



Journal of
**Software
Engineering**

ISSN 1819-4311



Academic
Journals Inc.

www.academicjournals.com



Research Article

A Study on College Computer Software Application Courses Teaching Based on Flipped Classroom: Take "Flash Animation Design" Course as an Example

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Abstract

Background: "Enhancing student's ability of practice and innovation" is a great task to implement quality education, improve education quality and build a harmonious socialist society. As the foundation of knowledge and technological innovation system, it is the responsibility of college to develop the advanced specialized talents with innovative spirit and practical ability. This study focuses on the teaching of computer software application courses in colleges and to seek the effective way to cultivate student's ability for practice and innovation through promoting the teaching reform. **Materials and Methods:** With the wide application of information technology represented by computer in all fields of life and work, the courses of computer application has become an important part of the training of talents. Strong practice and innovation of computer applications, making these courses has obvious advantages in cultivating student's practical and innovative ability. On the basis of the investigation of the current situation of teaching, taking reform of teaching mode as the breakthrough point, the study introduced the flipped classroom into the teaching of software applications course. Combined course characteristics with strong practicality and originality in application, the study built a new teaching model, which is mainly composed of three interrelated teaching composition with support of network teaching platform: Autonomous learning before class, training for internalization in class, after-school to strengthen and promote learning. According to the teaching model, took "Flash animation design" as an example to carry out the teaching design and implementation. **Results:** The practice test and investigation proved that the model is beneficial to help student master knowledge and skills, improve the student's learning interest, meet the needs of student's individual learning and help to cultivate the practical and innovative ability. **Conclusion:** The study aimed on reform of teaching mode, introduced the flipped classroom into the teaching of software applications course and constructed a new teaching model and provide a beneficial reference for similar courses teaching reform and exploration on the effective ways of cultivating college student's practical and innovative ability.

Key words: Flipped classroom, software application courses, teaching model, flash animation design, autonomous learning task

Received: May 05, 2016

Accepted: June 03, 2016

Published: September 15, 2016

Citation: Chenglin Huan and Jianwei Chen, 2016. A study on college computer software application courses teaching based on flipped classroom: Take "Flash animation design" course as an example. *J. Software Eng.*, 10: 328-337.

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Decision on some major issues concerning the construction of socialist harmonious society said: "Enhancing student's ability for practice and innovation" is a great task to implement quality education, improve education quality and build a harmonious socialist society. As the foundation of knowledge and technological innovation system, integrating practical and innovative ability into the whole process of education is the need of the development of the times and the need of the development of education itself. Seek the effective way to cultivate student's ability for practice and innovation through promoting the teaching reform. With the wide application of information technology represented by computer in all fields of life and work, the courses of computer application has become an important part of the training of talents. Strong practice and innovation of computer applications, making these courses has obvious advantages in cultivating student's practical and innovative ability.

Computer application courses include "Microcomputer operation and application foundation", "Flash animation design", "Multimedia creation", "Adobe Photoshop image processing", "Mechanical drawing" and other software applications courses. This study focus on courses teaching of computer software application and the common characteristics of this kind of course is professional skills supported by computer software in production application. The teaching goal should not stay in mastery of the basic computer application skills and techniques, but to cultivate student's practical and innovative ability in practical works and have a profound impact on in the mode of thinking and information literacy. Li Feng and other researchers take developing computational thinking ability as the intrinsic value of information technology courses¹. However, the teaching situation of this kind of course is not optimistic. Many have become pure skill training course, so that students can not complete the comprehensive task and solutions to practical problem. A study researched by Lin² showed that the traditional teaching is poor, students lack of autonomy in the whole teaching process, thinking is limited by invisible duration, hands-on just follow suit, once encounter practical problems on the helpless. In study of computer software application course teaching reform under the network environment, Chen³ thought that more attention should be paid to carry out practice teaching, not only to increase opportunities for off campus practice, but also with the network environment to promote teaching reform and enhance the practical ability of students. Facing the state of "Stressing presentation, neglecting training, stressing theory

and neglecting practice", Xie *et al.*⁴ and other researchers put forward teaching reform to enhance student's engineering practice and innovative ability by the change of teaching environment.

