses but not machines. Similarly, and notwithstanding some overlaps, all the other design disciplines are expected to design certain products and not others.

Most design disciplines also tend to be associated with one or the other of two *philosophically and methodologically different*: "creative" design methods that give priority to intuitive processes [characteristic of architecture][Rowe,1995], and "scientific" methods that give priority to rational

analysis [characteristic of engineering][Grabowski,1998]. Most other design education disciplines adhere generally to one or the other of these two methods [Cowdroy, 2000b].

2.3 Design as creative *and* scientific?

One body of wisdom claims that *all* design is *inevitably creative*, on the basis that the outcome is the creation of something new; another that all design is *inevitably scientific* on the basis that the outcome must involve a rational, logical analysis. However, there are degrees of creativity and degrees of "scientific-ness" Creativity varies [according to various taxonomies] from basic survival strategies [eg, sharpening a stick to use as a weapon] at one extreme, to purely abstract ideas [without any necessary practical application] at the other extreme [Bergquist, 1999]. Design is generally not associated with either of these extremes of creativity, but various types of design can be readily identified with various intermediate levels of creativity, and all involve at least some analytic process [Rowe,1995; Lawson, 1997]. Thus all design can be considered to be both creative and rational [by degrees].

In practical terms, design can be considered as involving at least three stages: *an intent* to achieve some outcome, *a thought process* [designing] directed towards achieving that intent, and *an outcome* [a design] [Cowdroy, 2000 b]. The design outcome could reside in the mind [ie, an idea] or could be a diagram [a cipher] or could be a model [a representation] or could be a final product [something that has been designed]. All are referred to as designs and are the outcome of the three stage process of intent, directed thought and outcome.

The question of "scientific-ness" arises from *evaluation* of a design outcome [poor, adequate, good, or excellent] *in terms of the intent.* The more precisely the intent is [or needs to be] defined, the more precisely the outcome can be evaluated, and the more scientific the design process. Thus, regardless of whether the intent is to achieve an essentially aesthetic or essentially practical design outcome [or an outcome that is both aesthetic and practical], the design process will be scientific if the design outcome is evaluated in terms of *a precisely defined intent* [Cowdroy, 2000 b].

2.4 Where does design start? aesthetic vs practical intents

It is often assumed that the most appropriate design method is determined by which comes first: the aesthetic considerations or practical considerations. Choice of design method, however, should be determined according to whether the design intent [and therefore evaluation] is to be based on one dominant criterion or dimension or on mult-dimensional criteria. If there is clearly a dominant dimension [eg, cost, or strength, or aesthetic quality], the design method can be a linear ["scientific"] process. If the intent is multi-dimensional, however, [eg, in design of a car, or hospital where many dimensions must be resolved simultaneously] the design method must be a conceptual ["intuitive"] process in which the multiple dimensions can be resolved simultaneously [Rowe, 1995].

3. Design Education

3.1 Alignment with practice

The research confirmed that both engineering and architectural practitioners use both methods according to complexity, but that architectural education recognises only conceptual methods as "legitimate", and that engineering education recognises only scientific design methods as "legitimate". From an educational perspective, identification of the most appropriate design method also determines the most appropriate pedagogical method, suggesting that engineering and architectural education should be developing *both* intuitive *and* scientific design skills in their respective students and graduates

Both conceptual and scientific design methods conform to the three-stage model discussed above. Actualisation of a design may be in the mind [an idea], or in the form of a tangible diagram [cipher], or a model [representation] or a "final" product. Many actualisations may be involved as the design evolves, and differing design methods are often most appropriate to the various stages, implying that a graduate needs to learn multiple methods in order to have the necessary design skills for practice as a "complete designer" in the respective design profession [Lawson].

3.2 Whose quality:?

Quality of a design education programme is determined by formal evaluation, of content, teaching methods and assessment methods. Evaluation of a programme, however, is generally resented as an attack on the expertise and academic standing of the individual design teachers and their respective disciplines, particularly if that evaluation is undertaken by anyone other than an 'expert' from the same design discipline. Notwithstanding the resentment, there is a range of diverse stakeholders with legitimate claims to stakes in determining what constitutes good design education in each of the design disciplines [Nicholls, 2001].

3.3 Conflicting expectations

This research identified the main stakeholders in any design education discipline as: *design teachers* who prepare and present the programmes, *students* who undertake the programmes, *graduates* who benefit from the programmes, *employers* of graduates who benefit from the knowledge and skills of the graduates, the *accreditation bodies* [where applicable] who endorse the programmes on behalf of their respective disciplines, *the community* who benefits from the contribution of the discipline, and *education specialists* who are concerned with the quality and outcomes of the teaching process.

The research also indicated that, while all stakeholders can agree on some general principles [all subscribe to excellent education], the notion of what constitutes quality varies significantly among the stakeholder groups [Nicholls, 2001]. Accreditation authorities are primarily concerned with the maintaining acceptable standards, and so are focused on the minimum-pass/fail margin; design teachers are primarily concerned with middle and high-achieving students in the upper half of a cohort [as well as satisfying accreditation standards]; students are primarily concerned with maximising the satisfaction they get from the course; graduates are primarily concerned with their career prospects; employers are primarily concerned with self-directed professional graduates; and the community is generally concerned primarily with the contribution of graduates as complete design professionals to society.

