



Developing Appropriate Teaching and Communication Methods in Architectural Design Studio through Understanding Students' Learning Styles

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Abstract The process of learning how to design is among if not the most important activity students of architecture engage in during their years of formal training. This process involves learning to think critically about design problems and generating acceptable proposals that satisfy the practical requirements of the building. Students are expected to learn by reflecting, thinking and doing while the studio instructor guides. This way of learning-by-doing is an old tradition in architecture by which design skills are developed. The learning opportunities offered in the architectural design studio however, largely depend on the communication methods the studio instructor chooses to adopt and whether or not they recognize the students' learning styles. Understanding the students' learning styles and integrating it in the way architectural design is taught will conform more to student-centered teaching approaches gaining wide acceptance around the world. The study examined learning styles of second year architecture students of the University of Jos in architectural design studio using Kolb's Learning Style Inventory (LSI).

Keywords Academic performance, design studio, learning styles, students, studio instructor

Introduction

To a large extent, it can be said that the *raison d'être* of schools of architecture are to prepare students for a profession in architecture. Developing an architectural knowledge-base and learning to integrate these principles in studio-based design are activities engaged in by architectural students. Although commonly agreed that students learn to design differently, it is yet to be fully understood why some students are exceptional and others underperform. If architectural education in Nigeria must develop beyond its current point, it is important for architectural educators to discover how students differ in terms of their learning preferences so that they can use this information as a basis for developing student-oriented learning strategies.

Evidence from literature shows that understanding students' learning preferences is important as it aids educators in selecting appropriate teaching strategies. Additional benefits include helping providing educators with a framework by which students may be guided so that they reap maximum benefits from studio instruction and also enabling them to effectively assess student performance [1]. From the students' point of view, it encourages students to reflect on their learning and to think more freely about how the knowledge acquired in school can be of impact in real world scenarios. In spite of its importance, however, this issue has been overlooked in most schools of architecture. Very few empirical studies have been carried out within the context of architectural education. Past studies examined the relationship between learning styles of students with respect to the design process [2], academic performance and gender [3], and the effect learning styles have on the performance of architectural students in structural design.

The aim of this paper is first, to describe methods of teaching and learning strategies that have been used in education broadly and then specifically in architecture. Secondly, the paper identifies learning styles and preferences of second year architecture students in the University of Jos, on the basis of Kolb's Learning Style Inventory (LSI). Differences in learning styles among architectural students need to be understood and



managed. This study is significant as failure to recognize and appreciate these differences in learning styles has resulted in frustrations among students and studio instructors alike.

Teaching and Communication Methods in the Design Studio

The design studio is considered to be the physical space where students learn to become architectural practitioners under the guidance of studio instructors, as well as considered to refer to the course within the curriculum where design is taught. Broad goals of design education include the teaching and communicating of the design process as well as the fostering of creativity among students. Design instruction represents patterns of teaching and communication that are different from other forms of teaching [4]. Some have gone further to argue that, “design is learnable but not didactically or discursively teachable” [5].

Communication is very important in design studio, and communication methods employed by educators can impede or contribute to the learning process. According to Wender and Roger [6], verbal interaction between studio instructors and students and among students in their peer group is a significant component of design studio. Design projects are assigned to students in order for them to develop problem-solving skills, technical, as well as visual and communication skills [7]. A student is required to transform the design problem into a proposal or scheme.

Models of Learning

Overview of Approaches to Learning

Behavioural, cognitive, humanist and experiential theories have been developed to explain how people learn. Behavioural approaches consider learning to entail behavioural changes in a desired direction. Learning in this approach is considered to be as a result of environmental forces. The teachers’ role in this context is to arrange the environment to produce the desired response and to use techniques that will enhance the reinforcement of learned behaviours. Cognitive approaches consider learning to entail the acquisition of knowledge and are underpinned by the assumption that learning is a result of mental operations. A primary goal of this approach is for learners to develop capacity and skills to learn better. Educators seek to structure and organize information in a way that will facilitate processing by students. Unlike behavioural and cognitive approaches to learning, humanist perspectives regard learning to be linked to the affective domain that motivate individuals to act to fulfill their potential. The educator here facilitates development of the whole person, while learners assume responsibility to become self-actualized autonomous learners. Experiential learning approaches consider learning to be a process of constructing knowledge and searching for meaning through experience. In this approach, the teacher’s role is that of a facilitator of a learning process that is basically self-directed.

Learning Approaches in a Design-centered Course

The position of learning in a design-centered course as architecture is peculiar because one is required to assimilate, reflect on, and transform different forms of knowledge and so it is not unexpected that multi-dimensional approaches are employed in learning. Sometimes in the course of studio projects students will be expected to learn on their own, at other times they will be required to collaborate with their studio group members in carrying out assignments related to the design project. Approaches commonly used by architectural students are briefly outlined.

