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Research Article

Exploration of Blended Learning Model Based on Moodle Art Learning Platform-Taking "Photography Foundation" Course for Example

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Abstract: In this paper, we combined with face-to-face teaching and online learning supported by the Moodle art learning platform from the concept of blended learning, and constructed a blended learning model based on Moodle platform, which was contained three stages: the preliminary needs analysis, blended learning design and blended learning evaluation. Taking "Photography Foundation" course for example, we further improved blended learning activity process based on the blended learning model. Finally, this paper adopted the questionnaire and interview method to analyze the effectiveness of blended learning model, it showed that blended learning model based on Moodle art learning platform could improve the teaching effectiveness of the course.
Keywords: blended learning; Moodle platform; online learning; effectiveness analysis

INTRODUCTION

With the wide application of information technology in the field of higher education, more and more teachers of colleges and universities realized that information technology was changing the way of teaching and students' learning styles. We found that great changes had taken place in the learning environment more than in the past, which was included the traditional face-to-face learning and non-face to face network learning that was usually called blended learning (BL) now [1]. The NMC horizon report (2015 higher education) pointed out: "Short-Term Trend: Driving Ed Tech adoption in higher education for the next one to two years"[2]. In recent years, colleges and universities and primary and secondary schools in China were actively creating teaching environment of blended learning, and encouraging teachers to apply the blended learning to the design, development and implementation of the course[3]. Lots of research results at home and abroad showed that blended learning could significantly improve the learning effectiveness for students [4]. It was worth noting that how to integrate effectively the advantages of online learning and face-to-face learning in the field of higher education is a concerned issue for a lot of first-line teachers in colleges and universities.

After the promulgation and implementation of the National School Art Education Development Plan (2001-2010), more and more science and engineering colleges set up the school elective courses and organized various art activities and lectures to improve college students' art literacy. Nevertheless, the teaching efficiency of the art education curriculum in science and engineering colleges was not very ideal now, there were still some problems to solute. For example: the kinds of courses were set single, most of the elective courses of art were dominated by teachers in class[5], the communication between teachers and students was not timely. Therefore, this research applied blended learning model to the elective course of art in the science and engineering colleges. Taking "Photography Foundation" course for example, the effective combination of Moodle art learning platform of Northeast Petroleum University that we built through the free open source software and face-to-face teaching, we did it for developing the teaching and exploring the structure of blended learning model based on Moodle platform, the design and implementation of learning activity, and the analysis of effectiveness so that we could improve the teaching effectiveness of art education course in science and engineering colleges.

DEFINING THE KEY CONCEPTS

(1) Moodle art learning platform

Moodle was the abbreviation of Modular Object - Oriented Dynamic Learning Environment that was a set of free used course management system. At present, Moodle had always been leading position in the course management system and it was also widely popular among educators all over the world. Because the Moodle platform was easy to use and the source codes of Moodle were open, so that people could conduct secondary development according to their own

requirements. There were many modules in the Moodle platform, such as: assignment module, chat module, vote module, BBS module, test module, resource module, questionnaire survey module, etc.

In this study, Moodle art learning platform was oriented to the teachers and students in school from Northeast Petroleum University. It was a major course management platform of college students' art literacy elective course that was based on open source software-Moodle, and was used parts of modules of Moodle to open "Photography Foundation", "Chinese Traditional Culture", "Art Appreciation" courses, etc.

(2) Blended learning

Research data at home and abroad showed that the concept of Blended Learning had been appeared more than ten years, which had a wide range of applications in the field of school teaching, teacher training and enterprise training. But the academics had not a unified definition about the definition of blended learning at present, and researchers explained the concept of blended learning from different angles as follows. Kekang He started from the perspective of learning style, he thought that blended learning was defined as "the so-called Blended Learning, it combined of the advantages of traditional way of learning and E-Learning, that was to say, which made the teachers play a leading role of guidance, enlightenment and monitoring in the teaching process and fully embody students' initiatives, enthusiasm and creativity as the main body of the learning process" [6]. While Kedong Li started from the learning mode, he thought "blended learning was the integration of two learning modes of face-to-face teaching and online learning and a kind of teaching mode of reducing the cost and improving the efficiency" [7]. Thus it could be seen that many researchers had a common view of the definition of blended learning "the integration of traditional face-to-face teaching and online learning", "the teaching efficiency optimization", etc.

