Learning from Feedback In BioWorld

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Abstract. Technology-rich environments provide the opportunity for medical students to develop expertise in clinical reasoning through deliberate practice with appropriate feedback. This study investigates whether feedback from intermediates may result in higher learning gains for novice medical students than feedback from experts.

Keywords. Clinical reasoning, case-based learning, expert feedback, medical education

Study Context and Aims

Expertise in clinical reasoning is not associated with the use of particular strategies, but instead emerges as a “consequence of an extensive and multidimensional knowledge base” [1]. While clinical experience is integral to this knowledge development, service pressures impose constraints on the number of clinical opportunities available to medical students [2]. Technology-rich environments (TREs) can supplement clinical experience by providing opportunities for deliberate practice [3]. BioWorld [4] is an example of a TRE that supports the development of clinical reasoning skills. The student first reviews a patient summary, then formulates a hypothesis about the patient’s disease and gathers supporting evidence through simulated medical tests. After submitting a final diagnosis, the student can then view and compare his or her performance to a text-based expert summary.

A potential issue with the use of expert summaries as a feedback mechanism concerns the automatization of expert knowledge. As expertise develops, knowledge can become “so tacit and intuitive that experts lose sight of what it was like to be a novice” [5]. Interestingly, intermediates in some domains show characteristics of both novices and experts [6]. Empirical studies in medicine have shown a linear increase in proficiency in diagnostic reasoning from novice to intermediate to expert [7]. Previous research in our lab has shown that there are differences between medical students, residents, and physicians in how they reason with BioWorld cases [8]. It remains to be investigated, however, whether feedback from intermediates can be used within the context of BioWorld to promote expertise in clinical reasoning. The specific aim of this study is thus to investigate whether novice medical students solving cases in

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BioWorld learn better from feedback provided by intermediates or from feedback provided by experts.

Methodology

A 3 x 2 complex mixed design will be used to investigate the effect of different types of feedback on the performance of second year medical students in BioWorld. Thirty-six students will be randomly assigned to one of 2 feedback conditions (intermediate, expert) and will complete 3 BioWorld test cases. The test cases will counterbalanced using all 6 possible orders to balance for practice and fatigue effects.

Each participant will be tested individually in a single session. The participant will produce a case summary for each test case both before and after reading the case summary produced by the intermediate student or expert. The dependent variables to be measured include diagnostic accuracy, solution time and quality of case summary, as assessed by 2 expert medical instructors on a Likert scale ranging from 1 (low quality) to 5 (high quality). Think-aloud verbal protocols will be used with 3 randomly selected participants from each group to gain further insight into how problem-solving processes are affected by feedback condition.

Main Contributions

The results of this study will advance scientific knowledge on the impact of feedback on the development of clinical reasoning skills. This knowledge can then be used to inform the design of intelligent learning environments that can potentially shorten “the road to competence” [9].

References