Application of Multi-media Platform in Mathematics Teaching

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Abstract

Mathematics is dull due to its abstraction and logicality. In traditional mathematics teaching, the teaching models are simple and it is difficult to improve teaching quality. Currently, multi-media platforms are used to show relevant contents to students in a diversified and visual manner, which improves not only students’ interests for learning mathematics, but also their logical capability and imagination. Therefore, researches are made on attention and academic results by comparative analysis and empirical investigation to study the effects of traditional mathematics teaching and multi-media mathematics teaching. Results show that multi-media teaching can effectively improve enthusiasm and participation of students, keep relatively high level of knowledge, and strong, divergent thinking ability. During teaching, teachers can also save lots of class time and enrich class capacity. Meanwhile, corresponding countermeasures is put forward for problems in multi-media teaching, to provide ideas and reference for improving mathematics teaching quality by using multi-media platform.

Keywords: Multi-media Platform, Mathematics, Teaching, Application.

1. RESEARCH BACKGROUND

1.1 Literature review

With the emerging of multi-media technology, multi-media platforms are widely used. The object of multi-media platforms is media, which are used as carrier of information and characterized in interaction, multiple hierarchy and integration in the era of rapid development of information. So, multi-media also had above characteristics (Shi et al., 2012). In practice, media are divided into two types, i.e. physical carrier of data and carrier of information representation and dissemination. Multi-media platforms are combinations of the above and they are used by people to communicate with machine. Multi-media actually used by teachers include characters, images, animation and sound etc. (Chen, 2011). During actual teaching at present, in order to carry out teaching plan, multi-media platforms are used to achieve the required objective. Multi-media teaching can be used to expand classroom contents and provide certain place and time for preparing teaching plans. Multi-media teaching meant the process that teachers designed reasonably according to corresponding teaching objective and characteristics of students and used multi-media platform to show relevant contents to students (Geng, 2011). At present, multi-media platforms had been gradually applied in computer-assisted instruction, computer-assisted learning, computer-based instruction, computer-based learning, computer-assisted training and computer-managed instruction etc. (Gao and Zhang, 2014). Multi-media platform had significant advantages in mathematics teaching, including increasing capacity of students in memory knowledge points, setting environment guidance, and establishing “symbol-graph combination” capacity during learning, which improves sporadic thought and creativity of students, save class teaching time, enrich the class continuously, achieve multiple resources sharing and provide the possibility of repeated learning for students. (Duan, 2014).

1.2 Research objective

Mathematics is a comprehensive, abstract and highly logic discipline. Students often had less interest or even felt a headache upon hearing mathematics (Wu, 2014). Traditional mathematics teaching method is boring. During teaching, students are passive; their interests cannot be motivated; teachers are unable to provide necessary teaching guidance for students before, during or after classes, or provide learning materials; teachers are also unable to grasp characteristics of personality of students to give hierarchical teaching according to aptitude of the students (Liu, 2012). With popularity of computer technology, multi-media design technique is generated to achieve diverse teaching, effectively motivate students’ intuitive understanding of teaching contents,
improve their knowledge perception capability and learning interests using characters, images, videos and voice etc. (Qiu, 2013). For difficulties in mathematics, multi-media platforms can be used to simulate stereoscopic effect of space. Multi-media teaching not only enable students to intuitively understand concepts of knowledge points, but also transform passive learning of students to positive learning. So with multiple disadvantages of traditional mathematics teaching and advantages of multi-media platform technology, it is very important to determine how to improve teaching environment of mathematics and teaching quality using multi-media platforms. This paper is mainly aimed at studying the function of multi-media platforms in improving mathematics teaching quality by comparing the effects of traditional mathematics teaching with those of multi-media platforms and exploring effective ways to improve mathematics scores of students.