MATERIALS AND METHODS

Features and main issues of college computer software application courses teaching

Features: Computer software application courses have three features. First: It is with strong professionalism, which reflects specialization in software applications. Currently, the computer has penetrated into all areas of our working life. These different areas of specialization determines the strong professionalism of software applications, second: Strong practicality. Different from other courses, learning computer application software values operation, practice and application, which reflects the practice of learning outcomes; third is innovation. Each application has its basic functions and applications, but in a different context, the operation or usage of software will differ, which will produce different results. Such as photoshop software and its basic function is the image processing, but everyone used it to process image differently, even with the same picture. This innovative application requires learners not only to learn the basic functions and operations, but also learn to innovate.

Main issues

Disconnect between teaching materials and actual needs:

Currently, there are two main types of college computer software application teaching materials. One is stressing on the theoretical explanation of the materials with relatively more complete theoretical system, more thorough parsing concept of, but not too strong operability and it takes a lot of time to understand and digest, which will make students feel disgusted and resentment. Another is putting the emphasis on the practical operation of text books, which list a large number of operation cases to help students, but they may overlook the basic position of the theory, making it difficult for students to guide practical operation with a solid theoretical knowledge and ideas. Both materials are unable to fully meet the needs of actual teaching. Additionally, the replacement rate of software is getting faster and the content of existing materials is relatively backward.

Teaching mode need to be improved: Due to the lack of laboratory equipment and teaching resources, such courses are mostly a "Two-step" teaching mode. The first step is teaching theory in the multimedia classroom and operation of

demonstration; the second step is carried out in the other time, focusing on machine training. This makes the theoretical teaching and practical training phase out of line. To a certain extent, "Teaching" and "Learning" is out of touch.

At low level of the teaching goal to achieve: "Two-step" teaching mode makes teachers put more focus on specific operational demonstration, which will cause the following results: (1) Theory of knowledge, ideas system interpretation are ignored, (2) Students focus on the operational details of the study and have no time for deep thinking, (3) Which is not conducive for training senior thinking and (4) Monotonous forms of teaching will make learning prone to fatigue and cause exercises do not go well and thwart learning initiative because of a negligence of detail. The comprehensive practical ability, problem-solving ability are ignored to make the goal of teaching at a low level.

As a new teaching model, flipped classroom can be implement reversed arrangement between knowledge transfer and knowledge internalization under the IT support. By self-study after class, discussion in class, project-based learning and other activities on the course, the problems in teaching software application class are solved effectively to better achieve teaching objectives and promote the comprehensive development and personalized learning.

Connotation and features of flipped classroom

Connotation of flipped classroom: Inverted classroom, also known as the flipped classroom, is the reversing traditional classroom structure and students make self-study with video-based teaching materials after class, while in the classroom the students should complete the job under the guidance of teachers, asking questions, carrying out the project practice, the application of experimental, collaborative learning and depth seminars and other learning activities⁵. Flip classroom originated in the United States Woodland Park high school, two chemistry teachers Jonathan•Bergman (Jonathan Bergmann) and Aaron•Sams (Aaron Sams). They found that students what need most is teacher's explanation in traditional classroom, but do effective help when they encounter problems, but at that time teachers are often do available⁶. From 2007, they provided instructional videos and courseware for students to arrange learning content autonomously before class. In the classroom teacher organized interactions and provided personalized counseling. Flip classroom is guided by constructivism and mastery learning theory, depending on modern educational technology and truly realizes the real teacher-centered to student-centered transformation, so that students transfer

from passive recipients of knowledge into active knowledge seekers. Two key points to achieve the optimal effect of flipping the classroom: One extracurricular really happens in-depth learning; the second is the efficient use of classroom time for the exchange of learning experiences and views of the collision to help deepen awareness.

Features of flipped classroom: Compared with the traditional classroom, the flipped classroom has the following characteristics.

To break the limitations of teaching time and space:

Teaching and learning in traditional classroom occurs primarily at a specific time and place, learning time and space are severely limited. Flipped classroom teaching and learning break the limitations of time and space, students are free to choose the time and place to watch videos and have pre-learning. In addition, various forms of teaching activities, such as question answering, debate, competition, cooperation, exchange and display etc. are available in class as the teacher's teaching was transferred to pre-class.

