Enhancing the design curriculum through pedagogic research

Abstract

Pedagogic research is becoming increasingly recognised as an important aspect of academic life. Many generic studies (Marton, Saljo, Entwistle, Biggs, Gibbs, Prosser, Trigwell et al), focusing on broad concepts of student learning, have found a purchase within particular disciplines. Concepts of 'deep' and 'surface' approaches to learning are now commonplace within subject-based rationales. Approaches to assessment have also benefited from research of this kind. The value of this kind of research is most pertinent when it is used at subject level to explore the learning and teaching axis.

Subject-focused research, using these established frameworks and methodologies, is only just beginning to emerge. Inevitably, the application of this new research is not so widespread. Subject-based research asks the questions about what it is that is characteristic about learning and teaching a particular subject. Recent research in creative subjects (Reid A, 1998 and Reid A and Davies A, 2000) has revealed that the quality of learning is predicated on how both students and teachers conceptualise the subject of study. In design, for instance, what teachers think design is determines how they frame the curriculum and how they go about teaching. Equally, students beliefs about what design is underpin their intentions when they go about learning. The research reveals that there are significant qualitative differences amongst teachers as well as students as to what design is. This has an impact on the quality of the outcomes of learning design.

This paper explores the implications of the outcomes of this research on curriculum design and teaching methodologies in design education.

Approaches to learning

The concepts 'deep' and 'surface', when applied to students learning, are becoming increasingly popular in academic contexts. Most developed learning and teaching web-sites, particularly in Australian Universities, utilise these terms in helping new teachers to conceptualise the task of promoting high quality learning. In the recent round of subject quality review by the Quality Assurance Agency in the UK, the terms were commonly seen in the Self-Assessment documents which were prepared prior to the reviews themselves. In many instances, the terms are used atheoretically, taking for granted the inevitability that 'deep learning' is the principal aim of higher education and that 'surface leaning' is the antithesis of this. There is something almost *a priori* about the use of the terms in that the concept 'deep' offers up a much more profound conceptualisation of

learning than that of 'surface'. It would be foolish, in this case, for any teacher to align themselves with promoting surface learning even if they didn't recognise the theoretical usage of the terms. However, when we ask for concrete examples of what deep or surface learning consists in, in a particular subject, then the answers are not only less forthcoming but are also wide in their range of possibilities. What one teacher means by deep can be distinctly different to another's when it is discussed at subject level.

But the terms are convenient shorthand anyway since 'deep learning' and 'surface learning' per se were never used in the early research. Not only have the terms been appropriated from the research literature but they have, to some extent, been misunderstood. Nevertheless, they have conveniently found their way into much of the academic literature as part of the rhetoric of accountability and transparency that has emerged in the pursuit of the quality assurance of standards. However, the terms deep and surface were originally used to describe the qualitatively different *levels of processes* or *approaches* that students took to any learning situation (Marton F and Saljo R, 1976). There was a recognition in the early research that there was a strong, positive correlation between the quality of the outcomes of student learning and the approach (deep or surface) that students took to their learning (Svensson, 1984). Also, there was seen to be a strong correlation between student's approaches to learning and what they thought learning consisted in. For those students who believe that learning is about memorising what is put in front of them by the teacher, they tend to focus on the concrete and literal aspects of the task. The strategy they adopt is limited to recalling the components, usually through literal description. This is a surface approach. The approach is constrained because these students have rather limited views about the nature of learning at university.

Students who take a deep approach to learning have a focus on understanding and making sense of the material in front of them. They look beyond the literal aspects of the material through interpretation and analysis. Whilst students who take a surface approach disregard underlying structures within the material, students who take a deep approach seek out relational aspects both within the material and to other conceptual frameworks. Marton and Saljo observed that,

> 'We had been looking for an answer to the question of why the students had arrived at those qualitatively different ways of understanding the text as a whole. What we found was that *the students who did not get 'the point' failed to do so simply because they were not looking for it*.'
> (Marton and Saljo, 1984)

Students who take a deep approach often do so because they see a personal benefit in learning. It enables them to see the world in a much more complex and interesting way. To this extent, the *intentions* of learners often determine the approach that they take and, consequently, the quality of the learning outcome. Whilst deep and surface approaches relate to particular learning occasions, students tend to demonstrate a predominant orientation towards either approach depending on what they believe learning consists in in particular learning contexts.

