Cognitive Abilities & Learning Styles in Design Processes and Judgements of Architecture Students

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by
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Summary

The main aim of this research is the exploration of relationships and correlations between thinking styles of student designers, their personal aptitudes, and design education. It involves discovering the role/s several groups of learning styles and cognitive abilities may play in problem solving during administered design tasks; and the influence they may have on academic performance and quality of produced design solutions.

The main hypothesis is that differences in designers' individual problem solving strategies and, ultimately, products of their expertise – designed artefacts – can be correlated with the differences in their learning styles and cognitive abilities. We suggest the following. (a) Designers with different styles adopt different approaches to design situations and use different strategies during problem solving. It is possible to find the supporting evidence by investigating their performance on design tasks. (b) Individual differences in design reasoning and problem solving could be correlated with the differences in individual cognitive abilities. (c) It may be possible to find correlations between cognitive styles and cognitive abilities. (d) It is likely that a number of visible or measurable qualities of students' design drawings, would in some way reflect different characteristics of the above individual styles and abilities.

The methodological approach draws on theoretical and empirical knowledge from several domains, including: design studies, psychology, cognitive science and study of creativity. This study is concerned with selecting and substantiating the *input* – a number of cognitive styles and abilities chosen for evaluation; and their subsequent assessment. It involves administering design sessions and exploring them as a *process* to see whether and how the above abilities and styles are reflected in problem solving. It also deals with the assessment of the *product* i.e. produced design solutions, and their relation to the academic performance reports. And, finally, it explores correlations between the *input*, the *process* and the *product* to help finding explanations for the students' preferences in adopting particular problem solving strategies in designing. This study is based upon the analysis of six major datasets from (1) an electronic test assessing individual positions on four dimensions (two dichotomies) of learning styles; (2) tests of cognitive abilities chosen on the basis of their relevance to designing; (3) design sessions, administered individually under retrospective protocol guidelines; (4) questionnaires, containing summaries of design sessions, and introspective reports of imagery use and problem-solving styles and strategies; (5) judgements of academic performance from course supervisors based on marks and grades; and (6) assessments of design drawings by professional architects.

The analysis revealed fundamentally different ways by which students approach design situations; they are positively correlated with their learning styles. Students' approaches to problem situations change with the task and within the task. However, eighty percent of the first year and half of the final year subjects showed various degrees of inflexibility in dealing with design problems; this may have decreased the quality of performance. Learning styles proved important in predicting the process and the outcome of problem solving. They may account for moderate to low quality of design solutions in cases with either style (from both dichotomies explored) being of low development. Styles were also observed to may have a moderate to strong influence on the students' academic performance. Correlations between the measured cognitive abilities and academic performance were moderate to significant for the first year and similar but marginally lower for the final year students. At the same time, final year students scored higher on the ability tests and showed better results on the learning styles assessments. One of the likely reasons for this is the enhancement of abilities and styles during the course of study. No significant linear correlations between preferred learning styles and most of the measured cognitive abilities have been observed. The probable inference is that abilities are among many other factors affecting the development of learning styles. It has been, however, possible to establish a number of important correlations between the measurements of learning styles, cognitive abilities, observed problem solving behaviour, and students' design solutions.

Overall, it has been demonstrated that the applied methodology, although requiring further refinement, does enable examining and elucidating the influence of learning styles and cognitive abilities on design problem solving and academic performance.

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