To reshape the role of teachers and students:

In the traditional classroom, the teacher is the inculcator of knowledge and students are passive recipients of knowledge. In the flipped classroom, in the pre-class learning stage, the teacher is designers, developers and providers of learning resources; in the classroom learning phase, the teacher is the guider and the helper of the students. Students are the active seekers and constructors of knowledge throughout the flipped classroom.

To reconstruct the teaching structure:

Teaching structure is the stable structure form of interacted teaching activities processes among four elements such as teachers, students, textbooks and instructional media unfolded in a certain environment⁷. At present, there are three forms of common teaching structures: Teacher-centered teaching structure, student-centered teaching structure, "Dominant-subject" double main teaching structure. Based on the flipped classroom connotation, it does not belong to any of the above teaching structure. Flipped classroom change from "First teaching and then learning" to "First learning and then teaching" and from "Learning outcomes-oriented" to "Learning process-oriented" from "Learning to guide teaching" to "Teaching to formulate learning" and so on. Teaching structure have different characteristics at different stages of flipped classroom, flipped classroom teaching structure is another form of reconstruction⁸.

To deepen the teaching interaction: In the traditional classroom, the teacher is the protagonist; most students are "Extras" or even "Audience" and "Listener", only a small part of students really participate in the interaction and teaching, becoming a supporting role of the protagonist. While, in the flipped classroom, before class, students need to answer questions or complete the job training and ask questions, learning materials must be analyzed in depth and understood thoroughly, which will help to deepen the depth of interaction between learners and learning materials, during the class, the teacher can organize learning activities such as cooperation discussions, peer collaboration, teachers and students are at the same time and space, to create favorable conditions for the full exchange and depth of interaction between teachers and students and students and students, making the interaction level between teachers and students and students and students deepened⁸.

Feasibility of introduction flipped classroom in software application courses

Flipped classroom meets requirements of software application courses traits: Only by listening to explanations and watching the presentation, it will be difficult for students to master the application of the software and the need for adequate "Hands-on exercises" opportunity and also "Really do" to solve practical problems, thus it can combine "Learning" with "Application". After the traditional classroom is flipped, it can guarantee a certain amount of "Practice". In the class, because of the time of liberation, the students can carry out certain practice training under the help of the teachers and students. Flipped classroom emphasizes on task-driven and problem-oriented, the work process for the students to master the knowledge can be changed to the process to finish homework, project negotiation, sharing collaborative inquiry learning, which is conducive to the cultivation of student's interest in learning, problem solving ability and innovation ability of application. Therefore, widely using flipped classroom of the research-type, project driven teaching mode and software application courses with strong practical and innovative application requirements are extremely consistent, helping to improve course teaching effect.

Student's basic information literacy: Early on February 16, 1984, comrade Deng Xiaoping said: "The popularization of the computer shall start from birth". From then on, schools have opened information technology curriculum. Before entering university, college students shall basically master the basic knowledge and skills of information technology, able to

skillfully use windows system and network tools, operating a variety of multimedia resources has the ability to access to information, transmit information, process information and apply information ability. Therefore, college students already have the basic information literacy⁹.

Teaching resources and learning conditions: The flipped classroom cannot succeed without the education technology and information technology support, on the one hand, the teachers engaged in software application courses shall have certain research of the technical field of information and also can be competent in the development and utilization of teaching resources and so on. On the other hand, the non-computer student's computer hold rate reaches 88%, computer related professional students are close to¹⁰ 100% and it can satisfy the student's learning requirement.

Student's independent learning ability: Autonomous learning is taking students as the subject of study, to achieve the learning objectives through independent analysis, exploration, practice, question and creation¹¹. An empirical study on Chang Baoying show that about 64.13% students can take the initiative to complete the task of learning, 22.34% of students passively complete the task of learning, 13.53% of students depends on¹². This shows that most students have a certain amount of autonomous learning ability and the ability of self-restriction, to carry out autonomous learning in accordance with the requirements of teachers. Although, some student's autonomous learning ability is not strong, but under the driven of excellent students and the guidance of teachers, most of the students can complete the knowledge of independent learning. At the same time, the strong practicality of software application courses and learning achievements increase interest and sense of achievement in learning, which also increases the power and confidence for the student's autonomous learning.

