The Research on the Influence of Mobile Learning System on Mathematics Performance of Junior High School Students in China

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Abstract

In recent years, with the development of the mobile learning system in junior middle school, the influence of this system on math performance has been attracted widespread attention. Many researchers have studied this aspect, but, until now, there isn't any complete summary. I use the literature research method in this paper to review and sort out the papers which involved the influence of the mobile learning system on math scores of junior middle school students, and to draw the following conclusions: (1) At present, researches mainly investigated from the following seven aspects: excellent rate, pass rate, average score, low score rate, score range, standard deviation, and overall grades. Most researchers admitted that the mobile learning system increased the math scores of students. (2) In many studies, currently, the experimental method is widely used, but it is worth noting that the reliability and validity of some studies whose sample size is too small are not high. (3) Since 2015, researchers have fallen into this field. They focused on the eighth grade and involved 5 provinces. So, it is apparent that the current objects and locations of study are relatively single. (4) Many scholars studied excellence rate, pass rate, and average score, while the other sides are less involved. Besides, the current researches that the influence on math achievements of junior middle school students is not perfect or in-depth enough, which ignored achievement changes of some poor students, and the influence of the mobile learning system on score difference of students is a blank point. Therefore, we need to broaden the research site, select a reasonable research method and sample number, and complete the research contents, so that the researcher will get further study and improve the effect of mathematics teaching.

1. Introduction

The Mathematics Curriculum Standard for Compulsory Education (trial) (a document issued by the Chinese Department of Education in 2001) pointed out: "Mathematics education should be oriented to all students and meet the needs of students' personality development so that everyone can get a good mathematical education and different people get different development in mathematics [1, 2]." The mobile learning system can respect the personality differences of junior middle school students [3-5], stimulate their interest in mathematics learning, and maximize the teaching effect of mathematics in junior middle school [6]. Math achievement is one of the important measures of teaching effect and learning effect [7-8], so it is necessary to study the influence of the mobile learning system on math achievement of junior middle school students. Until now, a series of related studies have appeared in China, but there is no complete summary. Therefore, this paper reviews and sorts out the current relevant studies in recent years to provide a different perspective for

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math teachers to evaluate math performance and better study the influence of the mobile learning system on mathematics scores of junior middle school students.

The research question of this paper is as follows: What is the current status of the research on the influence of the mobile learning system on the mathematics achievement of junior middle school students?

Specifically, it includes the following four aspects:

(1) What are the effects of the mobile learning system on scores of junior middle school students?

(2) What methods are mainly used? Is the sample size reasonable?

(3) When did the study begin? Which schools were studied? which grades were studied?

(4) What aspects have been studied more or less at present? Are there any gaps in the present studies?

2. Sources of Literature

2.1. Data Sources

This paper selects the literature in the CNKI (China National Knowledge Infrastructure) database as the sources of data. CNKI is the most authoritative document retrieval tool in Chinese academic journals, which approximately contains all the contents of Chinese journals. This database can ensure persuasion and reliability.

2.2. Data Collection

We search out of the 34 paper, through the advanced search function in CNKI to retrieve both keywords simultaneously: " Mobile learning system" and" Junior middle school mathematics". Among the 34 papers, 9 papers that mentioned the influence of the mobile learning system on math scores in junior middle school. Therefore, those 9 papers were selected for detailed analysis.

2.3. Data Sorting

Reading the literature carefully and taking notes, we summarized and sorted out the research results, research methods, and the information of samples.

3. Results

3.1. Statistics of Research Results

There are seven aspects in scholars' examination: average score, pass rate, low score rate, excellent rate, standard deviation, score range, and overall performance.

About the average score, the present study revealed a

consistent conclusion. Li, Liu, and Ma, et al, a total of 7 people concluded that the average score of mathematics of junior middle school students was improved under the mobile learning system [6, 9-14]; about pass rate, the current research has also presented a consistent conclusion. Yang, Liu, and Liang, et al, a total of 5 people concluded that the pass rate of mathematics was improved under the mobile learning system [6, 9-12]; About the low score rate, Only Li has noted a low score rate in the current research. He believes that this system has reduced the low score rate of mathematics [9]; there are two completely different results about the excellence rate, 5 people believe that this system has improved the mathematics excellent rate of junior high school students. [6, 10-12, 15], while Li argues that the result is just the opposite [3]; About Standard deviation, Only Li believes that this system has reduced it [9]; Only Yang believes that this system has enhanced score range [6]; Liu believed that the overall performance of the students increased, while the math scores of class B(this school stratifies all the students into classes A, B, and C based on scores) was not improved obviously after implementation of the system [16].

Through the arrangement of the above points, the impact of the mobile learning system on mathematics achievement of junior middle school students includes the seven aspects. Now, the changes in the seven aspects are classified as increase, decline, and no obvious change in three categories. The statistical frequency of these seven aspects is shown in Table 1:

Table 1. Statistics of Research Results.

Changes / Results	Improve	Decline	No Obvious Change
Average Score	7		
Pass Rate	5		
Low Score Rate		1	
Excellent Rate	5	1	
Standard Deviation		1	
Score Range	1		
Overall Grades			1

Note: Figures refer to the frequency which are counted in documents.

In terms of Table 1, we can know that, at present, most scholars tell that the mobile learning system improves the average score, pass rate, and excellence rate.