Blended learning involved in this study was a new way about learning and teaching that combined traditio nal face-
toface teaching with online learning, and it was dominat ed by teachers' classroom teaching, while students could learn independently in Moodle art learning platform in order to achieve the optimization of the teaching efficie ncy.

CONSTRUCTION OF BLENDED LEARNING MODEL BASED ON MOODLE ART LEARNING PLATFORM

According to the previous definitions of the two key concepts of "Moodle art learning platform" and "blended learning", blended learning model's design and development in this study was to promote the elective courses of art of Northeast Petroleum University. The students' self regulation and control ability were played fully in the learning process by means of the organization, feedback and guidance[8]. As shown in figure 1, the model mainly contained three phases: preliminary requirements analysis, blended learning design and blended learning evaluation.

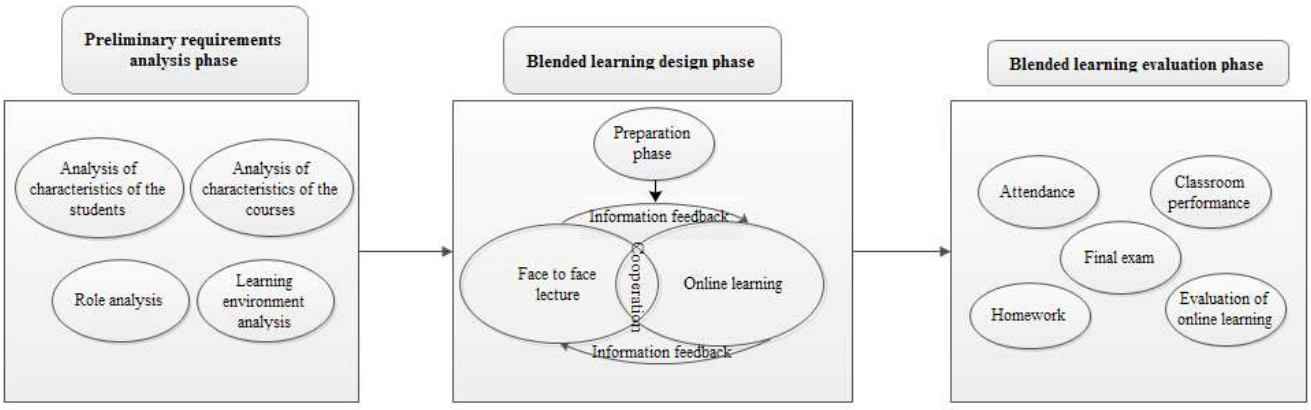

Fig-1: Construction of blended learning model based on Moodle

(1) Preliminary requirements analysis phase

The preliminary requirements analysis phase in this study was aimed at the complete blended learning process. The author mainly analyzed the four aspects: students' characteristics, course characteristics, role analysis and learning environment.

A. Analysis of the students' characteristics

The analysis of students' characteristics played an important role in the early stage of the needs analysis. Generally the teacher need to have a preliminary diagnostic evaluation to students who were elective before class and know the students' basic information, what courses they had first completed, an understanding of this course, the common social interactive software and familiarity of blended learning model.

B. Analysis of course characteristics

Course characteristics mainly was to know the basic case of artistic elective courses, such as: the object

of attending class, the distribution of period, the requirement for prerequisite courses, learning objectives, course contents and other information. Especially course contents had a direct impact on face-to-face teaching and online learning. We need to determine which contents were suitable for face-to-face teaching, which contents were suitable for online learning and which content were suitable for both.

C. Analysis of role

The researchers who participated in "Applications of the blended learning model based on Moodle art learning platform" were composed of four kinds of people: the organizer, teachers of departments, assistants and students. The author mainly analyzed the role of assistants: graduate student that were in the same major selected by the teacher. They mainly assisted teachers to carry out learning activities in the Moodle platform, helped students to answer their questions and gave the teacher some information responses.

D. Analysis of learning environments

According to the definition of blended learning in this study, learning environment mainly included multimedia classroom and Moodle art learning platform. As shown in the analysis of students characteristics, the majority of students in the daily life got used to use social interactive software (such as: QQ, WeChat, Microblog, etc.) which could assist learning in the Moodle art learning platform to receive and communicate the information. Therefore, learning environment in this study should also include social interactive software that students commonly used.