Software application courses teaching model based on flipped classroom: Software application courses flipped classroom with teaching class as the basic teaching unit is mainly composed of three interrelated teaching composition of the pre class autonomous learning, the course training, after-school strengthening and promotion under the support of network teaching platform (Fig. 1).

Pre-class autonomous learning: The main goal of pre-class autonomous learning stage is to preliminarily complete the basic knowledge and basic operation of the master. Teachers

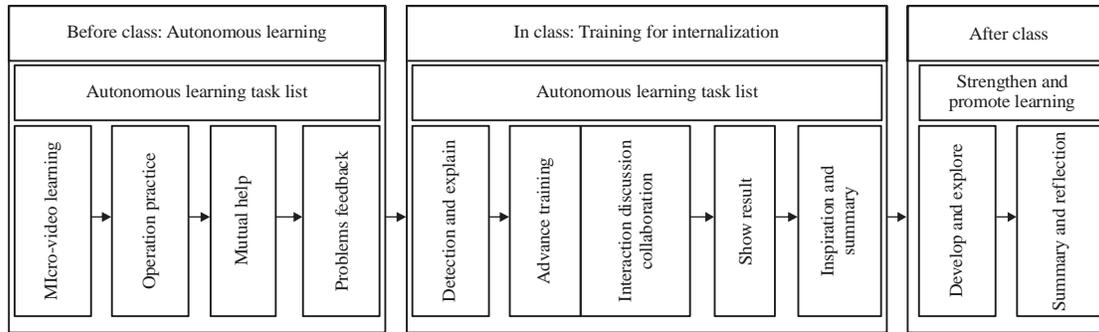


Fig. 1: Teaching model of software application courses based on flipped classroom

Table 1: Independent learning task list

Independent learning task list
One: Learning guide
• Topic name
• Learning goal
• Suggestion of learning method
• Notice about learning forms in class
Two: Learning tasks
Please finish the following works by watching the instructional video
Three: Feedback of puzzling question

will release learning video and learning tasks to the network platform in the previous lesson; the students carry out autonomous learning according to "Autonomous learning task list" and provide video learning resources. Students should first clear the teacher's questions or assigned design tasks, then watch video and seek answers with these questions/task, after the end of each knowledge point video playback, students complete the tasks assigned by the teacher and the results will be submitted to the network platform. Any difficulty or doubt of the task completed in the process can be communicated with network platform and teacher and classmate. If not resolved, the difficulty can be solved in the class by asking teachers.

Autonomous learning task list: Autonomous learning task list refers to the guidance material of related information which is designed with the learning time as the unit design to help the students clear learning contents, goals and the tasks needed to be completed¹³. It is mainly composed of learning guide, learning tasks, learning difficult as shown in Table 1. Study guide hand is to help learners to understand the basic situation of the learning tasks, including target, content, method and relations between teaching classes and available teaching resources. Moreover, it helps learners to construct knowledge curriculum framework and have a clear knowledge of the entire course content location. Study difficulty is the induction encountered in the self-study of student's difficulties and confusion, which is convenient for teachers to

understand student's self-study situation and provides the basis for the development of classroom teaching strategies.

Micro-video learning resources: Video learning is the classroom training, preparing for the internalization of the basic knowledge and skills. Learning effect directly influences the classroom internalization. In order to explain the knowledge points fully and facilitate student learning, micro-class ideas are employed in the development of learning resources. Each learning topic is subdivided into "Knowledge point set". There is a clear learning objective in every knowledge point, focusing on the explanation of an issue, with micro teaching video (5-10 min) as the main carrier. Video resource is mainly divided into two categories: One category is the record screen based on the operation of demo video, with the aim of helping students master the methods of operation and basic skills. The other is the "Concept map video Khan Academy", so, as to help students to refine the key points, combing the theory of knowledge.

In-class training for internalization: In St. Thomas Indianapolis city, the Indiana State of America, there is an Aquileia Catholic school, where the teacher Zoe once said, "Most people pour their main energy on the video production, but in fact, the most important is in the classroom and how to dominate the increase of free time¹⁴". The key to turn the traditional classroom successfully is the organization of classroom activities to complete the maximum internalization of knowledge. Therefore the traditional classroom teaching mode must be reformed by designing diverse and suitable teaching activities. Turning the software application courses should be based on the training of the task-driven project as the core and the integrated use of consultation inquiry, competition appraisal and displaying the communication activities and so on. The goal is to exert student's initiative fully and to complete the internalization, enhancing the knowledge of course before the classroom.

