Application of Mobile Intelligent Classroom in Teaching and Analysis of the Teaching Effect—Take the “Management Accounting Practice” Course as an Example

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Abstract. The classroom teaching reform in the era of “Internet plus” has become an irreversible trend of the times. The mobile intelligent classroom is a representative of new technology and is being built in the universities. This paper makes a case study on the course of Management Accounting Practice to expound how to apply the online software to improve learning efficiency and teaching methods. And then, this paper analyzes how mobile teaching technology is embedded in class teaching. Also, paper conducted a questionnaire survey on the teaching effect of online courses for students, which made a multiple regression model with SPSS and further analyzed the factors affecting online teaching. Finally, the result shows that even the mobile intelligent technique can improve the efficient of teaching, the course construction still need to be continued to satisfy students. The teaching content, teaching methods and online teaching environment remain to be the most important factors that students concerned.

Keywords: Mobile Intelligent Classroom · Teaching Effect · Multiple Regression Analysis

1 Introduction

1.1 Intelligent Classroom Based on Mobile Teaching
Mobile intelligent teaching is a new teaching mode that combine mobile phone and learning platform/software. This new mode breaks the traditional teaching concept, it embeds information technology and mobile devices into the teaching process to realize the dynamic interaction across time and space. At the same time, this teaching mode uses information technology to reform teaching methods to build a personalized, intelligent and digital classroom environment to students.

1.2 The Implementation of Mobile Intelligent Classroom
Management Accounting Practice is the professional core course for the junior accounting students of our university. From 2019, the mixed teaching mode which embedded online and offline teaching is carried out. The details of the teaching methods and resource as followed:
1.2.1 Course Platforms and Resources

The Superstar APP is the main teaching platform uses in the class which can be log on through mobile phone and computer. Online websites or platforms such as MOOC Online, Accounting Cloud Platform, teaching videos, and Xueyin Online, etc can also be linked or established modules in the APP. For students, Superstar APP provides functions to preview teaching materials, upload exercise, interact with teachers, consolidate knowledge and feedback learning effect at any time anywhere; For teachers, they can upload learning materials, interact with students, and arrange academic activities after class to expand the scope of studying. Background in Superstar APP can derived learning data to help quantify final score and get students’ feedback, which can also design questionnaire in the software and analysis the indicators of teaching evaluation [1].

1.2.2 Teaching Process

The micro-class activities can also carry out through multiple information technologies in intelligent class, such as QQ, We Chat, Tencent Conference and other online teaching software are become the channels for teachers to carry out diversified online teaching activities. The teaching process of this course is implemented in three phases: before class, in class and after class, the detail as followed:

1. **Before Class.**

   In order to encourage the exploration of knowledge points, teachers upload study task and teaching resources on Superstar APP before the class. Then the tasks notification will be sent to the mobile phones or computers of students who have to follow the guide to finish cases study and expand reading to familiar with the theoretical concepts of new lesson.

2. **In Class.**

   Skill training activities for students such as online quizzes, discussions and presentation are operated in intelligent class through software/platform, such as Superstar APP, QQ, We Chat and Tencent Conference to realize communication and performance assessment. At the same time, this course also combines the “Accounting Cloud Platform” to examine the application of students’ comprehensive knowledge and ability to deal with enterprise problems through cases study.

3. **After Class.**

   This course has built a practical chain combed school, second-class, course competition, certificate learning and enterprise cooperation to implement the comprehensive practical activities in intelligent class, such as online expert lectures, workshops, salons and other academic activities which can be hold through the Superstar APP, ZOOM and Tencent Conference. The Table 1 shows the details about relevant software and platform used in the mobile intelligent class.
Table 1. Relevant Software and Platform Used in the Mobile Intelligent Class (Author drawn by self)

<table>
<thead>
<tr>
<th>Teaching Phases</th>
<th>Teaching Methods</th>
<th>Students’ Activities</th>
<th>Teachers’ Activities</th>
<th>Applied Software/Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Class</td>
<td>Task driven and reference reading</td>
<td>Receiving tasks, read materials, preview, watch videos, and complete discussions</td>
<td>Assigning preview tasks, reference materials, teaching videos and discussion topics</td>
<td>Superstar APP, mobile phone, MOOC Online, Xueyin Online and other online resources</td>
</tr>
<tr>
<td>In Class</td>
<td>Interactive teaching, case discussion, group work, test, etc.</td>
<td>Using mobile phone to participate in discussion, answer questions, do exercises and take exams in class</td>
<td>Using computers or mobile phones to display teaching content, sent study tasks, interact with students, and summarize learning achievements</td>
<td>Tencent Conference, QQ, We Chat, Superstar APP, Accounting Cloud Teaching Platform</td>
</tr>
<tr>
<td>After Class</td>
<td>Practical teaching, lectures, salons and workshops</td>
<td>Participate in lectures and share, online review and inquiry</td>
<td>Invite experts to carry out teaching activities on the platform</td>
<td>ZOOM, Tencent Conference, Superstar APP</td>
</tr>
</tbody>
</table>

2 Analysis on the Teaching Effect

2.1 Research Questions and Methods

In order to further understand the factors that affect the teaching, this paper adopts the “Questionnaire Star” online questionnaire to investigate the satisfaction of the online teaching effect with the aim that collect feedback data and provide reference for further improving on the teaching quality.[2].