(2) Blended learning design phase

Blended learning design in this study mainly included four phases: preparation, face-to-face teaching, online learning based on Moodle art learning platform (hereinafter referred to as "online learning") and information feedback. Among them, the relationship between face-to-face teaching and online learning was cooperative and interaction. The content of online learning could be either the reinforcement of face-to-face teaching content or the transferring of face-to-face teaching content; accordingly, face to face teaching made the feedback information of online learning show to the learner, it could also explain the problems of online learning that students encountered. And information feedback was the controller and communicator throughout the process of blended learning design and played the role of bridge between face-to-face teaching and online learning.

A. Preparation phase

In the preparation phase, the author had been thinking about this problem: how to integrate into face-to-face teaching and online learning reasonably? Whether or not there was a proportional distribution problem between them? Based on consulting literature material, the author found that the proportional distribution problem between face-to-face teaching and online learning had been drawn the attention of many foreign scholars. They thought that keeping the balance between face-to-face teaching and online learning was necessary[9], The ratio between classroom and internet lessons should be adjusted to the study area and the course auditorium[9]. We could learn from foreign scholars' views, the balance that was discussed in this study mainly was determined by the learning content of course.

According to the previous analysis of students and curriculum characteristics, the author put the key points and difficulties of the syllabus as the main contents of face-to-face teaching, while the contents of online learning were mainly an extension of face-to-face teaching, which could be developed learners' knowledge structure. In addition, in order to make students quickly use Moodle platform, teachers also need to make a manual of Moodle platform to help learners to study.

B. Face-to-face teaching phase

For the elective courses of art, face-to-face teaching time was arranged according to the curriculum schedule of school, provided at least 2 periods per week. The whole instructional design was completed by the teacher. At this stage, the study mainly discussed the selection of the contents of face-to-face teaching. Based on the instructional objectives of the course, teachers selected the knowledge that were more important, had a certain operating requirements or the difficulties of the students were not easy to understand as the teaching contents. At the same time, the teacher also introduced the assistant in class, the basic functions of Moodle platform and the tasks that were completed [10].

C. Online learning phase

According to activity theory proposed by a Finnish scholar named Y.Engestrom, the author understood that activity system included six elements: main body, object, community, tools, rules, and division of labor. Among them, main body, object and community were the core elements, while tools, rules, and division of labor were the secondary elements. The main body was the performer of the activity; object was the operational object of main body, which could be physical or mental, and be converted to results; community was composed of several individuals and groups, which shared object and constructed themselves to distinguish them from other communities; tools included all of the things that were used in the process of the object could be converted to results, which could be physical or psychological tools; rules were the rules, law, policies and convention that restrained the activities, and the relationship between potential social norms, the standard and the members of the community; division

of labor was the allocation of lateral task and the allocation of longitudinal rights and status among members of the community [11].

Accordingly, the main body was students that participated in learning activities; the object was to achieve the course learning objectives; community was teacher, assistant and students that participated in learning; tools mentioned here referred to support tools that were required for online learning activities; rules were made to restrain students from learning behavior in the learning activities to form a certain criterion, and were regarded as a part of students behavior evaluation in general; division of labor was mainly allocated the task of learning activity. Apart from considering the above six elements, we also need to consider the organization of learning activities, students behavior evaluation and learning activities strategy in the process of learning activities design.

Online learning activities were designed completely before face-to-face teaching and allowed students to access the corresponding learning activities. Students chose their own time flexibly to participate in the activity, which either was regarded as a preparation before class or a task after class. Moodle platform supported for two forms of learning activities: individual learning and group collaborative learning. We regarded "face-to-face teaching content" as the guidance of the content of personal learning activities and designed different themes, which were simply easy to complete; on the contrary, the contents of group collaborative learning activities tent to be more interesting and complex that were suited to complete collectively for team.

D. Information feedback phase

The information feedback between face-to-face teaching and online learning was two-way. Moodle recorded complete learning log that every student learned from the beginning to the end in platform. When online learning activities were over, the assistant exported, collected and analyzed the data of Moodle log and also reflected students' online learning situation to the teacher. When the teacher developed the next face-to-face teaching, according to the information of online learning platform feedback, the teacher summarized the activity and adjusted timely the contents and methods of face-to-face teaching. Therefore, we found that the exchange of information between face-to-face teaching and online learning was promoted each other.

(3) Blended learning evaluation phase

Generally speaking, the students' learning evaluation was the main gist to judge students' learning effect, which included two parts: formative evaluation and summative evaluation. While blended learning evaluation was different from traditional classroom learning evaluation, not only it had the learning evaluation of face-to-face teaching, but also the evaluation of online learning. Specifically the blended learning evaluation in this study mainly included class attendance, class performance, homework, online learning evaluation and final exam. Among them, classroom performance was an incentive measures for the students who had good performance; while online learning evaluation was the most complicated, and we need to make a series of reasonable indicators for students' online learning behavior. With the help of the report module of the Moodle platform, the author analyzed the behaviors of the students and made the data for visualization operation so as to achieve the aim of teaching reflection and teaching prediction [12].