Detection and explanation: Instructors explain the problems and the difficult points proposed by students before the classroom and check the learning tasks before class. The detection, on the one hand is to test the learning situation before class, providing feedback, in order that instructors could adjust their teaching activities. On the other hand, it is to enable students to experience a sense of achievements, stimulating their interests in learning.

Advanced training: According to Lev Vygotsky's theory of "The most neighboring zone", when instructors design an advanced training task, they should focus on improving student's learning ability and comprehensive training. Furthermore the task cannot be completely beyond the ability of students. According to the designed classroom activities previously, the teacher guide students to understand the lesson objectives and tasks of advanced training and make clear the method of finishing the tasks, that is an individual finish the task independently or through group collaboration. Students should adopt the group-collaboration manner if the task is relatively complex. Therefore, setting up the learning team (4~6 people in a team) and electing a leader is necessary. The leader organizes the team members analyzing the task, designing the plan, manufacturing works, testing and so on. In the process of training, the students can have mutual exchanges and do joint research if they come across the problems. The teachers grasp the progress of each group timely and always are ready to offer guidance and help for students who face with difficulties.

Displaying the achievement: The students display their work report voluntarily or in the way that the teacher assigned them. The reporter should not only show the finished works, but also share their learning experience and attainment experience. The work-show is the timely evaluation of learning and also it provide an exchange and collision chance. Students may complement each other and stimulate new ideas through the work-show. If their works are evaluated or questioned by the other classmates, it could help them enhance the cognition and find the defects.

Inspiration and summary: For the common problems that students encounter in the training, teachers should provide uniform demonstration and collective resolution and help students generalize and summarize their experience. In response to student's questions, the teacher should not only help students solve the current problems, but also continually

guide students to a deeper level of thinking through proper instruction. In this way, students get promoted in the process of "Training, discussion, innovation, question, guidance, re-training and re-innovation".

After-class consolidation and reflection: Students polish and consolidate their work completed in class on the basis of teacher's guidance and summary. Besides, students evaluate and reflect on the learning process and achievements of this unit.

Network teaching platform: In flipped classroom context, the network platform is indispensable for the release of learning resources, supervision of extracurricular learning, interaction, sharing of student's work and learning evaluation. A fully functional, easy-to-use network platform will greatly facilitate the effective implementation of the flipped classroom.

The flipped classroom breaks the limits of time and space for student's learning and promotes the interaction between teachers and students, or among students themselves. Teacher is no longer the master of the classroom, but the guide and facilitator of learning. Students truly become the master of learning and classroom turns into a place for student's project training and problem solving.

Teaching design for "Flash animation design" based on flipped classroom

Learning situation analysis

Learners analysis: "Flash animation design" is a selective course for the specialty of digital media technology. As students have completed the college cultural basic courses of computer and specialized basic courses related to media production, they have certain capacity in computer and network application. A regular class survey reveals that all students are equipped with a PC and 98% of them are portable laptops, which meet the requirements of 90 min advanced training and collaborative research in class.

Teaching objectives analysis: Through learning Flash software, students are able to produce courseware animation, advertisement animation, dynamic MTV, web animation and integrated animation etc. It aims to train student's skills in animation creation, develop student's spatial imagination and aesthetic perception of artistic creation, exercise student's collaborative capabilities and enhance their professional qualities and skills.