Principles and architectural concepts taught in theoretical courses are made practical in design projects as students learn to design by doing. Schon rightly observes that:

In the architectural studio, the paradox inherent in learning to design places the student in a predicament. He is expected to plunge into designing, trying at the very onset to do what he does not yet know how to do, in order to get the sort of experience that will help him learn what designing means. He cannot make an informed choice to take this plunge because he does not yet grasp its essential meanings, and his instructors cannot convey these to him until he has had the requisite experience. Thus, he must jump in without knowing – indeed, in order to discover – what he needs to learn [8].



Students not only learn by doing but also by reflecting on their actions during the design process. Action and reflection are both important ingredients in the construction of architectural knowledge. Schon [8] was the first to draw attention to the fact that reflective learning is a key concept in learning the design process. Such a process constituted as reflection-on-action and reflection-in-action, allows students to constantly evaluate their design proposals as they are working and developing their ideas and where necessary re-align their thinking with that of their studio instructors.

Learning among architectural students is oftentimes through observation and modeling of other student's behaviour; this being commonly referred to as vicarious learning. The capacity to learn by observation enables people to acquire large, integrated patterns of behaviour without having to form it gradually. By carrying out case studies, students are able to closely examine, collect useful information and analyze the strengths and weaknesses of the building in question. In this way they are learning through precedents. Engaging students in the Student Industrial Work Experience Scheme (SIWES) is another way by which students have opportunity to reinforce learning through the application of concepts and skills developed in school to actual work places and professional settings.

Experiential Learning Model (ELM)

The Experiential Learning Model (ELM) regards learning to be "the process whereby knowledge is created through the transformation of experience; knowledge results from the combination of grasping and transforming experience" [9]. The model suggests that learning occurs in a four stage cycle along two dimensions. In new learning situations, the tangible experience of what one perceives forms the basis upon which observation and reflections are made. This leads to the formation of abstract concepts and generalizations, which in turn leads to a testing of the implications of concepts in new situations. Perception (grasping) of information occurs on a concrete-abstract continuum, while the transformation occurs on an active-reflective continuum.

The four learning modes through which the process occurs are identified namely as: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC) and Active Experimentation (AE).

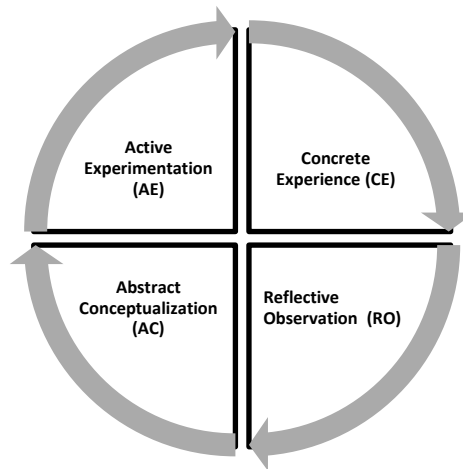


Figure 1: Kolb's Learning Model

Evidence from literature indicates that some individuals will show a preference to certain modes better than others [9]. The following characteristics are associated with individuals who show a learning preference to these modes:

- a. Concrete Experience - Some people learn by relying on tangible concrete experience.
- b. Reflective Observation - Some people learn by watching others who are involved in the activity. Such individuals consider a task and all the possible ways of doing the task before actually doing it. Such individuals prefer learning situations such as lectures.
- c. Abstract Conceptualization - Some people tend to grasp information through symbolic representation. Such individuals have a preference for conceptual and analytical thinking in order to achieve understanding.



They learn best in authority-directed, impersonal learning situations that emphasize theory and systematic analysis.

- d. Active Experimentation –Some people prefer to jump into situations and learn through experimenting. They learn by thinking about how the information they are imbibing offers new ways to act.

Learning styles and Kolb's Learning Style Index (LSI)

Learning styles refer to the preferred way in which an individual approaches a task or learning situation. Learning styles are affected by factors such as culture, personality type, educational specialization and current job tasks and roles. Using the learning model as a basis on which to categorize how individuals grasp and process information Kolb developed the Learning Style Index (LSI). Each learning style results from using two types of abilities in order to learn. The LSI which has been revised over time was originally developed as a 9-item scale that identifies four learning styles that describe the dominant learning preferences of individuals [10]. It groups individuals as **Divergers** (reflectors), **Assimilators** (theorists), **Convergers** (pragmatist) and **Accommodators** (activists).