3.4 Assessment

Assessment [of students, particularly at graduation] is the basis of *demonstrating* quality and is therefore central to the interests of all stakeholders. Assessment demonstrates adequate standards at the minimum pass level [for accreditation]; identifies high-achievers [for teachers], demonstrates progress [for students], demonstrates achievement [for graduates and employers] and demonstrates quality of programme [for QA and accountability].

Assessment of design students, however, typically neglects to address the design process skills and is, instead, focused on the product [the design]. Also, assessment of the design is typically dissociated from assessment of other subjects so that a student's ability to integrate multiple dimensions is ignored [Eraut, 1995].

The formal assessment criteria is dominated by accreditation requirements with emphasis on basic technical and theoretical knowledge, that ignores consideration of criteria for any but marginal-pass students. This requires arbitrary "roping-in" of informal professional and personal *attributes* in order to distinguish grades above marginal pass, for instance at Credit, Distinction and high-distinction levels [Table 1], resulting in arbitrary and ambiguous assessment that militates against stakeholder confidence in design education [Cowdroy, 2000a].

Table 1. Formal criteria and informal attributes used in assessment

GRADE	FORMAL ASSESSMENT CRITERIA		INFORMAL ATTRIBUTES	
Outstanding	Accreditable Tech + Theory	+ Higher Tech + Theory	+ Professional	+ Personal
Distinguished	Accreditable Tech + Theory	+ Higher Tech + Theory	+ Professional	
Creditable	Accreditable Tech + Theory	+ Higher Tech [or Theory]		
Passable	Accreditable Tech + Theory			
Failed	[Fail technical or theoretical]			

4. Conflicting challenges

4.1 Accreditation or excellence?

A major challenge for an accreditation authority is to decide which design skills [competencies] are *adequate* for registration of graduates. This decision is complicated by specialists within each design profession who are associated with differing design processes.

A major challenge for design educators, is to identify the design methods used by practitioners in achieving *excellence* in the profession, and to design assessment protocols that measure *and demonstrate* these design abilities in students and that satisfy the expectations of all stakeholders. [Nicholls, 2001].

4.2 What is assessed?

A major shortcoming in design education is that the design method [*any* design method] is often not taught. Most teaching in the design disciplines in higher education is focused on teaching discipline-specific knowledge but not design methods. Even where master classes and supervised studios [characteristic of architectural education] provide demonstrations, the student's ability to use an appropriate design method is rarely assessed: the design product is assessed and that is [incorrectly] assumed to include assessment of the method.

4.3 Can stakeholder expectations be satisfied without jeopardising accreditation?

Each of the stakeholders, *including the academic teachers*, has a broad field of interests but a narrow *primary focal* interest. If we differentiate between stakeholders and recognise only the *primary focus* of each stakeholder the conflicts are minimal [Table 2], providing a basis for satisfying at least the primary expectations of all stakeholders simultaneously.

Table 2. Transitional Criteria Framework: interelating stakeholder interests

Teacher and student focus			*Employers focus*	
GRADE	**FORMAL ASSESSMENT CRITERIA**		**INFORMAL ATTRIBUTES**	
Outstanding	Accreditable Tech + Theory	+ Higher Tech + Theory	+ Professional	+ Personal
Distinguished	Accreditable Tech + Theory	+ Higher Tech + Theory	+ Professional	
Creditable	Accreditable Tech + Theory	+ Higher Tech [or Theory]		
Passable	Accreditable Tech + Theory			
Failed	[Fail technical or theoretical]			
Accreditation Authority focus				

Table 2 shows a simplified Transitional Criteria Framework [TCF] for assessment in design education. The criteria for assessment are transitional according to the primary interests of respective stakeholders. That is, the most important values for employers are of diminished significance for accreditors [and vice-versa]. While values for teachers and students are aligned with each other, neither are aligned with values for accreditation or employers.

If the complex integrated skills expected of design graduates are to be developed through design education, then the criteria for assessment of students must be extended to include the design processes. Further, if students are to become the "complete" design graduates expected by employers and the community, then the formal criteria for assessment must be extended to include the informal "attributes" that are not part of the accreditation requirements. This would mean, however, acceptance of the radical principle that all should not be assesses on the same criteria, that is, that all assessment should be formal, and should be based on variable and transitional criteria, as indicated in Tables 1 and 2.

5. Conclusion

A dilemma for design teachers is that they are pressured to adhere to traditional discipline content and teaching methods that satisfy accreditation, but with little regard for the quality or effectiveness of their teaching. Traditional engagement of design practitioners as conjoint or part-time sessional teachers reinforces the dependence on discipline-specific content and traditional teaching processes, and militates against development of alternative approaches.

Attributes such as self-directed professionalism sought by employers, and the satisfaction sought by students are typically considered by academic teachers to be desirable but are outside the accreditable curriculum. However, the accreditable curriculum accounts for only the minimum pass-fail students and has little to do with high achievers, teaching excellence, or accountability, and contributes nothing to satisfaction of teachers or students, or employers.

The opportunity for design teachers is to re-define "design" and to re-design the pedagogical protocols with transitional assessment provisions that will satisfy all stakeholders. This will require accepting transitional curricula, some of which is outside the accreditation agenda, and some of which is outside the narrow specialisations of faculty staff. The balancing benefits, however, are greater stakeholder acceptance of the educational programme, leading to enhanced standing of the programme, of its graduates, and of faculty staff who provide it.

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