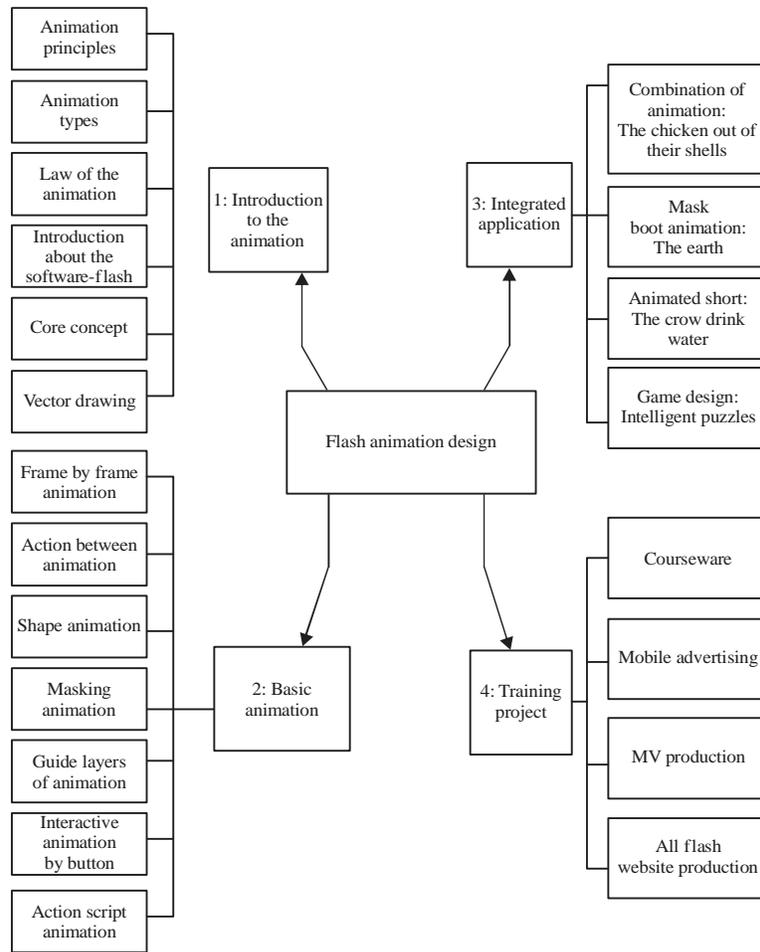


Fig. 2: Content structure diagram of flash animation design course

Teaching content analysis: Flash animation design combines knowledge of computer applications, graphics, multimedia, programming, etc. From easy to difficult, the individual practice to comprehensive training, the course content is structured as four parts: introduction of animation, basic animation, integrated application and training programs. The structure of the specific content is shown in Fig. 2.

Design and development of teaching resources and platform

Task list design: Eighteen learning subjects are produced through the subdivision of learning content and accordingly 18 task lists of autonomous learning are designed. Table 1 shows us the task list for the learning subject "Mask animation". Task list provides guidance and assistance to students self-learning. In addition, it helps students build complete knowledge system of a course.

Micro-video production: Video content should not only be highly integrated with classroom objectives and classroom training content, but also offer a concise, clear explanation of new knowledge and skills. It is logical, hierarchical and progressive. Meanwhile, teaching rhythm, case selection and interactive strategies should be paid attention to Tucker¹⁵. Flash animation design is so easy to operate that in learning procedural knowledge of this kind, demonstration is undoubtedly the best way to make student understand and experience new knowledge. Thus, the video of this course is mainly produced through screen recording. In the interpretation of theoretical knowledge, the video recording modes of "Khan Academy" is used to record how teachers draw concept graphics. Scientific research on human brain reveals that people's attention can be maintained for about 10 min or so, therefore, each video lasts for about 10 min. The video released finally has the function of speed adjustment and repeating to meet the needs of different students.

Table 2: Teaching activity schedule

Teaching activity	Time arrangement (min)
Detection and explain	10
Task assignment	5
Advanced training	50
Show and communicate	15
Inspiration and summary	10

Establishment of network teaching platform: Network teaching platform of the course adopts Moodle learning management system based on LAMP. Moodle system based on constructivism, with its modular design ideas, provides comprehensive and effective support for teaching management in terms of designing concept and resources, including user management, release of resources, video playing, collaborative learning, job management, interaction, interactive evaluation, tests and examinations and report on student's learning activities. As open source software, its functions are continually being perfected and developed to meet different requirements. For instance, the micro-video for pre-class study is released on the use of Podcast plug-in. Learners can discuss and exchange ideas about the video directly while watching online.

Design of teaching activities in class: In the classroom, teachers will check before-class self-study and give an overall explanation to the submitted question. Then advanced training missions are arranged and teachers should specify the goals they want, the way the task and schedule, etc. will be explained. In the training process Students can exchange ideas with students, teachers by QQ through network or face to face. Select 2-3 works displayed at the site after the job is completed and finally based on the display and inspections teachers will make a summary, including the knowledge to understand, design, operation skills, division of labor, show reports and so on. Meanwhile, give more tips about the improvement and re-innovation of the student's work to guide the consolidation after school. In a classroom teaching units (2 h, a total of 90 min) time schedule for each teaching activities are shown in Table 2.