2. PRINCIPLE AND STRATEGY FOR THE APPLICATION OF MULTI-MEDIA PLATFORMS IN MATHEMATICS TEACHING

2.1 Principles for the application of multi-media platform in mathematics teaching

Multi-media platform had following principles in mathematics teaching. It can be seen from lots of practice experience that it mainly included student-oriented principle, visual principle, optimal principle and discipline combination principle (Yang, 2013). Among them, student-oriented principle requires focusing on students and stressing comprehensive utilization of information resources during multi-media teaching to help cultivate learning habit, exploration and initiative thinking and independent learning. Visual principle requires teachers to use multi-media, including images, videos, characters and voices etc., to show abstract mathematics knowledge visually to students, so as to help students understand knowledge. Optimal principle requires selecting different courseware or teaching software, such as using animation to demonstrate geometric figures, according to different teaching contents, so as to achieve the best teaching results. Discipline combination principle focuses on combining mathematics teaching theory with logic preciseness, and speeding the combination of real life with professional knowledge, so as to improve the capacity for solving actual problems.

2.2 Strategy for the application of multi-media platform in mathematics teaching

During application of multi-media platform for mathematics teaching, it’s necessary to pay attention to strategies (Li and Lu, 2011). Firstly, it’s necessary to focus on motivating students’ interests in learning mathematics. Learning interests mainly refer to the positive mental disposition a student has towards teaching and are intrinsic motivation for improving grades. For improvement of mathematics teaching quality in schools, the key is to develop students’ interests in learning mathematics. For example, abundant life examples can be introduced to motivate their interests for learning mathematics; geometer’s sketchpad can be used to demonstrate mathematics experiment and activate classroom atmosphere; mathematics history and mathematics thoughts can be properly introduced to show enjoyment of mathematics. Secondly, teachers should optimize teaching habits and use multi-media platform according to the circumstances to help students find out suited learning method and cultivate good habits. “Mastery learning” can be used to set goals and evaluate the goals mastered by students, so as to promote active their learning. Meanwhile, the interactive teaching method breaking time and space limitation can be used to develop learning habits in real time. Ebbinghaus forgetting rules can also be used to help students develop the habits of reviewing and deepening their memory. Finally, it is necessary to focus on hierarchical teaching. Students have different capacities and hobbies for mathematics. During multi-media teaching, it’s necessary to give individualized and hierarchical teaching. Teachers can divide students into good, general and poor levels and teach them differently using multi-media. Hypertext format, as a type of multi-media, can be used to list teaching contents by reasonable layers.

3. PRACTICES ON THE APPLICATION OF MULTI-MEDIA PLATFORM IN MATHEMATICS EDUCATION

3.1 Selection of practice objects and practice design

Firstly, it’s necessary to select a class for practices. In order to highlight the mathematics teaching effects of multi-media platform and traditional way respectively, the author selected Class (3) and Class (5) in a municipal high school with similar number of students and similar entry records. Secondly, it’s necessary to select the practice courses. The selected courses are functional courses, because functions require symbol-graph combination and are closely associated with geometry, algebra and sequence of numbers, accounting a significant proportion in college entrance examination. Meanwhile, the translation, warping and zoom of a
function are bottleneck problems in traditional function teaching, and so the advantages of multi-media platforms can be shown. Furthermore, it’s necessary to determine the practice time. According to learning progress of the class, students’ interest, and effect evaluation, the practice time is set to be two weeks, 10 class hours in total. Finally, it’s necessary to invite teaching assistants to assist in recording courses. Courseware references are provided for making multimedia of functions.

3.2 Practice process

Choose the chapter of “finding zeros of a function using the bisection method” for multi-media teaching practices. Firstly, it’s necessary to set teaching objectives, including understanding the zero concept of a function, basically grasping the algorithm of a function zero with the bisection method, experiencing the mathematical thinking for mutual transformation of a function or equation, and using a calculator to get an approximate solution of an equation using the bisection method. Among them, the key point is to get the approximate solution and the difficulty is to determine initial interval of the approximate solution of an equation. Secondly, different teaching methods are set. Traditional blackboard teaching is used for Class (3) and multi-media platform teaching is used for Class (5). Finally, it’s necessary to design the courses, which is the key of practice process. Table 1 shows the design of the whole teaching course.