(4) The implementation plan and effectiveness analysis of blended learning activities based on Moodle art learning platform

Under the guidance of blended learning model in Moodle art learning platform, taking elective courses of arts of Northeast Petroleum University "Photography Foundation" for example in this study, the author studied it for the implementation of blended learning activities and effectiveness analysis. "Photography Foundation" was a course that combined theory with practice, for eight weeks of teaching, and the total period was 48 hours. The people that participated in the blended learning activity mainly included the teacher, assistant who were responsible for learning activities of the platform and 18 sophomores majoring in science and engineering, and the total amount was 20. In order to carry out the blended learning activities, the author used the questionnaire survey to know the characteristics of students, such as: prerequisite courses, common social interactive software, and whether or not students were familiar with blended learning model etc. In addition, the author found that most of the students all learned the two courses: art foundation and graphic image processing, students often communicated with QQ, but they were not familiar with the blended learning model. Therefore, it was necessary for students to be trained the blended learning model before the start of blended learning activities.

(1) The implementation plan of blended learning activities based on Moodle art learning platform

A. Set the learning objectives

Learning objectives of the course were knowledge that was acquired and learning skills that were mastered for a student at the end of the course. Learning objectives of this study were summed up, which combined the key points and difficulties of teaching syllabus of "Photography Foundation" course with teachers' experience, which mainly had the points as follow:

1) To understand the structure, working principle and usage of the digital camera;

2) To understand the factors of affecting exposure;

3) To master exposure in various kinds of climate;

4) To master light technology of all kinds of natural lights;

5) To understand the basic rule of capture and composition.

B. The selection of course contents

The "Photography Foundation" course in this study mainly included the theoretical and experimental topics, course contents were shown in table 1:

Table-1: Course content of "Photography Foundation"

Theoretical topics	Practical exercises
Topic 1 Cameras and Professional photographic equipments	The use of photography
Topic 2 Digital photography	
Topic 3 Exposure	Practicing exposure technologies in different lighting
Topic 4 Light	Using suitable light technology
Topic 5 Basic rules of photography composition	Grasping basic requirements and rules of photography composition
Topic 6 Integrated practice	Choosing a subject and taking some photos by every group

C. The design of the learning environment

We combined the characteristics analysis of students and courses, the learning environment involved in this study mainly included multimedia teaching environment and outdoor (face-to-face teaching), Moodle art learning platform and QQ discussion group(online learning). At the beginning of the course, the teacher would inform the students of account and password of the Moodle art learning platform, and invited 20 people that participated in the course to join the QQ discussion group.

D. The overall implementation plan of blended learning activity

Based on the needs analysis of the "Photography Foundation" course, we further upgraded the process of blended learning activities, and sorted out the relationship of learning objectives, curriculum content, the types of activities, activity behavior, the way of evaluation and scores (max) , which were corresponding to each phase of blended learning activities [13], as shown in table 2.

Table-2: Design plan of blended learning activities [13]

Learning objectives	Course contents	Types of activities	Specific activities	Assessment	Points (max)
1-5	1-6	Face to face lecture	Classroom discussions	Attendance, Performance of classroom	10
1-5	1-5	Online learning based on Moodle (individual)	Browsing learning resources, Online learning based on the problems, Self-testing, Uploading homework, Participating the subjects discussions, etc.	Checking students' logs in the Moodle platform	10
	6	Online learning based on Moodle (group)			
1-5	1-6	Practical exercises	Taking photos	according to the specified criteria of practical exercises	40
3-5	2-5	Presentations in the classroom	Producing an electronic photo album and having a presentation	according to the specified criteria of photography works and presentation	10
1-5	1-6	Final exams	Handing in the works	according to the specified criteria of photography works	30
Total					100

We could see from the table 2, blended learning activities in this study throughout all contents of "Photography Foundation" course. We would take "The third module: photography exposure" for example, and further analyzed the process of blended learning activities, as shown in figure 2.