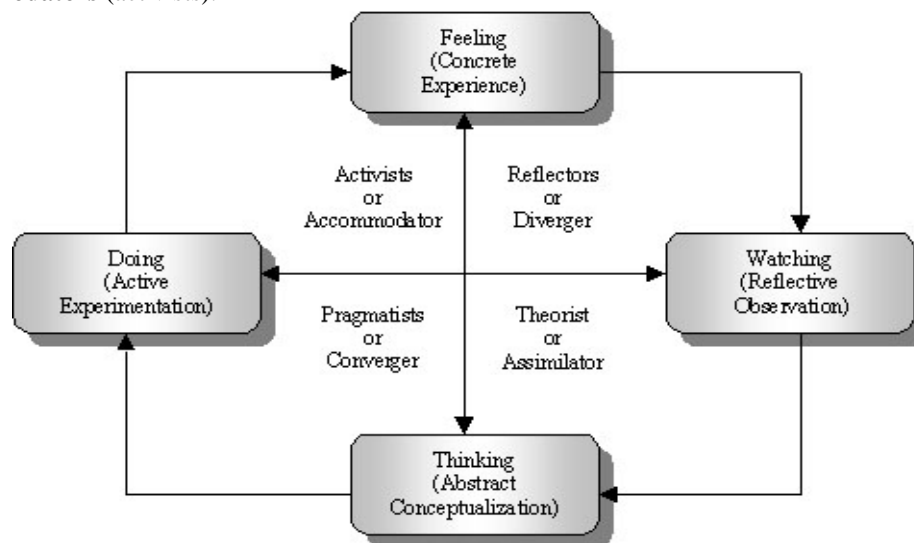


Figure 2: Learning Styles

Traits which characterize the different learning styles are shown below in Figure 3.

<p>Accommodators Strengths: Focus on getting things done Effective leaders Like new experiences and trying things out Tend to solve problems intuitively Are not afraid to take risks</p> <p>Deficiencies: Impractical plans Often engage in trivial activity</p>	<p>Divergers Strengths: Imaginative ability Good at generating and sharing ideas Understand and work well with people Have ability to synthesize observations They respond well to learning if they are able to relate the material to their experience.</p> <p>Deficiencies: Paralyzed by alternatives Poor in decision-making</p>
<p>Convergers Strengths: Practical application of ideas Good at using deductive reasoning to solve problems. Good in decision making</p> <p>Deficiency: Less concern with testing of theories Prefer to work with objects than with people</p>	<p>Assimilators Strengths: Analytical and theoretical interests Interested in abstract concepts Good at defining problems Good at developing theories Good in understanding large amount of data</p> <p>Deficiency: Less concern for practical use of theories Prefer working with concepts than people</p>

Figure 3: Characteristics of the Four Learning Styles



Learning Styles in Design Education

Academic disciplines differ in their knowledge structure, teaching methods and ways of communicating and portraying knowledge. It is indicated from previous work that learning styles have a wide range of application, particularly in education. One of such uses is that it helps educators to detect and classify student's learning problems at an early stage, so that they can choose appropriate teaching methods.

Research has indicated that different learning styles are peculiar to certain disciplines and that they are also related to the level students have reached in their education [10]. Although the level of the students in the study was not indicated, it was discovered that the learning styles among students of architecture was more concentrated among the accommodators (57.1%) and assimilators groups (28.6%). The inclination towards certain learning modes across different fields of educational specialization is shown in Table 1.

Table 1: Distribution of learning styles in different fields of educational specialization [10]

Educational Specialization	Learning Style Type				Total %
	Accommodators %	Divergers %	Convergers %	Assimilators %	
Accounting	26.2	17.4	28.2	28.2	100
Architecture	28.6	0	14.3	57.1	100
Applied &F/ Arts	30.7	26.7	16.0	26.7	100
Computer Sc.	26.2	17.0	26.7	30.1	100
Education	38.3	19.2	17.1	25.4	100
Engineering	23.6	11.5	33.3	31.7	100
Law	26.4	14.5	20.9	38.2	100
Medicine	27.8	15.8	30.4	25.9	100
Social Science	29.7	22.3	16.6	31.4	100

Understanding the place of learning styles in design is important although it would be misleading to suggest that one learning category is preferable to another. The design process requires that one engages in phases of analysis, synthesis and evaluation before graphic representations of design solutions are generated [11]. Recent studies suggest that different learning styles are effective in different stages of the design process [2-3, 12].

Method

Procedure and Measurement

Second year students of the Department of Architecture, University of Jos were selected as the subject group for the research. The rationale for using this level stems from the fact that they are entry level design students that have not been fully 'socialized' into the discipline. From the class of sixty-five registered students, of which fifty-eight are male and seven females, thirty-three students willingly volunteered to participate in the research. The purpose of the study was explained to the students and the test was administered in their studio. Three of the data sheets were omitted in the final analysis as they were not correctly completed. The research instrument used was Kolb's Learning Style Inventory (LSI). Raw scores reflecting Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC) and Active Experimentation (AE) for each participant were first calculated. The scores reflected on the scale indicate an individual's relative emphasis on the four learning orientations. The learning style of each participant was identified to be either 'accommodating', 'diverging', 'assimilating' or 'converging' by subtracting each student's CE score from AC scores and RO scores from AE scores.

