

“Diagnose-KIT” - a computer-based training to improve transfer using constructivist instructional design

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Abstract

Content of the report is the further development and formative evaluation of a computer based hypermedia system to train troubleshooting at complex production systems. On the grounds of instructional design principles of the cognitive apprenticeship approach the authenticity of the hypermedia task environment was improved and cognitive modelling videos were developed to teach effective diagnostic strategies by maintenance experts. The main reason for the further development of the training programme were unsatisfying results concerning the transfer of the diagnostic skills after a computer based training with the old hypermedia system. In a formative evaluation of a first prototype of the new training programme 57 apprentices of electro-technical vocations were involved. Research questions were concerned about (1) which effect does the cognitive modelling have on diagnostic problem-solving (2) how is the authenticity of the new task environment judged by the users and (3) how motivating is the learning and problem-solving with the new computer-based training programme.

Introduction

Technical systems are characterised by complex and non-transparent working cycles automated by programmable controllers. If a working system is interrupted, many different faults are possible causes for the disruption, and depending on the actual fault, it could be more or less difficult to detect it. Therefore efficient fault-search is a high demanding task the technical staff is confronted with (Schaper & Sonntag, 1995, 1998; Bergmann & Wiedemann, 1997). Training of these persons, aimed at learning to manage these demands of fault-finding efficiently and competently, can be designed in different ways. Computer-based training (CBT) may be a valuable tool to train competencies.

Computer-based training of diagnostic tasks allows for low risk and unlimited testing of fault-finding strategies and the systematic engagement with rarely occurring faults (Baker & Marshall, 1989). Besides, CBT is suitable for teaching system knowledge, that is difficult to present in real-life situations or by other media. Finally by means of CBT self-organised learning processes can be supported, because the learning environments can be used in absence of trainers or experts and outside of training courses (Mandl, Gruber & Renkl, 1994).