A Study of Information TechnologyIntegrated into Remedial Teachingfor Mathematical Literacy

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ABSTRACT

According to the results of the Program for International Student Assessment (PISA) in 2009, the rank of mathematical literacy of junior high school students in Taiwan dropped its place from the first to the fifth, and the ratio of the low performance group of students whose grades are under Level Two rose sharply. It shows that the mathematical literacy of junior high school students is decaying. How to effectively enhance mathematical literacy of the low performance group of students has emerged as a priority. The purpose of this study is to investigate the effects of the integration of information technology into the remedial teaching, which is aimed to enhance the mathematical literacy of the low performance group of students. Taking a public junior high school in Nantou County for example, a total of 650 students at grade 7-9 received a test of PISA mathematical literacy sample questions. Compared with the average level of PISA achievement of Taiwan junior high school students in 2009, 44 students whose assessment results are under level 2 in the low performance group were selected and participated in the remedial instruction program. The remedial teaching units were identified based on the test answers of the mathematical literacy of the low performance group of students. The remedial teaching materials were designed based on the current junior high school math curriculum. The remedial students are randomly divided into the experimental group (n=22) and the control group (n = 22). The former accepted the remedial instruction integrated with information technology, and the latter accepted the didactic remedial instruction. With the same remedial teaching materials, the math instructor gave 10 classes of experimental teaching to the students from each of the two groups. To measure the effects of the remedial instruction program, a triangulation method was employed. A quasi-experimental design method compared the differences of the students ’ mathematical literacy in scores, before and after the remedial instruction integrated with information technology and the didactic remedial instruction. A questionnaire survey was administrated to the students after finishing the remedial instruction. Finally, three students from group, who improve the most in scores, are interviewed to explore the reasons for their improvement. Single-factor analysis of covariance (ANCOVA) was used to test the pre-test and the post-test of the mathematical literacy assessment of the two groups of students. Results showed that the post-test scores of the two groups of students after the remedial teaching were significantly higher than their pre-test scores. The experimental group scores were significantly higher than the control group in the mathematical literacy assessment. This indicated that the remedial instruction integrated with information technology is more effective in enhancing the mathematical literacy of low performance group of students than the didactic remedial instruction. According to the survey, the experimental group of students held a more positive attitude toward the remedial teaching than the control group of students do. It is plausible that integration of information technology (Mouse Mischief R) into the remedial teaching causes more interactivity hence,and it is better-beloved by students. Results of the interviews revealed that both remedial teaching methods were interesting and helped them to better understand the meanings of the questions and the solving methods. Thus, students ’ achievements in mathematical literacy were improved. Based on the findings, two suggestions for junior high school math teachers: (1) teachers should strengthen the low performance of students ’ abilities in the mathematical problem-solving and in the description of management, in order to enhance their mathematical literacy; (2) the use of interactive multimedia tools guides students to understand the meanings of questions better and to understand the methods of solving problems more easily

Keywords : Information technology integrated into remedial teaching、Mathematical literacy、Program for International Student Assessment

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