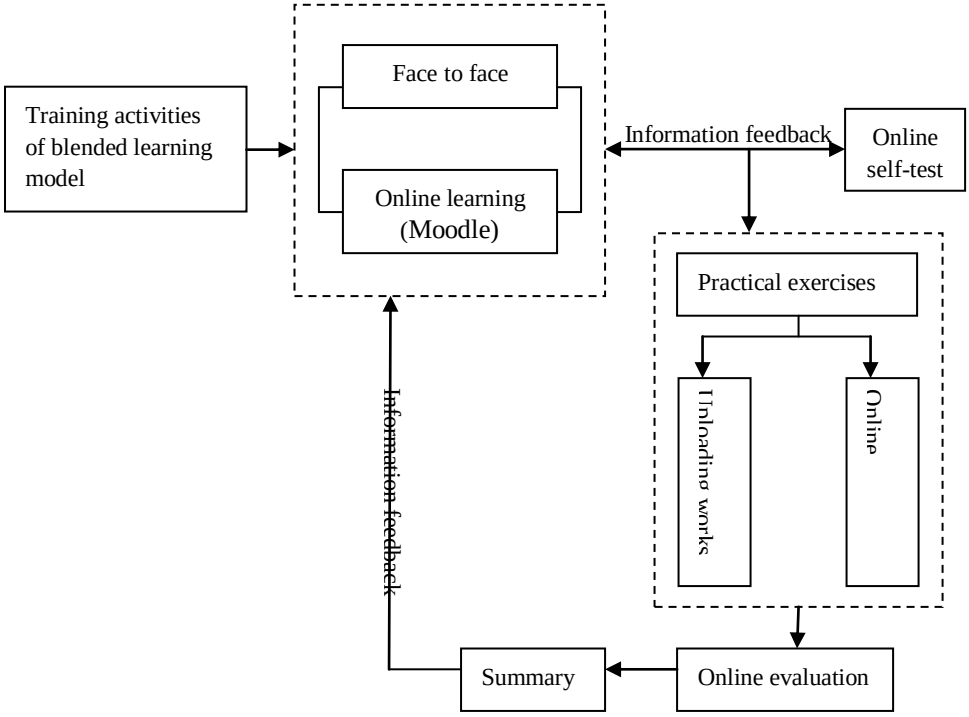

Fig-2:The flow chart of blended learning activities

We can see from the figure 2, the beginning of blended learning activities was from the training activities of blended learning model that teacher presented to students. The course content was presented in two forms. One was face-to-face classroom teaching and teacher would impart the main content of "The third module: photography exposure" in the form of PowerPoint to students; the other was online learning of Moodle platform. Not only the assistant provided video resources of "exposure compensation and manual mode" that were related to knowledge, but also presented the key knowledge points "how did 'correct exposure, overexposure, underexposure' express in the picture?" in the form of question. Online self-testing time was flexible which could be arranged before class or after class and the scores were recorded in the students' usual performance. Through the online test, students were able to understand the knowledge situation of self-mastery timely. In the subsequent classroom learning, students can actively learn the knowledge so as to complete relevant task better.

Experiment contents were requested students to complete the shoot of "Exposure Photography Practice" outdoor according to the experimental instructions and tasks assigned by the teacher. After the experiment, students need to upload the works to discussion module of Moodle platform within the prescribed time, and raised the problems that were encountered in the process of experiment. A week later, the teacher evaluated this experiment works, and the scores were recorded in the students' grades.

In addition, we found that information feedback played an important role in the process of blended learning activities. Information data herein mainly come from the log of Moodle platform which recorded all the students' learning behavior during online learning. We made a specific research on the behavior index of online learning. Through consulting the references and observing the log of Moodle platform, we found that the behavior indicators of online learning mainly included the following [12]: 1) the number of visiting the course; 2) the number of uploading work; 3) the number of adding discussion in forum; 4) the number of browsing the resources, the posts and works; 5) the number of adding post in forum.

We exported all the students' learning activity logs of this module through the Moodle platform, and made the data statistic according to the learning behavior index and obtained table 3 [14].

Table-3: Logs of learning activities of topic 3

Activities contents	Learning behaviors	Frequency
Photography Foundation	Visiting the course(course view)	168
exposure compensation and manual mode[Video learning]	Browsing the video resources(page view)	73
Topic 3 Exposure[PPT]	Browsing the courseware resources(resource view)	55
Forum discussion	Browsing the posts (forum view discussion)	45
Forum discussion	Posting a message in the forum discussion(forum add discussion)	11
Forum discussion	Replying a message in the forum discussion（forum add post）	6
Activity 3 Silhouette	Uploading the works（assign submit）	34
Activity 3 Silhouette	Browsing works of the other students（assign view submission）	17

As shown in table 3, the assistant fed back the following information to the teacher:

1) The number of students that accessed to courses was more generally which demonstrated that they frequently log into the platform for learning, so we achieved the initial purpose of the learning activity design.

