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Design Education in Architecture:  
A Psychosocial Analysis

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Abstract

Despite strong criticism of the design studio as a method of teaching and learning, little work has been conducted in evaluating its effectiveness and efficiency. In an attempt to instigate such investigation, this Paper highlights the need for the learning environment to be conceptualised holistically with attention paid to such influential variables as the nature of the content and task; the characteristics of the students and the teacher; and the psychosocial aspects of person-environment interaction. Particular attention is paid to the role of classroom climate studies in facilitating and assessing changes to the learning environment.

At present design educators give very little consideration to ‘designing’ teaching and learning environments that take into account the multiplicity of factors affecting teacher and student performance. In the design studio, for example, tutors view themselves, almost exclusively, as designers rather than accepting their dual role of designer and teacher. Consequently, instructional, diagnostic and remedial issues are approached blindly, without any real understanding of how design knowledge is acquired and applied, and without appreciating what factors are influential in determining the level and quality of design(ing) performance.

The studio as a method of teaching architectural design, interior design and other related disciplines, is often criticised by administrators and some design educators for its substantial reliance on time and resources. Despite these criticisms and others concerning efficiency and effectiveness, the quality of the studio learning environment and its suitability for teaching design and designing has attracted only superficial and selective attention.

In order to carry out extensive evaluation it is necessary to have an understanding of the range of variables constituting the environment and the effect of the interaction of the variables on learning performance. Underpinning this approach is the Lewinian paradigm, $B = f(P, E)$, which views behaviour as a function of the person and the environment. According to Stern (1964), Kurt Lewin’s purpose in developing such an equation was “to conceptualise behaviour as a molar event, involving an actor and a broad contextual setting, as opposed to what he perceived as the then prevailing trend towards correlating fragmented responses with equally discrete stimuli” (p. 161).

Similarly, this Paper attempts to conceptualise the teaching/learning of architectural designing as a type of cognitive behaviour incorporating the interaction of the environment with the personal characteristics of students, lecturers and tutors in an educational setting such as a studio. The nature of the subject content, in this case architectural design(ing), is included as an environmental variable and is conceptualised as a cognitive skill demanding for its development domain specifically (determinate and indeterminate problems of a repertoire of
problem types and specific procedures), and generality (attention to metacognition and higher-order procedural skills to aid transferability and decision-making).

In devising a framework for the discussion which follows, the Paper draws upon recent research in learning and action which accepts a constructivist/information-processing approach (as opposed to a Behaviouristic approach) to understanding skill development. Once the suitability of the framework is established for the conceptualisation of design behaviour, further discussion concentrates on the interactive demands of learning and teaching, with particular reference to psychosocial aspects including the notion of person-environment fit. At this point the Paper surveys a number of studies undertaken in Australia concerning classroom climate.

The conclusion emphasises the need for those design educators interested in taking up the challenge to maximise learning, to consider the possibility “that the total pattern of congruence between personal needs and environmental press is more predictive of achievement, growth and change, than any single aspect of either the person or the environment” (Pace & Stern, 1958, p. 276).

Understanding Learning and Action


Brown, Bransford, Ferrara & Campione (1983) propose that there are a minimum of four factors that comprise the learner-in-context. The four factors are: (1) the learner’s activity which relates to the deliberate plans and routines called into service for remembering, learning and problem solving; (2) the characteristics of the learner, incorporating existing skills, knowledge and attitudes; (3) the nature of the materials to be learned with particular reference to the compatibility of the organisation in the material with the learner’s extant knowledge; and (4) the criterial task or, in other words, the aim of the learning activity. Effective and flexible learning involves tailoring activities finely to the competing demands of all these forces.

The interactive nature of learning is also emphasised by Wittrock (1986) whose research on students’ thought processes points to the critical role that student background knowledge, perceptions on instruction, attention to the teacher, motivation and attribution to learning, affective processes and ability to generate interpretations and understanding of instructions play in teaching and in influencing student achievement. White & Tischer (1986) express a similar view of learning by regarding it as a new arrangement of memory determined by external influences, prior memory, abilities and attitudes.