The *prior experience* of learning in other contexts, therefore, often has a significant impact on how individuals approach learning in new contexts. Learners who have only experience of curricula and teaching which promote a surface approach are more than likely to expect this experience in any new contexts. Hence, they approach new learning situations with a strong expectation that success in learning will require the approach they adopted in the previous context. That, for them, is what learning consists in.

It follows from this that, in order to improve the quality of student learning, we must, as teachers, help those students who take a predominantly surface approach to learning in their formal studies to develop deeper, more sophisticated conceptions of what learning consists in. Indeed, the major task of education is to enable those students who 'just don't get it' to begin to think differently about what learning is for them. We need to help students who conceptualise learning as teacher-focused to experience, believe and trust that effective learning is something that they do to themselves. This requires a substantial paradigm shift in their beliefs about learning - a greater shift to the act of studying a subject than those who already take a deep approach to learning. This is the first pedagogic challenge.

In the early eighties, Biggs (Biggs J, 1982) offered a taxonomy which helped to understand more clearly the *structural complexity* of student responses to tasks set. The SOLO (Structure of the Observed Learning Outcomes) taxonomy is a learning cycle, is hierarchical and has five basic levels:

> 1 Prestructural: The task is engaged but the learner is distracted or misled by irrelevancies
> 2 Unistructural: The learner focuses on the relevant domain and picks up one aspect to work with
> 3 Multistructural: The learner picks up more and more relevant features but does not integrate them
> 4 Relational: The learner integrates the parts with each other so that the whole has coherent structure and meaning

5 Extended abstract: The learner generalises the structure to take in new and more abstract features representing a new and higher mode of operation

Levels 1 - 3 can be seen as surface approaches and levels 4 - 5 as deep approaches. I design terms, examples of the taxonomy might be:

Prestructural: The student is preoccupied with the outcomes of a previous project and is unwilling to move on. The new project is tackled by attempting to draw in the main features of the previous project despite them being inappropriate to what is required

Unistructural: The student believes that there are right and wrong answers to projects set. Their task is to find the answer that best suits what they think the teacher wants.

Multistructural: The student believes that doing lots of work is required. They are inclined to spend more time 'researching' than any other aspect of the task. They gather lots of material but do not use the material in developing and integrating their thinking.

Relational: The student attempts to identify different interpretations of the project and considers a range of possible outcomes. Although their 'research' is focused on the project set they are open to embracing unexpected outcomes of the research activity. They are inclined to see the purpose of the project as developing their conception of the subject that they are studying.

Extended abstract: Whilst this approach involves relational activity, a design student taking this approach might begin to question assumptions about the nature of the brief which derived from their investigations. The are likely to look beyond design principles to satisfy their curiosity.

Although these categories are hierarchical, it should be recognised that each category will involve some elements of the previous one in the hierarchy. For instance, students who take a surface approach often focus on the skills and techniques required without too much concern about their cognitive development. Students who take a deep approach, on the other hand, whilst focusing primarily on the conceptual challenge of the problems to solve will, inevitable, seek to make judgements about which are the most appropriate tools and skills required to achieve their objectives. These students learn the skills and techniques by applying their understanding of design principles.

Also, whilst these categories are considered developmental in the learning cycle, students who have a conception of learning which is teacher-centred and focused on the concrete

elements design, such as learning skills etc. are unlikely to have experience of levels 4 and 5 and therefore have no intention of achieving them.