After-school consolidation and ascension: Timely summary and reflection helps strengthen student's understanding of knowledge. After school consolidation mainly contains two aspects: one is the improvement and innovation of the completed works and will eventually share it on the internet teaching platform to accept judgments from teachers or other students. Each student should judge 3 students work at least; the other is to write a web log on the feeling of the learning subject and harvest of knowledge and skill.

Teaching program implementation: "Flash animation design" course amount to 48 h, including 36 h of theory and 12 h on the computer. Theory lessons adopt flipped classroom model to complete the task of teaching introductory courses in animation, basic animation and integrated application. The computer classes will use cooperative learning ways where each group choose one randomly from training programs and finish it in the machine room.

Teaching evaluation: The learning assessment of "Flash animation design" course based flipped classroom is divided into formative assessment and summative evaluation. Formative assessment is based on the completed before-class exercises, the raised difficult questions, the completion of classroom work, reflection logs, works display performance, the exchange during the learning process and the like. Summative evaluation is made by the tripartite (self-assessment, peer assessment and teacher assessment) for the completion of the training program to undertake a comprehensive assessment.

Flipped teaching application research in "Flash animation design" course

Research methods and objects: Flipped classroom effect was verified by using questionnaire survey in the "Flash animation design" course. According to Danish psychology doctor Knut, learning behavior, in a general sense, consists of factors at least in three dimensions, including motivation, content and interaction¹⁶. Therefore, research on flipped teaching effect has carried on the questionnaire survey. It was studied that mainly from the learning interest and learning motivation, self-learning help for knowledge learning, quality satisfaction of micro-video resources and independent/collaborative learning ability and knowledge internalization, etc. At the same time, Using interview method to know recognition, adaptability of students to the new learning pattern.

The object of study is sophomore of a digital media technology professional, a total of 52 people. All students are equipped with a laptop and the campus can be wired or wireless Internet access. It is viable to autonomous learning before-class and BYOD in class.

RESULTS AND DISCUSSION

According to the survey, 83% students thought that self-study before class helps to master the fundamental knowledge and skills, 64% students thought that the objectives of flip learning are clearer and 72% students indicated that they can set the pace of learning. The survey

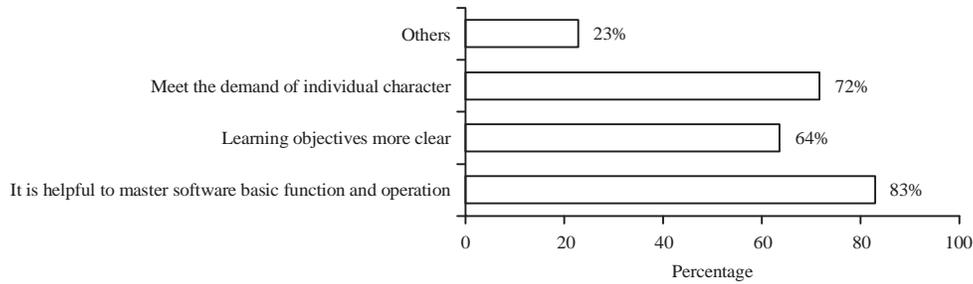


Fig. 3: Investigation about flipped classroom help of autonomous learning before class to acquisition of knowledge

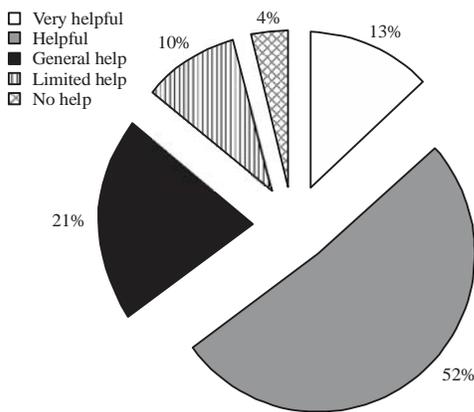


Fig. 4: Investigation about flipped classroom help to the cultivation of independent/collaborative