2.2 Research Object

The students in grade 2019 who had studied “Management Accounting Practice” in accounting major in the university were randomly sampled. The number of sample was 200, including 46 males and 154 females. A total of 200 questionnaires were distributed and 196 valid questionnaires were taken back express that the questionnaire recovery rate was 98%, The Cronbach’s α coefficient is 0.812, which shows the reliability is good.
2.3 Design of Questionnaire

In order to ensure the reliability of the survey, the questionnaire is designed based on the suggestions from relevant research and the opinions of experts. There were nine contents in the questionnaire: students’ information, students’ learning attitude, autonomous learning ability, teaching environment, teaching content, teaching attitude of teacher, teaching methods, teaching assessment and overall evaluation of teaching effect. The measurement scales of this study are 5-likert scales.[3].

3 Model Building

This study uses SPSS 22.0 statistical software for data analysis. There are seven factors are chosen to be the key variables which will be included in the multiple regression equation for testing whether have an impact on the evaluation. The equation is:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \epsilon \]

In the equation, Y represents the satisfaction of online teaching effect; \( \beta_0 \) is a constant term; \( X_1 \) represents students’ learning attitude; \( X_2 \) represents students’ autonomous learning ability; \( X_3 \) represents teaching environment; \( X_4 \) represents teaching content; \( X_5 \) represents teachers’ teaching attitude, \( X_6 \) represents teaching methods; and \( X_7 \) represents teaching assessment methods.[4].

3.1 Multiple Regression Analysis

3.1.1 Correlation Analysis.

The Pearson correlation of variables was tested, which laid the foundation for further regression analysis. The greater the absolute value of Pearson correlation coefficient, the greater the degree of linear correlation between variables. The analysis result in Table 2 shows the correlation coefficient of \( X_1 \) students’ learning attitude and \( X_2 \) students’ autonomous learning ability are not pass the significance test and the value both less than 0.4, which indicated that they are not the factors affecting online teaching effect and these two variables can be deleted in the following analysis. The correlation coefficients of other five variables are greater than 0.7, indicating that there is a certain correlation, which may affect the effect of online teaching.

3.1.2 F-test, t-test and Regression Coefficient of the Model.

According to the result of correlation test, the modified equation is:

\[ Y = \beta_0 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \epsilon \]

The results of F-test, t-test and regression coefficient calculation in Table 3 as followed:

The correlation coefficient \( R^2 \) value of the regression model is 0.802 and the value of adj \( -R^2 \) is 0.762, the results indicates that the fitting degree of the model is good.
Table 2. Correlation Test Results of Each Variable in the Model (Author drawn by self)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Y</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1</td>
<td>0.217</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X2</td>
<td>0.342</td>
<td>0.005</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X3</td>
<td>0.710***</td>
<td>0.011</td>
<td>0.003</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X4</td>
<td>0.872**</td>
<td>0.145</td>
<td>0.041</td>
<td>0.519</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X5</td>
<td>0.748**</td>
<td>0.024</td>
<td>0.018</td>
<td>0.405</td>
<td>0.853**</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X6</td>
<td>0.851**</td>
<td>0.016</td>
<td>0.001</td>
<td>0.254</td>
<td>0.316</td>
<td>0.843**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>X7</td>
<td>0.728**</td>
<td>0.107</td>
<td>0.008</td>
<td>0.678</td>
<td>0.672**</td>
<td>0.114</td>
<td>0.752**</td>
<td>1.000</td>
</tr>
</tbody>
</table>

The F value is 6.239 and greater than the F0.05 value of 5.205, indicating that the model is reliable. The P value is 0.001, indicating that the linear relationship between the dependent variable Y and each independent variable is significant, the correlation coefficient between each variable and the dependent variable is significant, and the VIF value is less than 10. Therefore, the multiple regression model of influencing factors of online teaching effect is:

\[ Y = 50.067 + 0.061X3 + 0.083X4 + 0.034X5 + 0.054X6 + 0.031X7 + \varepsilon \]