2) The students browsed video resources more than courseware resources which showed that students tended to like intuitive visual impression. So the assistant could modify the form of resources in platform to make most of the learning materials presented with the form of video media resources, in order to attract students' interests and attention more.

3) In the module of assignment, students uploaded works with the trend of increasing. This showed that students modified their work repeatedly and finally submitted the most perfect work. In addition, the frequency of students' browsing works of other students was low, so many students missed the chance to learn outstanding works of other students. But when the teacher commented on these outstanding works in face-to-face classroom teaching, we found that they also consciously saw the works of other students in the next activities so as to constantly improve their work.

4) In the module of forum, the number of adding post and adding discussion was relatively few. It showed the low degree of interaction among students which was also proved in questionnaire survey. So it requested teachers and assistants to play a guiding role to encourage students to participate in discussions actively and to promote communication between students.

5) The time of completing test was relatively delayed and this showed that students did not understand knowledge completely. So it requested the teachers to emphasize important knowledge points needed to be mastered in face-to-face classroom teaching to make the students complete online test efficiently and accurately.

(2) The effectiveness analysis of the blended learning based on Moodle art learning platform

In order to verify whether the blended learning model could improve the teaching efficiency of the "Photography Foundation" course based on Moodle art learning platform, after the end of the course, the author adopted the method of questionnaire and interview to survey, summarized the collected data and analyzed the effect.

The objects of this questionnaire were 18 students (13 boys, 5 girls) that participated in the practice of the blended learning model in the "Photography Foundation" course. The purpose of the questionnaire was to know about the degree of student liked blended learning model and whether blended learning model could improve the students' learning efficiency, we could investigate and analyze mainly from the following several aspects:

A. The application of Moodle art learning platform

The investigation shows that 50% of students spent 3-6 hours per week on the Moodle art learning platform, while 20% of students spent 6-9 hours on the platform, the rest of the students' learning time was 1 to 3 hours. Although the time was different, we were not sure that the less learning time meant lower learning efficiency and vice versa. Through interviews, students with less online time might spend more offline time in class face-to-face; it was a good way to supplement the less online learning time. This issue only for investigating the application of the platform, and that was the length of online learning.

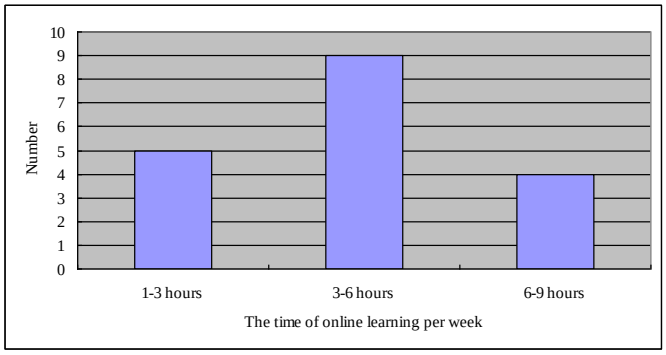

Fig-3 The time of online learning per week

B. The degree of interaction between students and teachers

Through figure 4, in the interactive communication, 33% students paid their attention and often participate in it, 55% students just had a look but rarely participated in it, 6% students had a look but didn't participate at all, and the rest 6% didn't even got involved. In the module of forum, more than half students just watched but rarely participated in discussions actively, adding discussion and adding post were even rare. So it requested teachers and assistants to play a leading role as an intermediation, to promote communication between different members actively in platform [14].

In addition, figure 5 showed 28% students preferred the way of synchronous communication in online discussion, 33% students liked to leave a message, 33% students liked the way of asynchronous communication by email, and the rest would like to use QQ and other social software to communicate. This showed that the students accepted the way of synchronous and asynchronous communication, we could design the way of synchronous and asynchronous communication at the same time to promote the communication between students.