3.2. Statistics of Research Methods

At present, those papers involved five research methods including experimental method, statistical analysis method, observation method, case analysis method, and literature research method. The experimental method was used most frequently. The statistical frequency of these five research methods in different papers is shown in Table 2:

Table 2. Statistics of Research Methods.

Research Method	Experimental Method	Statistical Analysis Method	Observation Method	Case Analysis Method	Literature Research Method
Frequency	5	1	3	1	3

3.3. Grade Information Statistics of the Sample

The current study involved three grades of junior high school. Especially, most researchers focus on the eighth grade, which has been studied in 5 articles above in total, while the seventh grade and the ninth grade have been studied in 3 articles above respectively. The frequency of these three grades was studied by researchers in different papers is shown in Table 3:

Table 3. Grade Information Statistics of the Sample.

Grade	Grade Seven	Grade Eight	Grade Nine
Frequency	3	5	3

3.4. Statistics of Sample Size

I classified the number of samples according to their distribution range. There is 1 paper whose sample size ranges from 0 to 100, 2 papers whose sample size ranges from 201 to 300, 3 papers whose sample size ranges from 301 to 400, and 1 paper whose sample size is more than 400. Therefore, the number of samples ranged from 301 to 400 was the most frequent. Detailed statistical results are shown in Table 4:

Table 4. Statistics of Sample Size.

Sample Size Range	0-100	101-200	201-300	301-400	More Than 400	Uncertain
Frequency	2	0	2	3	1	3

3.5. Statistics of Year

In 2015, researchers began to study the influence of the mobile learning system on math scores of junior middle school students. In 2015, 2016, and 2018, this aspect was respectively studied for just one time by researchers, while this aspect was respectively studied for three times in 2017 and 2019. The specific statistical results are shown in Table 5:

Table 5. Statistics of Year.

Year	2015	2016	2017	2018	2019
Frequency	1	1	3	1	3

3.6. Statistics of Province

The current study about the aspect involved a total of five provinces in China: Guangdong, Hunan, Zhejiang, Jiangsu, and Shandong province. it's worth noting that Guangdong and Shandong provinces are involved most frequently. The frequency of the provinces studied in different papers is shown in Table 6:

Table 6. Statistics of Province.

Province	Guangdong	Hunan	Zhejiang	Jiangsu	Shandong
Frequency	3	1	3	1	1

4. Discussion

To sum up, we can know that people currently examine this problem with the influence of the mobile learning system on mathematics performance of junior middle school students from the following seven aspects: excellent rate, pass rate, average score, low score, score range, standard deviation, and overall grades. Scholars all indicate that, to some extent, the mobile learning system improved the math scores of junior high school students [6, 9-16].

In terms of research results, first of all, there are many studies focused on average score, pass rate, and excellence rate, but few studies on a low score, standard deviation, and poor performance. And then the research results show completely different views: improvement of the excellence rate and decline of the excellence rate. Both of the above two points indicate that the current research on the influence of performance is not comprehensive and in-depth. Besides, Yang mentioned that the score range increased in his article [6], but not mentioned the low score. Even more, there was only one article that mentioned the low score above all articles. So, we can infer that the researchers ignored the effect of the

mobile learning system on the performance of poor students.

In terms of research methods, researchers use a variety of methods. Most scholars use the experimental method to carry out the research. However, Yang and Li perform experiments whose sample size is less than 100. It should be noted that the sample size is too small to cause high reliability and validity of the experiment.

In terms of provinces and grades of study, the current study involved 3 grades and 5 provinces. Most researchers focus on the eighth grade, which has been studied in 5 articles above in total. while the seventh grade and the ninth grade have been studied in the above 3 articles respectively. In terms of the distribution of provinces, Zhejiang and Guangdong provinces are slightly more involved, while others are less involved. The above of information indicates that the current research object is relatively single. It should involve a wider range of regions to more comprehensively and convincingly study the impact of the mobile learning system on the mathematics performance of junior middle school students in China.

Standard deviation and range can reflect the dispersion degree of data well, both of which can indicate the difference in students' performance. Regarding the influence of the mobile learning system on math scores of junior middle school students, researchers are more focused on scores and the overall grades whether or not improve. There is a lack of research and analysis on the performance differences.

5. Conclusion

This paper reviews and sorts out 9 pieces of literature about the influence of the mobile learning system on mathematics achievement of junior middle school students, and draws the following conclusions:

(1) People currently examine this problem about the influence of the mobile learning system on mathematics performance of junior middle school students from the following seven aspects: excellent rate, pass rate, average score, low score rate, score range, standard deviation, and overall grades. The research results show completely different views: improvement of the excellence or decline of the excellence rate; average score, pass rate and score range all increased; low score rate and standard deviation declined; overall performance improved. Through the research, scholars have affirmed the improvement of mathematics performance of junior middle school students under the mobile learning system.

(2) At present, researchers used a variety of methods including experimental method, statistical analysis method, observation method, case analysis method, and literature research method. The experimental method was used most frequently. But it is worth noting that the reliability and validity of some studies

whose sample size is too small are not high.

(3) The current study involved 3 grades and 5 provinces. The eighth grade and Zhejiang and Guangdong provinces were studied the most frequently by the researchers. Generally, the current research objects and locations are relatively single.

(4) Many scholars studied excellence rate, pass rate, and average score, while the other sides are less involved. Besides, current researches on the influence of the mobile learning system on mathematics achievement are not perfect and in-depth enough, because researchers ignored the achievement changes of some poor students. In the end, it is a blank point that the influence of the mobile learning system on the difference of junior middle students' achievement.

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