Students also hold views on the nature of the subject of study, in this case, design. In a recent study on the qualitative variation in students' conceptions of, and approaches to, the studying of design (Davies A and Reid A, 2000), some students expressed a quite limited conception of what they thought design consisted in. It amounted to a strong belief that design was about the manipulation of certain skills and techniques that had to be learned in order for them to be used in the industry. There views were particularly concrete and stable about the world of design:

> *'........whereas on Fridays, being the best day, because I go there, I get taught the trade, I get taught skills. That is what I want the most. Learn software programmes or any kind of craft that can help.....Because I want to become more professional, master a skill'*
> or
> *'I think you need to be able to step out of university and into a job and have all the skills necessary for working in the field that you have chosen'*

Students holding a slightly more sophisticated conception relied heavily on the practical with the belief that doing 'research' was important if you wanted to get ideas. Research in this context amounted to gathering as much potentially useful material in relation to the project set and picking one or two ideas to elaborate:

> *'You have to get your research down to a 't' because it has to be correct. You do that then you do some practice runs... and you will show your teacher and she will go: "That is good" or "That is bad, maybe you could do this to improve that, maybe if you go away and do this" and you will go away and you will do that two or three practice runs and try things out and then you will do your assessment.*

In neither instances did these students express concern about conceptual development or expanding their conception of what design might be. For them it was taken for granted.

Some students saw design as a cognitive and interpretive activity which required a focus on solving problems set. Even so, some of these students saw problem-solving as an extrinsic activity that was a skill within the nature of the subject rather than an intrinsically intellectual and personal challenge which other students expressed:

'So I think it is probably critical to think of the equilibrium of design - like designer and user and whether you are thinking about aesthetics or function, communication or just looking pretty. I think its important to find the balance between these two'

The most sophisticated conception was expressed by those students who looked beyond design and its principles towards greater moral and social understanding. This is a view of design which is about living in the world as a human being which requires a recognition of socio/political contexts which integrate with design principles and practice.

Students who engage in the more sophisticated conceptions will engage with the elements expressed by the less sophisticated views but in a more considered and integrated way.

We can see from this that there are two very strong perspectives, conceptions of learning and teaching and conceptions of the subject of study, which can play a major role in determining the quality of learning students learning outcomes in studying design.

Factors which contribute to the quality of student learning
There are, of course, factors beyond the learner which bear upon their approach. The teaching methods used, the nature of the curriculum and, most significantly, assessment (Gibbs, 1991).

Teaching approaches
There are a number of recent studies which focus on what teachers think they are doing when they are teaching (Prosser M and Trigwell K, 1999). Again, there appears a qualitatively differentiated hierarchy of conceptions of teaching which range from intentions to simply cover the syllabus or transfer the understandings of the teacher through to helping students to change and develop their conceptions. These qualitatively different conceptions can have a marked influence on the quality of student learning. Teachers design projects, syllabus and curricula on the basis of what they believe students should learn

In a recent study on design teachers' conceptions of teaching (Davies A and Reid A 2000) some teachers expressed a commitment to teaching students their own practical expertise, explaining that, without basic skills, students were unlikely to find employment in the industry. Similarly, some teachers felt that somehow they should teach students what they thought the principles of design were through aspects of the defined curriculum. There was a strong focus on the teachers being responsible for the learning and transferring

what they knew about design to the students. This approach was predominant in design education in the UK until recently, primarily through what became known as 'sitting by nellie' (Swann C, 1986) - a now dubious expression, taken from the practice of inducting new workers into the weaving industry in the 19th C. It assumed that learning happened on a one-to-one basis between teacher and student by seeing and doing. The practitioner passes on the relevant skills by some form of osmosis. Of recent times, increased class sizes have required teachers to abandon the one-to-one approach although the conception of teaching may not have changed.

Some design teachers believe that learning is best achieved when the students are busy doing something to solve the problems the teachers have set, normally outlined in the form of a brief which is seen to mirror practices within the design industry. There is a strong teacher-focus here with the teacher often playing the role of both senior manager (in the outlining of the brief/project) and client (in the assessment). Students are encouraged to see themselves as key participants in the process of learning design but it is essentially about them identifying problems and trying to satisfy what other people want.

Some design teachers design curriculum activities in the belief that learning is about constructing personal understandings through interpreting and experimenting. The focus for them is on helping students to develop and change their understanding of the nature of design through problem-finding. The emphasis is much more on divergent thinking where the student is encouraged to find a range of alternative solutions to the brief set. These teachers tend to see the issues of learning from a student's perspective.