### Table 1: Design of Teaching Course for Getting the Zero Point of a Function Using the Bisection Method

<table>
<thead>
<tr>
<th>Teaching processes</th>
<th>Teaching Content</th>
<th>Class (3)</th>
<th>Class (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game leading</td>
<td>Guessing game and experiencing the bisection method.</td>
<td>Teachers’ dictation and blackboard writing</td>
<td>Flash animation demonstration</td>
</tr>
<tr>
<td>Revealing the subject</td>
<td>Introducing function: ( y=f(x)(x \in D) ), if there is real number ( c \in \text{D} ), when ( x=c ), ( f(x)=0 ), then ( x=c ) can be called zero of the function.</td>
<td>Teachers’ dictation and blackboard display</td>
<td>PPT display</td>
</tr>
<tr>
<td>Practical research</td>
<td>Judging whether there is a zero in function ( f(x)=x^3+3x-1 )? If yes, can you solve one?</td>
<td>Teachers’ blackboard writing and dictation</td>
<td>Giving function image by virtue of geometer’s sketchpad, or using TI calculator to draw function image</td>
</tr>
<tr>
<td>Summarization and abstraction</td>
<td>Guiding students in concluding and summarizing steps for calculating the zero point of a function with bisection method.</td>
<td>Blackboard writing and teachers’ dictation</td>
<td>PPT display</td>
</tr>
<tr>
<td>Consolidation and feedback</td>
<td>Observing whether bisection method can be used to calculating the zero point of a function in mathematics formula through images and other multi-media.</td>
<td>Teachers’ blackboard display</td>
<td>PPT display</td>
</tr>
<tr>
<td>After-school exploration</td>
<td>Guiding students to read program chart by virtue of computer program.</td>
<td>Teachers’ dictation</td>
<td>PPT display</td>
</tr>
<tr>
<td>Homework</td>
<td>15 questions on bisection method of the function.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.3 Practice results and analysis

3.3.1 Practice results

In this mathematics class, information calculated by the teacher in the class is shown in Table 2.
Table 2 Comparison Table of Evaluated Teaching Effects

<table>
<thead>
<tr>
<th>Contents</th>
<th>Class (3)</th>
<th>Class (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participating students in the class (person)</td>
<td>43</td>
<td>98</td>
</tr>
<tr>
<td>Initiative students demonstrating on the stage (person)</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Completion of classroom contents (40 minutes)</td>
<td>Parts are not completed in the class, which causing a delay of 8 minutes</td>
<td>Completing in the class with 5 minutes left</td>
</tr>
<tr>
<td>Average correct subjects of after-school exercises (pieces)</td>
<td>11.72</td>
<td>13.94</td>
</tr>
</tbody>
</table>

It can be known from Table 2 that Class (5) providing multi-media mathematics teaching had a higher degree of participation in the class and a more enthusiastic class atmosphere. During guidance of thoughts by the teacher, time for getting the answer is obviously less than Class (3). Average accuracy of after-school exercise also showed that multi-media teaching had a better result. Results of teaching examination after teaching practice showed that average score of Class (5)is 4.5 scores higher than those of Class (3), which never appeared before comparative practice. In 10 class hours, quantity of students in Class (3) active to raise hand to answer questions is 782, while Class (5)is 1,363. For completion of class in 10 class hours, the teacher is unable to complete the teaching contents for three times in Class (3), while Class (5)is 0. For 150 exercises in the class, students in Class (3) correctly answered 122.35 questions on average, while those in Class (5) 141.93.

