

Supporting Learning from Worked-Out Examples in Computer-Based Learning Environments

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Example-based Hypertext Environments

Gerjets, Scheiter, and Tack (2000) demonstrated that learners experience serious difficulties in utilizing instructional examples according to their profitability when learning with a nonlinear hypertext environment. In two experimental studies we examined two possible causes of these difficulties and investigated different instructional methods for improving learners' example utilization when interacting with a learning and problem-solving environment in the domain of combinatorics.

Reducing Learner Control (Linear Hypertext)

A first possible cause for learners' insufficient example utilization is related to the fact that learners may suffer from cognitive overload due to additional control and navigational demands imposed on them by using a nonlinear hypertext environment. Additionally, learners may be generally overemployed by the requirement to decide for themselves which information might be profitable to select in which situation. In order to counteract these problems we introduced a *linear-hypertext condition* that contained the same information as a nonlinear-hypertext condition and that forced learners to recognize all information available in a predefined order without imposing additional control demands onto them.

Comparing *linear vs. nonlinear hypertext environments* experimentally yielded that the linear information presentation increased example-processing time, however, without improving learning outcomes, therefore resulting in less efficient learning. This pattern of results can be explained by assuming that the *linear presentation* reduced extraneous cognitive workload as expected but at the same time eliminated important opportunities for learners to compare and elaborate instructional examples. Restricting learner control by presenting information in a linear environment resulted in less efficient learning. Thus, linear hypertext can not be recommended to improve computer-based learning from worked-out examples.

Reducing Illusions of Understanding (Incomplete Examples with Feedback)

A second possible cause of insufficient example utilization refers to the fact that learners may suffer from illusions of understanding when learning from worked-out examples – resulting in scarce example retrieval in hypertext environments. To prevent learners from such illusions we introduced an instructional condition with *fragmentized example solutions* and allowed learners to complete the gaps by selecting one out of two possible multiple-choice answers. After the completion, learners were provided with *feedback* concerning the correctness of their answers. This procedure was intended to improve intensive example processing by helping learners to recognize that they lack an in-depth understanding of the rational underlying example solutions.

Comparing *complete examples vs. incomplete examples with feedback* yielded that example completion with feedback was indeed beneficial to support learning, in particular for subjects with low prior knowledge. Unfortunately, these subjects were only scarcely using this opportunity. Therefore, it can be concluded that learners do not only experience problems in utilizing worked-out examples appropriately in hypertext environments but also in using additional instructional support like incomplete examples with feedback that would be helpful to support appropriate example processing.

Acknowledgments

This work was supported by the Deutsche Forschungsgemeinschaft.

References

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