Finally some teachers regarded learning as helping students to become change-agents in society. They encourage students not only to reflect on the subject of design but also to become autonomous learners within the wider community.

These same teachers were also asked about what they thought was the nature of the subject they were teaching. This conception, in building on an earlier study in music (Reid A, 1996), is known as the 'Design Entity'.

Some teachers regarded design as product-oriented which involves the honing and developing of the skills and techniques which contribute to the making of these objects. The objects were often seen as the principal elements in the assessment process and grades or marks awarded to the 'quality' of the object.

Other teachers saw design as solving other peoples' problems in which the criteria of success was the satisfaction of the client. Problem-solving, particularly in relation to the tension between the aesthetic elements of the material outcome and its functionality, was seen as the core aspect of design practice, although some teachers looked beyond this to claiming the designer's role to be that of bringing all of these elements together and 'orchestrating' the whole.

A more sophisticated view of design was intrinsically cognitive. Not only are analytical and creative abilities required but design led to new ways of seeing the world. Often this involved an understanding of the community in which the design was operational and how design impacted on it. Some teachers considered that true designing required an understanding of human agency - who we are as people.

Each of these descriptors can be seen as qualitatively different categories which define the limitations on how teachers regard what learning and teaching is and what the subject of study, design in this case, consists in. Not surprisingly, those teachers who held a somewhat unsophisticated view of what design is also held rather unsophisticated views about how students go about learning and how they themselves should go about teaching.

We see, then, the qualitativly different conceptions that teachers have about the job that they are doing. Teachers who believe that the basic skills of design are essential for student learning, particularly if they are to gain employment, will organise the curriculum, projects and their own teaching to emphasise these aspects of the design process. Equally, design teachers who believe that learning design is about problem solving will set their projects differently, often emphasising the challenge of establishing a balance between the aesthetic and functional values.

Given that teachers tend to teach in relation to their implicit theories of learning (Biggs, 1999), and that they are usually responsible for the syllabus, teachers with limited conceptions of teaching are more likely to promote surface approaches to learning than those teachers who hold a more sophisticated, student-centred, conceptions of teaching and who have intentions of deepening students understanding of the subject of study.

In the figure below (Fig 1), the potential relationship between teacher and student is outlined with examples of the kind of focus that might occur when the conceptions of learning and teaching and the conception of the design entity are shared. This mutuality, at whatever level of engagement, is conflict free and often leads to a productive relationship - despite the quality of the learning.

Design entity (teacher's focus) Student approach	Making/Doing	Interpreting/ Experimenting	Living
Unistructural	Product/skills oriented Finding the right answer Satisfying the teacher		
Multi structural	Collecting information Increasing skills	'Researching' Trying things out	
Relational		Making sense Choosing appropriate tools Orchestrating the parts Informed judgements	
Extended abstract		Seeking alternatives beyond design principles Teacher as facilitator	Self-authorship Seeing the world differently Change-agency Challenging design principles

Fig. 1

It is possible to make two observations from these scenarios. Firstly, students and teachers working in the same learning context and sharing the same conceptions are likely to reinforce each others attitudes. Secondly, students and teachers who do not share this mutuality are likely to be in conflict, although the cause is rarely revealed.

Curriculum design
Understanding how students learn can help teachers develop their teaching. But understanding how students learn can also contribute to much more constructed curriculum design. When interviewed, some teachers of design described how it was important to introduce students to all the basic skills in the first year, arguing that these are necessary for producing the material outcomes of the more independent, ideas-based activities in the later years. This makes sense but only from the teacher's perspective. We have already seen how some students have an already formulated view about design bring about learning skills. If they have formulated this view prior to embarking on a degree programme, then the first year curriculum will be no surprise to them - it will simply reinforce their beliefs and intentions. Imagine that these skills are taught, for efficiency sake, in a strong teacher/demonstrator way. What more could encourage a surface approach? And consider the struggle (often internally and un-stated) that these students have when they begin to realise that design is becoming something different to what they believed and that they have had little preparation for this new, ideas-based

activity. Students who take a deep approach often take a limiting curriculum in their stride. They are able to see possibilities beyond the prescriptions of the teacher and the curriculum. Yet these teachers, because of the success of the able students, continue to believe that the curriculum is appropriate and it's the fault of the student if they 'don't get it'.

