Tailoring of Feedback in Web-Based Learning: The Role of Response Certitude in the Assessment

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Abstract. This paper analyzes the challenges of tailoring feedback to the student's response certitude during the assessment in Web-based Learning systems (WBLSs). We present the summary of the results of a series of experiments related to the online assessment of students through multiple-choice quizzes, where students had to select the confidence level and were able to request different kinds of feedback for each of the answered questions.[1]

Keywords: online assessment, response certitude, feedback personalization.

1 Introduction

Online assessment becomes an important component of modern education complementing traditional methods of (self-)evaluation of the student's performance.

Feedback is usually a significant part of the assessment as students need to be informed about the results of their (current and/or overall) performance. The existing great variety of the feedback functions and types that the system can actually support make the authoring and design of the feedback in e-learning rather complicated [4]. Another important issue is that different types of feedback can be differently effective up to having negative influence on the learning and interaction processes [1].

Feedback personalization becomes a challenging perspective for the development of feedback in the assessment components of WBLSs as it is aimed to provide a student with the feedback that is most suitable and useful for his/her personality and the performed task [4]. In this work we study how the feedback in online assessments can be personalized to the student's *response certitude* (*confidence* or *certainty*) that specifies her certainty in the answer and helps in understanding the learning behavior.

The traditional scheme of multiple-choice tests evaluation, where the responses are being treated as absolutely correct or absolutely wrong, ignores the obvious situations when the correct response can be the result of the random or an intuitive guess and luck, and the incorrect answer can be given as due to the careless mistake as due to some misconceptions a student may have.

[1] An extended version of this paper can be found at http://wwwis.win.tue.nl/~debra/its08/

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The use of feedback in certitude-based assessment in traditional education has been actively researched for over 30 years [2][3]. In spite of this intensive research, the methods and guidelines for designing and implementing feedback in confidence-based assessment remain scarce so far. In this work we discuss the results of a series of experiments related to the online assessment of students through multiple-choice quizzes, where students had to select the confidence level and were able to request different kinds of feedback for each of the answered questions.

2 Method and Results

The data for this study were collected from seven online multiple-choice tests (partial exams or mandatory individual exercises for three different courses). Each question (answered strictly one after another) in a test was accompanied by the compulsory question about response confidence that affected the grade[2] (2 points for a HCCR, 1 point for a LCCR, -1 point for a HCWR, and, 0 for a LCWR). After giving the response (with a specified certainty) the student could either go directly to the next question or request immediate (KCR/KR/EF) and delayed (EF) feedback. Students could optionally answer to the questions whether EF was useful or not.

Types of feedback requested. Most of the students were eager to get KCR and/or KR. There were usually only a few students who did not check their answers for most of the questions in each test. In two tests we analyzed whether the students were eager to only KR feedback or also KCR+EF by separating these possibilities. In this scenario more students requested only the KR, without KCR+EF. In another test where KCR/KR could only obtained from studying the EF students did request the EF to extract the KCR/KR.

After students knew whether their answer was correct they tended not to request any EF (and this was independent of the response certitude). For incorrect responses, especially for the HCWRs, the frequency of "ignoring" the EF was lowest.

In two tests we experimented with EF recommendation (based on students' learning style, response correctness and certitude) when a few different types of EF for a question were available. Corresponding results can be found in [5].

Time used for examining feedback. Students were spending less time on average for reading EF when giving HCCRs vs. LCCRs, and more time for reading EF for HCWRs vs. LCWRs (this would not be the case if the students were simply not careful with HCRWs). Having a misconception, it takes more time to understand the problem and "patch" the knowledge of certain concepts rather than simply get an understanding of some concept having no strong (incorrect) opinion about it before.

Students with many LCWRs were interested much less in the EF and more often spend just a few seconds for scanning through the explanations.

Effectiveness and usefulness of the immediate EF. The corresponding grades of the students were sufficiently higher in those cases, when the EF for the preceding related

[2] The results have shown that students were able to estimate the level of the confidence in their answers reasonably well. Used acronyms: H(L)CC(W)R – high (low) confidence correct (wrong) response; K(C)R – knowledge of (correct) response; EF – elaborated feedback.

questions was examined. This positive effect is due to the facts that EF helped many students *to answer correctly* the forthcoming related questions, and to choose appropriately low (i.e. if EF could not help to fix the knowledge problem it was still useful to choose the "correct" certainty for the answers) or high (i.e. EL indeed helped to fix the problem or confirmed the correctness of students thinking) certainty.

3 Conclusions

Designing and authoring feedback and tailoring it to students is an important problem of the online learning assessment. In this paper we addressed this problem focusing on the issues of the response certitude and the response correctness, in particular studying how they affect (1) the types of feedback the students preferred to request; (2) time the students used for examining the feedback; and (3) effectiveness of the immediate EF on the overall performance of the students during the test.

The obtained results confirmed our expectations regarding the main functions that EF may play in the online assessment depending on the combination of correctness and certitude: (1) "patching" the student's knowledge, (2) filling the gaps in the student's knowledge, and, (3) simply providing KR and KCR information.

The results strongly suggest that (1) students are able to estimate the certainty of their responses fairly well, (2) knowledge of response certitude together with response correctness allows determining what kind of feedback is more preferable and more effective for the students, and (3) elaborated feedback may sufficiently improve the performance of students within the online tests.

Concluding the stated above, the results obtained in our study strongly advocate the benefits and necessity of evaluation of the response certitude during the online assessment, and reveal the additional possibilities of feedback personalization [6].

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