The approach that a student takes to a learning task has formed the focus for research by Biggs (1987) who believes that learners react in a way typical across situations as well as in a way dictated by a particular situation and that they react by selecting learning strategies that are congruent with their motives. Learning strategies connected to motives, learner ability and personality can, generally, be categorised according to the amount of effort investment. Some learners, for example, display an initial state of effort avoidance; some display a state-orientation, wherein attention is focused on some internal or external concern; some exhibit action-orientated whereby a variety of control strategies are utilised to protect their intention-action sequence form competing tendencies; some could be identified as master-oriented in that they believe that ability improves with learning and, consequently, direct their actions toward this end; and some are performance-oriented believing their ability to be fixed and, as such, direct their attentions toward teacher evaluation (Snow, 1989).
The fact that students appear to be aware, to some degree, of the task demand, their motives and abilities and their ability to control strategies suggests that they are, to varying levels, metacognitively developed when they approach learning situations. In many cases, however, a student’s potential to learn how to learn is not explored because of inflexible instructional tasks, authoritative teaching and an absence of a theoretical learning model which empowers both teachers and learners.

The notion of metacognition and learning how to learn is taken up by Evans (in press) who adopts the view that learning is, essentially, about how individuals process and construct information under executive control. While this approach concentrates on the process of cognitive skill acquisition and the nature of the controlling processes, it does not deny the influence of the task, the context and the characteristics of the learner on the behavioural outcome. From this point of view the work of Snow (1989) is also worth consideration in that it highlights the premise that learners come to instruction with prior knowledge, skills and values and that achievement and learning performance involves a transition from initial states of cognitive and conative development to the desired states of deep understanding, efficient intuitive use, multiple flexible strategies, adaptive action control and achievement motivation.

While these approaches to understanding learning are distinguishable by different points of emphasis, they are similar in that they accept that individuals actively construct their reality and that learning, explained in terms of the use of existing knowledge and the restructuring of existing knowledge to replace or reformulate old concepts and relationships, is influenced by a range of variables summarised in Figure 1.

![Figure 1: Model of factors influencing the learning process](image)
Understanding Architectural Designing

Using the theory of learning and action outlined in the previous section, a framework for understanding architectural designing in an educational context can be constructed (Figure 2). While Dilnot (1982) would suggest that a comprehension of design is based not on the products of design activity nor on the problems design seeks to solve but on the activity itself, the approach adopted in this section is that the process cannot be discussed to the exclusion of the task, the person or the context since it is the nature of the problem which dictates the process and it is the person and the context which determines the quality of the learning process and its outcome. With respect to the distinctive nature of designing behaviour, Cross (1982) suggests that designerly ways of behaving which he describes as constructive, normative and creative, are not just embodiments of any intrinsic inadequacies of designers but are more likely to be a reflection of the nature of the design task and of the nature of the kinds of problems designers tackle. This statement does not decry the significance of the person or the context to the outcome but seeks to highlight the connection between the nature of the design problem and the problem solving process.

“Within the logic of designing there are various frames of reference that may result in rather different types of designing …. We see designing, not any designing, but the design of practiced architects, as rooted in the designer’s appreciation of a particular site and in the architectonic ideas evoked in him (sic) by that appreciation” (Porter, 1988, p. 169). Architectural design and closely allied fields such as interior design, therefore, have their own kind of reasoning independent of but affected by the designer’s appreciative judgements. What this alludes to is that architectural designing while involving problem solving and information processing is also something else. It is, as Schon (1988) describes, a kind of ‘making’ expressed in designers’ transactions with materials, conditions under which they are made, and the manner of making. This understanding is also expressed by Goldschmidt (1983) who states that design is doing and architecture is making.

In accordance with this view Goldschmidt (1983) has developed a model of architectural designing which closely parallels the designing learning and action framework illustrated in Figure 2. The model is expressed as

\[
A \rightarrow B \rightarrow AD
\]

where ‘A’ is identified as definition/design imperatives, ‘B’ the interpretation/personalised program, ‘#’ independent inputs/design modifier, and ‘AD’ architectural design.

In more detail ‘A’ represents the initial stage in any design process where the design task is described and the designer is concerned with the information relevant to the task. The information can be organised in a number of ways or domains (Schon, 1988). Goldschmidt (1983) proposes that four categories suffice to list every possible design demand that can be described for a given task. These include functional needs, cultural heritage, climate and site characteristics, and available resources.

