

EXECUTIVE SUMMARY: EVALUATION OF A METHODOLOGICAL TRAINING IN DESIGN EDUCATION

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1 INTRODUCTION

In order to meet the increasingly complex demands of modern working life, supporting designers in their daily work and preparing the students of engineering design to cope with these requirements gain more importance than ever. There is agreement among experts that educational concepts, which impart methodological approaches and allow students to practice them on a design case in a team setting, can enable novices to deal with complex design tasks [e.g. 1], [2]. But besides the implementation of these educational approaches an evaluation of teaching concepts has to be undertaken, in order to assure a high quality of design education.

2 OBJECTIVES

The paper introduces a concept of a methodological training in design education, which is offered at the Institute of Product Development at the Technical University (TU) of Munich. The training course is offered to graduate students from mechanical and electrical engineering in order to allow them to get acquainted with different, commonly known design methods, to apply these methods to a concrete design case, and to experience team work in the design process.

Aim of the study presented in this paper has been to evaluate the concept of this methodological training course. We have intended to find out whether methods taught in the training course were applied appropriately by the participants – that means according to the methods' goals. Based on these findings, the study aims at drawing conclusions for the observed course in particular and for systematic design education in general.

3 METHODS AND HYPOTHESES

Against the background of problem solving theory [3] a qualitative, process-oriented research approach was implemented, which analysed the participants' cognitive operations during method application and compared them to the method's intentions and requirements. Therefore, all ten sessions of the training course were observed and video-taped. Participants' interactions were analysed by categorisation of each single communicative act with the aid of a categorisation system named KATKOMP [4].

We assumed that under correct method application these codes, which characterise cognitive operations representing the method's goals, would occur more often during the employment of one particular method than during the application of other methods. The hypotheses were tested separately for each method by calculation of χ^2 -tests.

4 RESULTS

Results indicate that most of the methods taught in the training course were applied appropriately by the participants, which means that the students succeeded in attaining the methods' goals. This could be observed for the methods "Requirements List", "Brainstorming", "Synectics", "Morphologic Chart" and "Weighting and Rating".

Exceptions to these results were found with the more complex and demanding methods "Quality Function Deployment (QFD)" and "TRIZ (Theory of Inventive Problem Solving)". Though "QFD" supported processes of integrative information processing in the team, it failed in guiding the students to deduce focal points of the development work. "TRIZ" facilitated the solution finding processes in the team, but did not contribute to a further clarification of the problem, which means students did not engage in detecting interlinkages between variables.

Obviously, the students were not able to grasp the whole range of those two demanding methods. In order to discuss possible reasons for this finding, two aspects are considered: Firstly, the complexity of the methods and secondly, the designers' experience. We have come to the conclusion that the interplay of these two factors is of particular importance, as designers with no or little practical experience in the field of product development seem to have difficulties with the application of complex and demanding methods. Measures for the methodological training course at TU Munich in particular and for design education in general are proposed.

5 CONCLUSION

In design education it is not enough only to implement promising educational concepts. In addition, it has to be proved whether education in design methods reaches its goals. The observed training course at TU Munich has proved to be a useful way for teaching design methods and giving the students the opportunity to practice various methods on a concrete design case. In order to enable the students to grasp the whole range of more complex and demanding methods, some measures are proposed that adapt the complexity of the methods to the lacking design experience of the participants.

In future, it is crucial that further evaluative studies assure a high quality of systematic education in design.

REFERENCES

- [1] Pahl G. and Beitz W. *Engineering Design*, 1995 (Springer, London).
- [2] Grimheden M. and Hanson M. What is design engineering and how should it be taught? – Proposing a didactical approach. In *International Conference on Engineering Design, ICED '05*, Melbourne, August 2005 (Institution of Engineers, Barton, ACT).
- [3] Dörner D. *The logic of failure*, 1996 (Metropolitan Press, New York).
- [4] Stempfle J. and Badke-Schaub P. Thinking in design teams – an analysis of team communication. *Design Studies*, 2002, 23(5), 473-496.

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