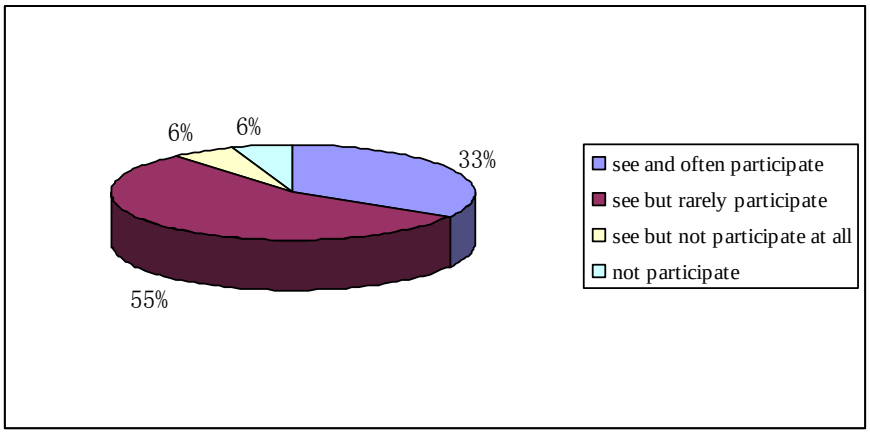

Fig-4: The degree of interaction between teachers and students

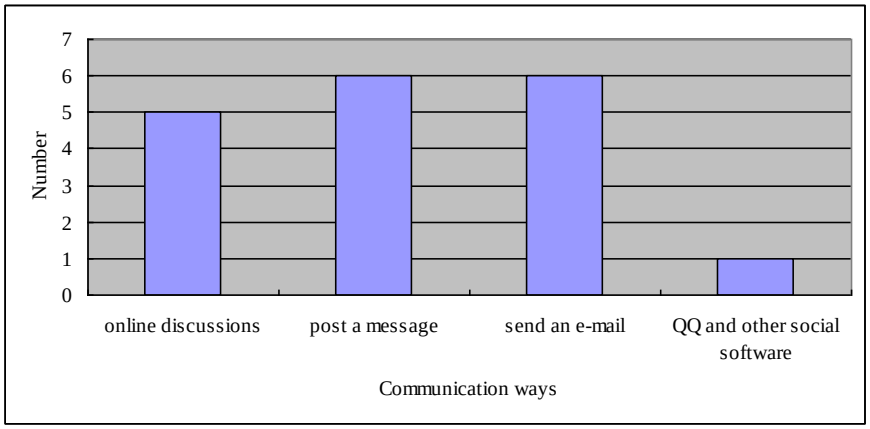

Fig-5: Interactive communication ways

C. The degree of love about blended learning model

The survey found that 7% students liked the blended learning model very much, 60% students liked blended learning model relatively, 28% students liked it a little, and the rest were not used to the way of blended learning. Therefore it showed that most of the students liked the learning way of the combination of online learning and face-to-face teaching, they also gradually adapted to the reform of traditional teaching. While for the part of the students that didn't like the blended learning model, we learned from the interview, the main reason was they were not good at technology, and lacked of the motivation of autonomous learning, and ignored their course learning in spare time without the teacher's supervision and guidance. Therefore, they gradually reduced the learning interest of blended learning model.