3.3.2 Practice conclusions

It can be seen from above mathematics teaching practice that multi-media platform teaching is used to bring about higher active participation and enthusiasm of students, higher acceptance level and stronger divergent thinking ability; from the perspective of teachers, multi-media teaching can not only enrich teaching class, but also save teaching time in the class. Therefore, teachers should give multi-media teaching to better achieve the teaching objective, complete teaching contents in a short time and improve learning capacity of the students. Multi-media platform can also be promoted and applied in teaching mathematics.

4. EXISTING APPLICATION PROBLEMS OF MULTI-MEDIA PLATFORM IN MATHEMATICS TEACHING AND COUNTERMEASURES

4.1 Existing problems

It can be seen from application practice of multi-media platform in mathematics teaching that there are still some problems. The first is that it increases dependency of students. Teaching in the multi-media platform can be implemented to record courseware in multi-media and keep records of class situations and teaching process. Although it satisfies the requirements for reviewing and consolidating the knowledge after class, it improves dependence of students, causes students to have the psychology of studying later without careful listening in the class, even causes students to give up when they meet difficulties in listening. The second is that multi-media effects are better. In mathematics teaching, multi-media platformshave audio and visual effects and teachers often adds FLASH, images and animation dubbing and other materials to attract students’ attention. But, this also caused negative effects. For example, students easily have association to the course due to courseware materials, and ignored the learning contents. The third is that emotional exchange in teaching is hindered. It can be known from concept of new course that essence of teaching is communication. During traditional teaching in classroom, process for writing on the blackboard by the teacher is learning process of the students. Corresponding situation introduction, question discussion and open thinking inspiration has a good interaction effect. For subject teaching of mathematics, interactive communication is more important. However, for media teaching, mathematics course is displayed by operating the mouse. Relevant calculation and analysis processes appears on the screen suddenly, which increases the difficulty in understanding and digestion. Lacking necessary process communication affects teaching effects of mathematics.

4.2 Solving strategy
For problems in mathematics teaching with multi-media platforms, this paper puts forward solutions. Firstly, teachers should use multi-media platforms according to the principle of preparing “proper” courseware. Multi-media courseware should be used to improve the mathematics level of students. Multi-media technology and novelty design should be properly used in the preparation of courseware, such as limiting the times or frequency of images, voices and videos. At the same time, teachers should provide situation introduction and divergent thinking enlightenment, walked about in the class to increase emotional exchange with students and lead students to actively explore knowledge. Secondly, participation of students should be improved during multi-media teaching. During traditional mathematics teaching, students can only interact with teachers by calculation on the blackboard, which can not only motivate efforts of participates, but also improve attention of other students. During multi-media teaching, such feeling of freshness can be used to guide students to participate in calculation demonstration. For example, during rendering of functional images, students can be asked to go on the stage and render images on the drawing board, so as to improve teaching effect. Thirdly, it effectively reduces the dependency of students on multi-media platforms and strengthens students’ attention to knowledge points. Dependency of students on multi-media platforms includes not only mental dependency and courseware dependency, but also automatic dependency. For example, some function drawing can be easily achieved by multi-media technology, so students reduced manual rendering of the function. For this aspect, teachers should pay more attention to students’ solving, properly increase requirements for written calculation and manual drawing, and manage multi-media courseware.

5. CONCLUSIONS

With high-speed development of information technology, multi-media platforms, with their unique advantages, can solve some technical bottlenecks in traditional mathematics. They can be used to motivate students’ learning interests and improve their attention and learning effects. But attention should be also paid to the disadvantages of multi-media teaching, which should be improved. So it is required for teachers to avoid the disadvantages and make good use of the advantages in multi-media teaching. But in general, the advantages of multi-media platforms are considerably more than the disadvantages and these platforms are being innovated and developed. Therefore, teachers should give full play to the advantages of multi-media teaching and improve it during teaching practices according to industrial development, so as to enrich mathematics teaching methods and improve teaching quality.

REFERENCES

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