The Assessment of Digital Reading Skills With Cognitive Diagnose for the Reading Achievement Test in China

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Abstract: Reading skills has been viewed as a multifaceted construction with multiple constituents. What has been invested of skills multiplicity has expanded on previous literature by including paper reading skills constructs (comprehension, interest, and engagement). Advances in digital technologies are dramatically altering the texts and as tools available to students. Yet with the diagnose assessment of the digital reading skill hasn't come issue that can be detected by the cognitive diagnostic assessment. The study has obtained pre and post-reading performance based on the digital reading, reading perception self-reports. DINA was used in the processing of reading assessment, and the diagnosis feedback report was designed to improve students' reading skill. Furthermore, implications for the diagnose framework of the Progress in International eReading Literacy Study (ePIRLS) were discussed.

Keywords: Digital reading, cognitive diagnosis, DINA, reading perception, ePIRLS

The study questions

Digital-text media as one of the reading approaches, has been optioned by the most readers. IEA has introduced ePIRLS, which was a forwarding thinking computer-based extension to PIRLS in 2016(PIRLS, 2016). Most reading assessment was based on the simple scores, understanding how well students' reading comprehension, interpreting, and critiquing the information. However, it lack of diagnostic report to help students improve their reading skills. The study was conducted that what the reading features students have, and assess reading skills by cognitive diagnostic model to provide the personal feedback report for students to improve their reading performance.

Objectives

This study has several objectives. First, we explore how reading skills fourth-graders in Shanghai primary school using cognitive diagnose processing. Second, we explore whether fourth-graders would improve reading skills through diagnose feedback. Comparison between the pre with post-reading test was conducted to confirm the impacts on digital reading skills.

Significance of the study

Based on the previous literatures, there were not many researches on the cognitive diagnosis of reading skill, but scores. This study is a significant part in assessment students digital reading skills from the cognitive diagnose of their reading performance. The cognitive diagnose model is likely to be adopted into a comprehensive, criticizing reading skills to better understand the picture of students digital reading. This study will help better understand the relationship between students' reading characteristics and their learning performance, and likely to diagnose the learners with poor reading skill so that timely pedagogical intervention can be implemented to improve the situation.

Methodological and data sources

The study is part of a learning analytics project to portray students' learning within a learning technology and assessment technology in Shanghai. A cognitive diagnostic model was employed, involving five classes of 143 students in a primary school. In addition, a complex algorithm (DINA) was proposed to classify the reading scores based on the skills attributes and the diagnose feedback analysis has been established to identify what variables of students' reading scores have significant impact on their reading skills. Finally, the study would provide the feedback to each student to improve their reading ability.

Major findings

According to the Q matrix and the student response matrix, the DINA model is estimated and fitted. The grasp mode of the subjects was also analyzed in this study. At last, the correlation analysis was made with the students' end-of-term Chinese performance.

According to ePIRLS2016, the title of this test has been identified with the corresponding attributes. The resulting of Q matrix was shown in table 3. A1 has been stands for 'direct extraction'; A2: 'reasoning and understanding'; A3: 'integration and interpretation'; A4: 'criticism and evaluation'.

It can be learned from the table that all four attributes '1111' of the subjects had a total number of 15 students, accounting for about 10.5%. There are 38 students, who have mastered the two attributes, accounting for 26.6%.

The highest proportion of attribute mastery pattern was '1110', with a total of 54 people, accounting for about 37.8% of the students. The students have not mastered "criticism and evaluation", and the other three attributes have been mastered. There are three kinds of mastery pattern '0001', '1001', '1101', which were in accordance with these three types of mastery patterns. It can be found that the proportion of the attribute of criticism and evaluation was the highest.

Conclusions and implications

This study is still on-going to detect reading behaviors furtherly. Thus far, the preliminary analysis of the collect data suggested that (1) the DINA model analysis has shown that the reading skill of 'direct extracting information' and, 'direct reasoning ability' maintained excellent. However, the ability of 'integration and interpretation' and, 'criticism and evaluation' need still improving. (2) The diagnosis of feedback report has intervened personalized reading skills promotion. (3) Digital reading skills can be assessed by DINA, and T-test between pre and post-test was statistical significant. The limitation of the study is the sample size which was only focused on the one grade. Furthermore, it is necessary to pay attention on the learning behaviors during students doing reading and, the follow-up study is needed to be improved.

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