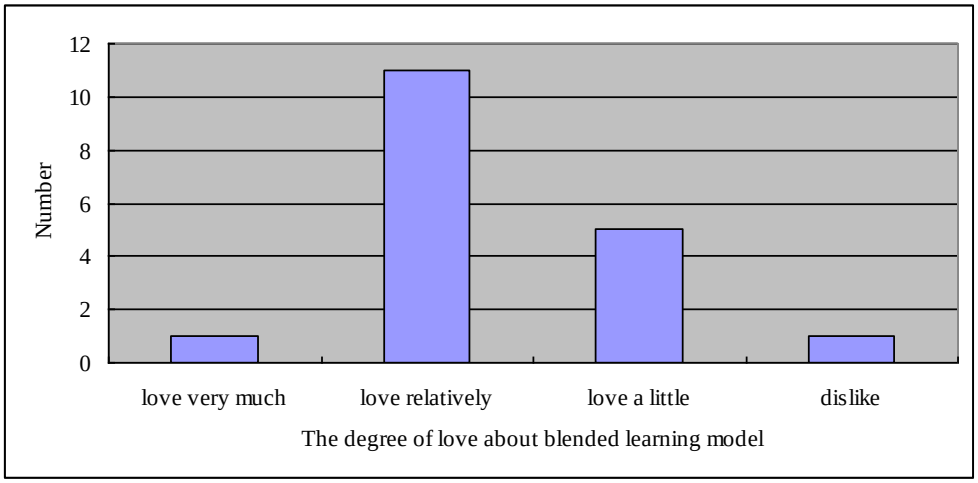

Fig- 6: The degree of love about blended learning model

D. The learning effect of blended learning model

According to the survey, 85% students thought that blended learning model had a great effect on their learning, and we could learn from the interview that they thought learning activities in the platform could promote their course learning, which were the knowledge contents' expansion and migration by face-to-face. The effective combination of the face-to-face teaching with online learning content could promote the comprehensive understanding of knowledge, which could improve their learning efficiency. And the effect was very significant, which could be reflected in their usual grades and in the final grades. We found that more than half of students had a big enhancement on participation and listening in class through observation [15]. In addition, observing and analyzing the students' performance in platform through the log data of students learning behaviors in the platform, we could find that the numbers of login in the platform, the numbers of visiting course and visiting resources and the completion of works all showed a trend of gradually increasing [19], thus we inferred that blended learning model could improve the teaching efficiency.

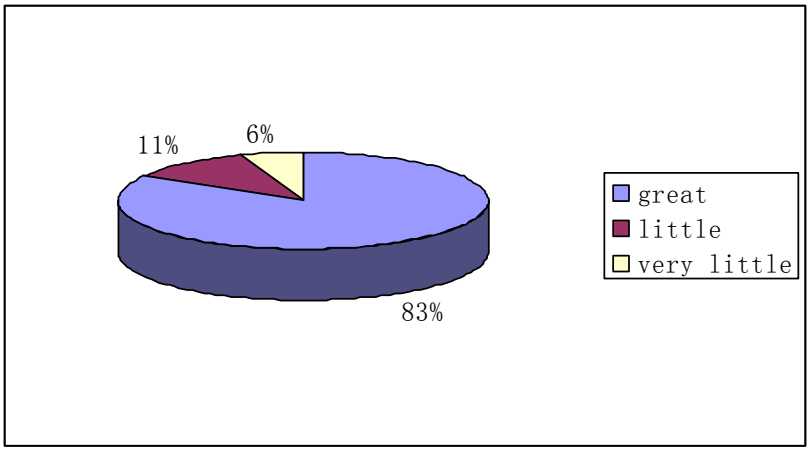

Fig-7: The learning effect of blended learning model

E. Opinions of students putting forward the design of online learning activities

Students thought that the insufficiency in Moodle platform included: the speed of login in platform was slow; participants were not active enough in platform; the last four learning activities for the purpose of collaborative learning didn't publish activities in time, which didn't remind them to see the posts timely in forum; few people went to see posts except themselves. The feedback to the assistant and teacher had a certain role of guiding and could make the Moodle platform more effective under the support of online learning.

CONCLUSIONS AND REFLECTIONS

In this paper, blended learning model based on Moodle art learning platform was discussed, and correspondingly teaching practice activities were implemented in the art elective course of Photography Foundation. Based on the effectiveness analysis, it can be found that blended learning model by Moodle was helpful for students of universities of science and engineering, and there were some personal reflections in the blended learning activities.

(1) Enhancing emotional communication between the assistant and students

In general, there were less chances for the assistant and students to meet face to face. The assistant was always the "invisible" of online learning so that emotional communication between the assistant and students was not good. Therefore, the students were known the role "assistant" in class so that they had chance to know who was the assistant in the online learning platform. Meanwhile, the students were enhanced the emotional communication in the virtual learning which lay a solid communication foundation for the further online learning.

(2) Cultivating the students' consciousness to learn actively online

Since most of the students had not learnt on the Moodle platform before, it could be the case that they would not login the platform to learn in time. In order to avoid the occurrence of the above, there were two actions to remind the students to login the platform: one was that the teacher forecasted the online learning contents during classroom teaching; the other was the assistant to remind the students to login via instant messaging, such as discussion group of QQ. With the blended learning activity process, the students would develop online learning habits.

(3) Developing the strategy of learning activities for individuals and groups

The author also took the strategy to encourage the individuals and groups to online learning into consideration. About the individuals learning, the teacher and assistant were also required to participate in the online learning and finished the task on time which was expected to fully arouse students' enthusiasm and enhance the designers' experience of online learning.As for the group cooperative learning, the teacher and assistant divided the students into groups and each group was chosen a group leader. Every group had a chance to design and report the learning activities which made every student had the chance to change his role from a participant to designer and organizer. In order to make sure every group fulfill the task, the assistant would provide assistance needed to the group leaders via instant messaging and publish the issues of common concern online bulletin boards of the Moodle platform.

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