If we value the more sophisticated conceptions of design as expressed earlier and we genuinely believe that learning at university is about becoming autonomous then these are the values which should be promoted at the beginning of the curriculum. Students need to be inducted into these values and have opportunities to experience them and, on occasions, get them wrong. There is much made of risk-taking and experimentation in the learning of design, yet many students limit the risks in a context which is teacher-centred and the outcomes and assessment criteria are unclear or poorly articulated.

Assessment

Assessment is well recognised as a major driver in student learning (Gibbs G, 1992). In their study, Entwistle, Hanley and Ratcliffe (1979) observed, along with meaning orientations (deep) and reproducing orientations (surface), a *strategic* orientation towards learning by some students. It was recognised that students with a reproducing conception, adopted a *surface apathetic* approach, and preferred teaching that transmits information and directs learning towards assessment requirements. Other research has indicated that students who show a deep strategic approach are better able to discern and utilise the aspects of a learning environment which will support their way of studying (Meyer, Parsons & Dunne, 1990; Meyer, 1991). In other words, students who are mindful of the assessment requirements of a project can take a either a deep or surface approach to them. Getting high grades becomes the focus of the students' attention rather than a focus on the subject of study or their own intrinsic success as learners. Most students, at some point in a project, will ask the question, 'What do I have to do to do well in this project?' Students who take a deep approach will be able to accommodate the assessment requirements in their approach. Students who take a surface approach will be driven by the requirements. In a study of the strategic approaches taken by psychology students (Norton LS, Dickens T, & Cook NM,1996) in relation to coursework assessment over half the students admitted to playing the role of 'the good student' with the expectation that this strategy would influence the teacher's judgement of their work.

Designing assessment tasks which promote a deep approach to learning requires that the learning outcomes and assessment are clearly defined and relate to each other. Biggs (1999) has articulated an approach to curriculum design in which all the elements of the learning context have to be 'constructively aligned' in order to encourage a deep approach.

In an attempt to explicate the observation by the Quality Assurance Agency (QAA), in their overview report on the quality of provision in the Art and Design sector in the UK, that:

> there is a widespread need to improve the definition of assessment criteria, to relate them to published learning outcomes and to use them consistently.

a project, funded by the Art and Design - Learning and Teaching Subject Network (ADC-TSN) in 2001, and conducted by the author found that concern about the administrative aspects of assessment needed to be complemented by further teacher and curricular activity. Informed by the work of Rust, Price and O'Donovan (2001), it recommended that:

- Learning outcomes in art and design should not only be clearly written but should also promote divergent thinking (imagination, creativity, visualisation etc) outcomes.
- The assessment criteria should be criterion referenced, related to the subject of study, and be capable of differentiating levels of achievement of the learning outcomes
- The strategy for using the assessment criteria to determine the level of achievement of the criteria should be explicit.
- Curriculum and learning and teaching strategies (eg socialisation events, learning teams, learning logs, learning agreements, self-and peer-assessments) should be developed within the curriculum experience to enable students to understand what is required from the learning outcomes (written material alone is not enough) and what they have to do to perform well.
- The course team should ensure that they also understand what they are asking of the students and be able to articulate it between themselves as well as with students.

One of the key observations made during this research was that simply offering students the information on the project, no matter how well documented and 'constructively aligned' it was, was not sufficient in helping them to understand the key concepts which underpinned the tasks. It was observed that, even within projects at subject level, students' conceptions of the key concepts, such as 'analyse', 'research', 'create' etc as well as common concepts such as 'design' varied substantially from each other's and particularly from the teacher's. Often, the terms mean different things in different subjects. Students analyse differently in sociology to the way the do in, say, psychology or business studies. The key here is to construct the introduction to the briefings, etc so

that students have the opportunity to test out their understanding of these concepts against those of other students and, of course, those of the teacher's.