Results and Discussion

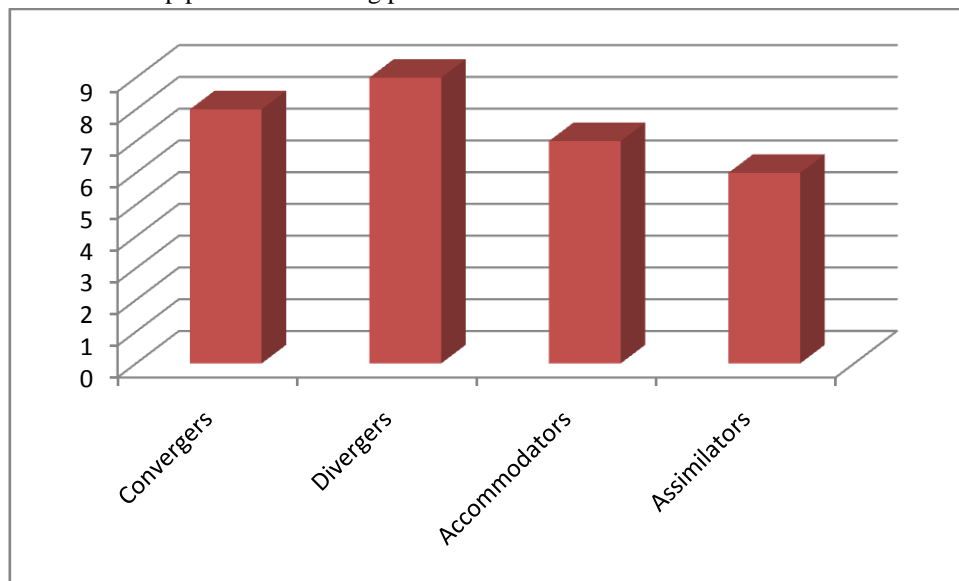
The results showed that among the students that participated, the distribution tended to be greater in favour of diverging (30.0%) and converging (26.6%) learners. Among diverging learners, the dominant learning preferences are learning by experiencing (CE) and learning by observation (RO), while converging learners tend to prefer learning by thinking (AC) and learning by doing (AE). The distribution of learning styles from the research findings is shown in Table 2.



Table 2: Learning styles of 200 level Architectural students

<i>Learning Style</i>	<i>Number of Respondents</i>	<i>%</i>
Accommodators	7	23.3
Divergers	9	30.0
Convergers	8	26.6
Assimilators	6	20.0
Total Number	30	100

The findings of the study went contrary to previous research findings which showed that architectural students tended to fall within the accommodating and assimilating learning modes [10, 13]. Although the reasons why this is so are not immediately obvious, it may be connected to the fact that the study participants are at an early stage of their architectural training. It has been suggested that generally the learning styles of students in the first third stage of their studies tend to be more similar with each other, gradually relating to the learning requirements of their discipline as they progress [10]. This indicates that discipline-specific demands may cause students to alter or develop particular learning preference.

*Figure 4: Summary of Students' Learning Styles*

Conclusion

The paper examined models of teaching and communicating design studio, in common use by architectural educators. It also examined general ways in which students learn to design in architecture. By using Kolb's Learning Style Inventory (LSI) the learning styles of a sample of second year architecture students were identified. The LSI, developed on the basis of the experiential learning theory, is a tool which helps describe an individual's preferred way of learning. A primary goal of experiential learning is to identify ones' strengths and weaknesses as a learner as well as to learn the specifics of a particular subject matter [10].

Experiential learning as a concept fits very well in the domain of architectural education. It encourages students to put into practice what they are learning (experiencing-watching-thinking-doing) and to take responsibility for their own learning. Recognizing that learning to design may be a potentially frustrating experience, for students (especially at the beginning stage) studio instructors that are informed with regard to learning styles will be in a better position to tailor a range of teaching and instruction techniques. It will likely also result in them being more patient towards slow learners and under-performing students, and make them more willing to guide them in developing deficient areas.

The twenty-first century is a period where constructivist views of knowledge and learning are gradually replacing previously held ones. The educational process in this emerging paradigm revolves around the experience of the learner. For architectural education to develop, students must not only be well taught and effectively communicated to, but one must know that they have mastered and learned the subject matter. For



learning to be effective educators must appreciate the fact that individuals learn differently and on this basis develop creative teaching strategies. This study, though an exploratory one has shed light on the potential understanding learning styles has in architectural education, and leaves the door open for further research.

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