Once the information has been collected and categorised, the designer then has to make a stance regarding the problem (identified as ‘B’ in the Goldschmidt model). “The designer must frame a problematic design situation: set its boundaries, select particular things and relations for attention, and impose on the situation a coherence that guides subsequent moves” (Schon, 1988, p. 182). To further understand this the framework of problem solving behaviour developed by Newell & Simon (1972) is most helpful. Underlying this framework
is the theory that describes behaviour as an interaction between an information-processing system (the problem solver) and a task environment, incorporating the problem to be solved. It is interesting to note that this theory is also basic to an understanding of cognitive development and behaviour and is the premise for the learning and action framework used as an overall structure by this Paper.

With respect to the problem solving framework, distinction is drawn between the task environment and the problem solver’s perception of the task environment – the problem space which is where problem solving takes place and which, for the most part, determines the possible strategies to be used in attempting to solve a particular problem. Biggs (1987), of course, would take this one step further and propose that the motives held by an individual, in terms of the outcome, determine the strategies and, ultimately, the problem space. Goldschmidt (1983) refers to this input as a design modifier (#), the origins of which are deeply rooted in the designer’s inner life and the make-up of his or her personality.

It is the structure of the problem space, according to Simon (1981), that constrains behaviour by defining the ‘legal’ moves; by defining the goal and direction toward or away from the goal; and by having to rely, in part, on the limits of short-term memory. Effective and efficient problem solving, therefore, involves extracting information about the structure of the task environment which is as accurate a description of the task environment as possible and using the information for highly selective heuristic searches for patterns.

Problems contained in the task environment vary according to the degree to which they can be defined. Some architectural problems, for instance, are well-defined in that they exhibit specified initial conditions, operations and goals. Others, and these can be labelled design problems, are ill-defined, possessing poorly specified initial conditions, operations and goals. While well-structured problems do require some information stored in long term memory (LTM), ill-structured problems require extensive use of LTM, in addition to information from external resources. Basically, the procedures for solving well- and ill-structured problems are the same, except that for ill-structured problems the conception of the problem alters gradually as new elements are evoked from LTM or from outside sources, and a wide repertory of recognition processes is necessary to evaluate the appropriateness of each altered state (Simon, 1981). Expressed in terms of the Evans (in press) framework the distinction between well-defined problems and design problems is related to the degree to which executive procedures are utilised through propositional knowledge to develop and control high-order and specific procedures. Executive procedures are seen to be responsible for setting, domain and task identification; goal and plan formation; activation and deployment of resources; monitoring progress on the current task in terms of goals and values; making use of feedback; decisions to continue, change or terminate activity; and storage of current states of activity.

The point is made by a number of researchers that an important step towards understanding how knowledge is acquired and controlled lies in distinguishing clearly among the major kinds of learning. Ausubel (1985), for example, makes a distinction between reception and discovery learning and another between rote and meaningful learning. Unlike some professional courses, the nature of design problems demands that students develop expertise in using existing or acquired knowledge in solving problems independently and critically, as well as building on the existing repertoire of concepts and propositions through reception. While some auxiliary knowledge in architecture can be acquired through rote learning, the knowledge and skills associated with designing must be meaningfully learned, i.e., it must be linked with some prior knowledge. It is when this link is not made the frustration and helplessness are experienced by both the teacher and the student.

The frustration for design students is further heightened when they realise that designing skill cannot be given to them by the teacher but must be constructed by them through their action
and reflection. Design as a reflective conversation with the situation has been analysed to a great extent by Schon (1983) who stipulates that in a good design process the conversation with the situation must be reflective. "In answer to the situation’s back-talk, the designer reflects-in-action on the construction of the problem, the strategies of action, or the model of the phenomena which have been implicit in his (sic) moves” (p. 79). In the design studio this approach to developing design expertise is used by providing students with the opportunity to mimic the design process as modelled by ‘expert’ designers. Unfortunately, the inability of the ‘expert’ to make explicit his or her procedures involved in the process only adds to the mystification of designing which, ultimately, hinders effective and efficient learning. For education, the aim is to describe these design processes and to understand and promote the development of these processes in students (Portillo & Dohr, 1989).

The discussion to this point has indicated that such understanding is based upon the interaction of the task and its inherent demands on the student in terms of his or her knowledge and cognitive skills. While not explored in detail, mention was also made of the need to consider the student’s preferred learning style, reasons for learning and expectations about what is to be learned. Similarly, the learning environment also makes demands of the teacher whose actions significantly determine the level of cognitive performance attained by the student.