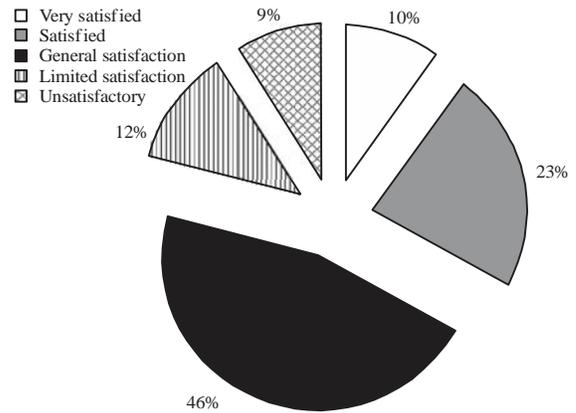


Fig. 6: Satisfaction survey about video resources

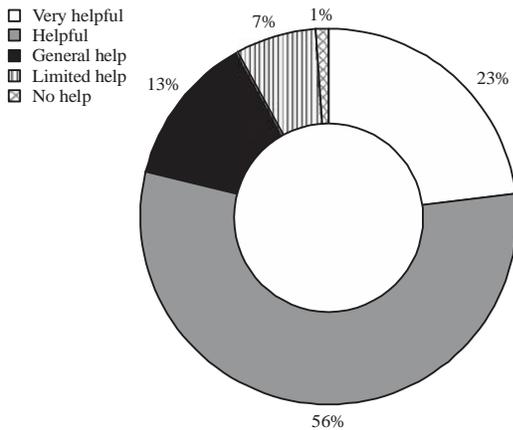


Fig. 5: Investigation about flipped classroom helps to knowledge internalization and application

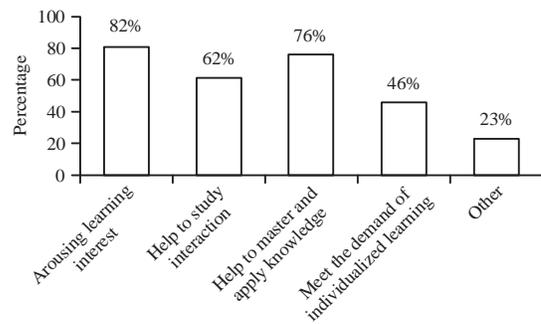


Fig. 7: Recognition survey to flipped classroom

result is shown in Fig. 3. Figure 4 and 5 show that flipped classroom is good to the cultivation of independent/collaborative learning ability and knowledge internalization/application, which represented 65 and 79%. Satisfaction survey about the quality of micro video resources is shown in Fig. 6. "Very satisfied" and "Basically satisfied" accounted for the results only 10 and 23%.

Through, the interviews with the students it know that micro-video images is more clear and knowledge points are explained in details, but the teaching skills in the aspect of software operating demonstration have to be improved. The operating steps of software application demonstration and the setting parameters are too much, which is easy to make students get lost in movements of the mouse and the interface switching. So, the key demo steps can present by adding subtitles or adding annotations on the video screen to guide student's attention. The investigation into the recognition of flipped classroom is shown in Fig. 7.

About 82% of the learners thought flip teaching can stimulate learning interests, 62% thought it does good to the mutual communication between students and teachers, 77% thought that it helps to the mastery and application of knowledge and 46% thought they can set the pace of learning to study individualized.

CONCLUSION

Take integrated analysis of the above study and the following conclusions can be drawn:

- Flipped classroom applies to colleges and universities teaching courses in software applications and provides a new idea for the traditional teaching innovation. It helps student master knowledge and skills and stimulates student's enthusiasm and initiative, cultivates student's ability to solve problems and innovate
- Software application class teaching mode based on flipped classroom is divided into three associated stages, including pre-class autonomous learning based on learning tasks list and micro-video, knowledge internalization advanced training based on task driven in class and consolidation to promote after class. Of course, the effective implementation of the teaching mode can't depart from the strong support of network teaching platform
- Flipped classroom is to flip traditional teaching structure of "Teaching in class teaching structure of-extracurricular internalization" and truly embodies the "students centered" educational philosophy. In software application course, students learn basic knowledge and operation autonomously before class and discuss and research design projects in class

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