3.2 Analysis of Regression Results

From the analysis results, we can see that X3 online teaching environment has a significant positive impact on the teaching effect, and the marginal impact on the satisfaction of improving the online teaching effect is 6.1%; X4 teaching content has a significant positive impact on the online teaching effect, and its marginal impact is 8.3%; X5 teachers’ teaching attitude has a significant positive impact on the online teaching effect, and its marginal impact is 3.4%; X6 teaching method has a significant positive impact on the online teaching effect, and its marginal impact is 5.4%; X7 teaching assessment
method has a significant positive impact on online teaching, and its marginal impact is 3.1%. To sum up, we can see that the factors that have the greatest impact on the teaching effect are the online teaching environment, teaching content and teaching methods, and the marginal impact is more than 5%. Therefore, if we want to improve the effect and satisfaction of online teaching, we need to make more efforts in the above three aspects.[5].

4 Analysis on Students’ Self Learning Situation

At the same time, this questionnaire also has a survey on students’ self learning situation, such as learning attitude and autonomous learning. The final examination scores of students are expressed by (\( \bar{X} \pm s \)). Wilcoxon rank sum test or Kruskal wallis H test in Table 4 are used to compare the differences between the final examination scores of two or more groups, \( P < 0.05 \) is a significant difference.

In general, 62% of the students showed that they were interested or very interested in this course, and the average final score of these students was 81.45, which was in a good level. The analysis results show that the former has significantly higher academic performance than the latter (\( P = 0.003 \); At the same time, 64.8% of the students always complete the learning tasks in time, whose average final score is 82.54 and it is in a good level. The analysis results show that the former has significantly higher academic performance than the latter (\( P = 0.021 \); There are 14.2% of students often initiative

<table>
<thead>
<tr>
<th>Content</th>
<th>Number of Respondents (%)</th>
<th>Final Exam Score (( \bar{X} \pm s ))</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are you interested in “Management Accounting Practice”?</td>
<td>62%</td>
<td>81.45 ± 10.54</td>
<td>0.003</td>
</tr>
<tr>
<td>Ordinary</td>
<td>38%</td>
<td>74.09 ± 12.41</td>
<td></td>
</tr>
<tr>
<td>2. Did you complete the online task in time?</td>
<td>64.8%</td>
<td>82.54 ± 10.63</td>
<td>0.021</td>
</tr>
<tr>
<td>Occasionally</td>
<td>35.2%</td>
<td>76.48 ± 12.37</td>
<td></td>
</tr>
<tr>
<td>3. Will you take the initiative to learn by yourself?</td>
<td>14.2%</td>
<td>82.73 ± 9.27</td>
<td>0.032</td>
</tr>
<tr>
<td>Occasionally</td>
<td>50.8%</td>
<td>80.53 ± 9.15</td>
<td></td>
</tr>
<tr>
<td>Will not</td>
<td>35%</td>
<td>70.11 ± 17.49</td>
<td></td>
</tr>
</tbody>
</table>
to learn by themselves, and the average final score is 82.73 which in a good level. The analysis results show that the former has significantly higher academic performance than the latter ($P = 0.032$). Finally, it can be seen that not only the teachers’ curriculum design, online learning environment and teaching methods have an great impact on the teaching effect, but also the students’ efforts and learning attitude have a certain positive impact on the learning effect [6].

5 Conclusion

Even this course used mobile intelligent technique which had improved the efficiency of teaching and learning, however, the research shows that technology can not completely solve the improvement of teaching effect. According to the data analysis results, the following suggestions are made for the course construction:

5.1 Stimulate Students’ Interest in Learning and Improve Their Learning Initiative

The course also needs to further think about its orientation, for example, how to increase students’ interest in learning through the teaching design of the course, and at the same time, teachers also need to further think about enhancing students’ awareness of autonomous learning. In order to stimulate students’ interest, we can improve from the following points: (1) Increasing the cases studies which close to students’ life, adding more interesting elements which students sensitive to the teaching content, and increasing the students’ reflection. (2) Enriching teaching resources, increasing resources of references, lectures and projects, and strengthen students’ participation. (3) Guiding students to establish good online learning habits in online learning [7].

5.2 Continuous Curriculum Construction

The core part of teaching satisfaction is course construction. The course construction is the basis for satisfaction of students’ learning. Efforts will be made to solve the problems feedback from this research, such as the combination mechanism of online and offline, the assessment method with the learning situation and the training effect. However, the course can not only achieve the teaching objectives, but also make real achievements.

5.3 Innovation of Teaching Methods

The methods of online teaching and offline teaching should be different. Teachers should learn more about the teaching forms of accounting courses in other schools, further improve the quality of teaching interaction, such as online discussion quality, posting quality, video viewing quality, etc. at the same time, the innovation of teaching methods should also match the corresponding teaching evaluation system. These are the places where online teaching can be further improved in the future.
References


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