The development of designing behaviour in students is, however, also affected by their expectations and perceptions of the environment to fulfil their needs and of the teacher’s expectations and perceptions of the same learning environment. These learning environment variables have all too often been neglected as predictors of performance.

**Psychosocial Aspects of the Learning Environment**

Following Lewin’s studies relating to topological psychology is the much celebrated work of Murray (1938) and Pace & Stern (1958). Murray (1938) was the first to recognise the dual process of personal needs and environmental press by suggesting that individuals have specific needs which are either potentially satisfied or frustrated by the environment. This approach to understanding human behaviour allowed representation of person and environment in common terms – an important methodological consideration for research and measurement. More explicitly persons were conceptualised and measured in terms of psychological needs; environments were conceptualised and measured in terms of their environmental press; and behaviour was viewed as the outcome of the interactions and transactions of persons with environments (Genn, 1984). This concept of person-environment fit was developed further by Pace & Stern (1958) who believed that a person’s perceptions of the environment influenced behaviour in that environment.

Subsequent studies from 1958 indicate a diversity of approaches relating to person-environment interaction with the perspective adopted being determined by the nature of the study, its context and application. Hunt (1975), for example, proposed a model for matching teaching methods with student characteristics based on the notion of the need for consistency between the degree of environmental structure and learner development. In terms of classroom climate and class success at the university level, the work by De Young (1977) is worth further investigation. Believing that teacher delivery or presentation was but one factor influencing the intellectual climate of the classroom, De Young (1977) undertook a study to assess the psychosocial characteristics of the classroom from a social climate perspective. In addition, the study sought to manipulate the measured social/intellectual climate to facilitate specific learning objectives and understanding of course content. The conclusion from the study was that social climate methodology was a useful tool in helping to provide an understanding of the dynamics of the classroom from the students’ viewpoint.
In Australia, research on classroom environment has followed a number of directions. These include (a) predictive validity studies of environment-learning associations, (b) use of classroom environment dimensions as criterion variables, (c) investigation of the differences between student and teacher perceptions of actual and preferred classroom environment, (d) person-environment fit studies of associations between student learning and the congruence between actual and preferred environment, and (e) practical attempts to facilitate improvements in classroom environments (Fraser, 1981). It should be noted at this point that this research makes use of data obtained from the perception of students and teachers to assess and study classroom environment rather than naturalistic techniques and interaction analysis which tend to highlight the observer’s perceptions of the environment rather than those of the student and the teacher.

Despite the variation in studies (Power & Tischer, 1976; Fraser & Fisher, 1983; and Rentoul & Fraser, 1979) undertaken with respect to the predictability of student cognitive and affective outcomes from classroom environment perceptions, the results provide convincing and consistent support for the predictive validity of student perceptions in accounting for appreciable amounts of variance in learning outcomes (often beyond that attributable to student characteristics such as those previously identified) (Fraser, 1981).

Used as criterion variables classroom environment dimensions have provided valid criteria for the evaluation of instructional materials and curricula. Studies by Fraser (1984) and Fraser & Fisher (1983) point to the effectiveness of using actual and preferred forms of classroom environment instruments in comparisons of students’ and teachers’ perceptions of actual and preferred classroom environment. The results of these studies indicate that students and teachers are likely to differ in the way that they perceive the actual environment of the same classroom and that the environment preferred by students and teachers differs from that actually present in the classroom.

From the studies previously identified, those associated with Barry Fraser are perhaps the most significant for the Australian educational context including tertiary environments. Of particular note is the study by Rentoul & Fraser (1979) which was concerned with the conceptualisation of enquiry-based and open classroom learning environments. The outcome of this research was an instrument, the Individualised Classroom Environment Questionnaire (ICEQ), which was designed specifically to describe, classify and measure those learning dimensions which differentiate conventional classrooms from individualised ones involving either enquiry-based or open approaches.
Table 1: Description of scales in the Individualised Classroom Environment Questionnaire (ICEQ) and their classification according to Moos’ scheme for conceptualising human environments (Rentoul & Fraser, 1979, p. 240).

The framework for developing the ICEQ is based on the findings of Moos who undertook an intensive study of eight different kinds of environments. According to Moos (1979) all human environments can be characterised by certain common dimensions involving three broad domains: relationship dimensions; personal growth or goal-orientation dimensions; and system maintenance and change dimensions. Table 1 presents a description of scales in the ICEQ and their classification with respect to these domains.