One of the important challenges in helping design students to not only understand the tasks in design education but support them as creative thinkers is to articulate the learning outcomes in a form that promotes this kind of thinking. One of the difficulties here is that it seems to be much more straight forward to write learning outcomes that relate to convergent thinking, which usually involves logically moving from the general to the particular or even generating theories, than to divergent thinking, which is often seeking a potential range of alternative outcomes (Hartley,J 1998; Heywood J, 2000). Making judgements that qualitatively differentiate the level of achievement of these learning outcomes is equally challenging for teachers. Helping students understand the assessment requirements requires as much orientation into the project as does that for the learning outcomes. Students are less likely to take a surface approach to assessment if they understand the judgements and how they are made during assessment particularly if they are rewarded for 'creativity', 'risk taking' etc if these are the concepts which appear in the learning outcomes.

Summary

This paper has attempted to lay out just a few of the issues that emerge when we begin to recognise that there are significant difference between what students think they are doing when they are studying a particular subject, in this case design, and what teachers think they are teaching. If the conflict of intentions between students and teaches continues unexplored in any teaching/learning context then the potentiality for students taking a surface approach are significantly enhanced. Research into design education need not be profound in order to bring successful rewards. There is more than enough generic research into student learning for teachers to begin to use it to interrogate their own practise. Small-scale action research projects in relation to individual practice can often provide significant insight into specific learning and teaching contexts and help teachers design curricula, learning and teaching and assessment tasks which promote the kind of learning that genuinely do transform student understanding of the subject of study.

References

Biggs JB. (1996). Enhancing Teaching Through Constructive Alignment. Higher Education.32.

Biggs, J.B. (1999), Teaching for Quality Learning at University. Buckingham, Open University Press.

Biggs JB,&Collis KF. (1982) Evaluating the Quality of Learning: The SOLO Taxonomy. New York. Academic Press.

Biggs, JB. (1999) Teaching for Quality Learning at University, SRHE & OU Press

Davies, A. (2000), 'Uncovering problematics in art and design teaching and assessment' in Rust C (ed), Improving Student Learning (1999), OCSLD

Entwistle NJ. (1992). Student Learning and Study Strategies in Clark, BR & Neave, G (eds) The Encyclopedia of Higher Education. Oxford. Pergamon.

Entwistle N, Hanley and Ratcliffe. (1979), Approaches to Learning and Levels of Understanding, British Educational Research Journal 5

Gibbs, G. (1992), Improving the Quality of Student Learning, TES

Hartley,J. (1998) Learning and Studying. A Research Perspective, London, Routledge

Heywood J. (2000) Assessment in Higher Education, JKP

Marton, F and Saljo, R. (1976), On qualitative differences in learning – Outcome and process, British Journal of Educational Psychology

Marton, F and Saljo, R. (1984), 'Approaches to learning' . In F.Marton, D Hounsell and N. Entwistle (eds) The Experience of Learning, Scottish Academy Press

Meyer J.H.F. Parsons P. and Dunne T.T. (1990), Individual study orchestrations and their association with learning outcomes, Higher education, 11

Norton LS, Dickens T, & Cook NM (1996) Coursework Assessment: What Are Tutors Really Looking For? in Gibbs G (ed) Improving Student learning: Using Research to Improve Student Learning. OCSD. Oxford.

Price M et al (2001)*Strategies to develop students' understanding of assessment criteria and processes,* in Rust C (ed), Improving Student Learning Symposia 2000, OCSLD

Prosser M and Trigwell K (1999), Understanding Learning and Teaching, OUP

Reid, A. (2000). Musicians' Experience of the Musical World: Relations with teaching and learning, in Rust, C (ed) Improving Student Learning, OCSLD

Reid, A and Davies, A (2000), Variation in teachers' and students' understanding of professional work and teaching and learning in design (awaiting publication)

Swan, C. (1986), Nellie is Dead, Designer

Swan, C. et al, (1989), On not sitting with Nellie, CNAA/CHEAD seminar paper

Svensson, L (1984), Skill in learning. In F. Marton, N. Entwistle and D. Hounsell (Eds.) The Experience of Learning. Scottish Academic Press