The final version of the ICEQ consists of 50 items, with 10 of these measuring each of the five scales identified in Table 1. An important feature of the instrument is that the scales have been designed to measure all four of the following:

1. Students’ perceptions of their actual learning environment;
2. Students’ perceptions of their preferred learning environment;
3. Teachers’ perceptions of their actual learning environment;
4. Teachers’ perceptions of their preferred learning environment.

<table>
<thead>
<tr>
<th>Scale</th>
<th>ICEQ Description of scale</th>
<th>Sample item</th>
<th>Basic type of dimension</th>
<th>Moos’ classification of human environments Description of basic type of dimension</th>
<th>Examples of specific dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalization</td>
<td>Opportunities are provided for individual students to interact with the teacher and there is concern for the personal welfare and social growth of the individual.</td>
<td>The teacher takes a personal interest in each student.</td>
<td>Relationship</td>
<td>The nature and intensity of personal relationships within the environment. The extent to which individuals are involved in the environment and the extent to which they support and help each other.</td>
<td>Involvement, Affiliation, Staff support, Peer cohesion</td>
</tr>
<tr>
<td>Participation</td>
<td>Students are encouraged to participate rather than be passive listeners.</td>
<td>Students discuss their work in class.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Independence</td>
<td>Students are allowed to make decisions about, and to have considerable control over, their own learning and behaviour.</td>
<td>Students choose their own partners for group work.</td>
<td>Personal development or goal orientation</td>
<td>The potential or opportunity in the environment for personal growth and the development of self-esteem. Goal orientation variables relate to specific functions of the environment, e.g. ‘academic style’ in the classroom.</td>
<td>Academic achievement, Practical orientation, Competition, Task orientation</td>
</tr>
<tr>
<td>Investigation</td>
<td>There is emphasis on the skills and processes of inquiry and their use in problem solving and investigation.</td>
<td>Students draw conclusions from information.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differentiation</td>
<td>There is emphasis on the selective treatment of students on the basis of ability, learning style, interests, and rate of working</td>
<td>Students work at their own speed.</td>
<td>Systems maintenance and system change</td>
<td>Extent to which the environment is orderly and clear is its expectations, maintains control, and is responsive to change.</td>
<td>Order and organisation, Clarity, Control, Innovation</td>
</tr>
</tbody>
</table>

Table 1: Description of scales in the Individualised Classroom Environment Questionnaire (ICEQ) and their classification according to Moos’ scheme for conceptualising human environments (Rentoul & Fraser, 1979, p. 240).
The advantage of this format is that in addition to its application for criterion and predictive studies, it also enables the investigation of the congruence between actual and ideal environments and the congruence between teacher and student perceptions.

The reason for focussing on this particular instrument is that in its present form it appears to be appropriate for providing feedback which could be employed as a basis for “reflection upon, discussion, of, and systematic attempts to improve classroom environments” (Fraser, 1981, p. 260) for enquiry-based subjects such as architectural designing.

**Evaluating Design Environments – Future Directions**

With the development of more efficient and effective learning environments in mind future research should seek to:

1. Characterise the learning environment appropriate for the making of architecture. Such a task would involve an appreciation of the range of variables including subject content, the process of learning and action, and the personal and environmental characteristics influential in determining the level and quality of student and teacher performance;
2. Dimensionalise the environment to be consistent with the framework delineated by Moos (1979) for conceptualising human environments;
3. Dimensionalise the environment to be consistent with the opinions and beliefs about design learning environments; and
4. Be salient for both teachers and students (Rentoul & Fraser, 1979, p. 236).

**Summary and Conclusion**

Previous discussion can be summarised in terms of the following expression:

\[ \text{Behavioural Activity} = f (\text{Person variables, Environment variables, Conjoint variables of person and environment}) \]

(such as designing)

The distinction made by this expression in comparison to the Lewinian equation: \( B = f (P, E) \) is that the evaluation and design of learning environments including those involved in architectural designing must consider the interactive, dynamic nature of learning and the significance of psychosocial factors as predictors of behavioural activity and cognitive performance. The discussion relating to design learning and action presented in this Paper has, hopefully, reinforced the need for design educators to reassess their understanding of learning environments and to initiate more extensive evaluation of the studio both in terms of the quality of learning and the teaching and as a method of design teaching and learning. The focus on educational climate was intended to highlight its value in facilitating and assessing changes made to the learning environment.

**References**


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