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A Study on the Flipped Classroom Application in Vocational Training

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Abstract: Flipped classroom is a new teaching mode by the influence of information technology application, and videos provided by teachers work as the main form of learning resource. Therefore, students need to complete teaching videos and other related learning resources before class, and then both teachers and students focus on completing homework, Q&A, collaborative inquiry and interactive activities in classroom. From recent researches of the flipped classroom, the basic process of teaching is that students are required to read learning materials and resources – do classroom exercises – teacher gives guidance - summary. When the flipped classroom is applied in vocational training, there are issues to be considered and resolved, such as how to present knowledge, ability and value through "video"; how to reasonably allocate and effectively integrate in-class time and after-class time in training; how to connect physical classroom with network classroom; how to overcome the limitations of reliability and validity of the training content, mode and evaluation. The article mainly focuses on four aspects of the Flipped classroom: What flipped classroom is; the role and effect of flipped classroom; How to implement the flipped classroom in vocational training and adult education; the restrictions and challenges of implementing the flipped Classroom. The main findings are that Flipped classroom is an effect way for vocational training. It is suitable for adults and puts forward higher requirement for instructors and learners.

Keywords: Flipped Classroom, Blended learning, Vocational training, Training process

1. Introduction

The continuous development of information technology promotes the process of education reform and the teaching and learning capability. The deep integration of information technology and education is to identify an effective way to realize the educational informatization, in order to highlight the significant effect of information technology application in the field of education. However, the integration is not just gradual repair of teacher's teaching method, and it is mainly for the structural change of education system. In the past ten years, information technology and education were difficult to involved in deep integration, and the application of information technology in education were usually located in the instrumental level of assisting teaching procedure or partly supporting students' learning, without touching the essence of education or promoting students' personal growth. The flipped classroom provides the possibility for the deep integration of information technology and education.

The flipped classroom is an instructional strategy and a type of blended learning that reverses the traditional education arrangement by delivering instructional content, often online and outside of classroom. It transfers activities, including those may have been traditionally considered homework, into the physical classroom. In a flipped classroom environment, students firstly watch online lectures, collaborate in online discussions, or carry out research at home and engage in concepts in the classroom with the guidance of the instructor.

Jonathan Bergmann and Aaron Sams, the chemistry teachers from Woodland Park High School, became driving forces in flipped classroom teaching at the high school level. In 2007, they recorded their lectures and posted them online in order to provide help to students who missed their classes. Bergmann and Sams noted that a lot of conceptual knowledge or operating methods did not need to be taught in class, and learners could study according to their own individual experiences. Furthermore, they asserted that there was no one 'right' way to flip a classroom as approaches and the teaching styles needed at schools

were diverse. If the classroom teaching and knowledge internalization out of classroom are flipped, the new teaching structure of "learning outside the classroom, internalizing knowledge in the classroom" will be formed, and also the study will become more effective. In 2011, Salman Khan introduced a new teaching method, the flipped Classroom, to the world at the TED conference. Soon afterwards, the flipped Classroom became the global focus teaching mode in the field of education. At present, more and more schools are applying the flipped classroom to teaching practices, and they have already achieved good teaching effects.

2. The Concept of the Flipped Classroom

The Flipped Classroom is a new type of teaching mode in the informational Technology environment. In this mode, teachers provide teaching videos as the main form of learning resources, then students complete the tasks of watching and learning the video resources before class, afterwards both teachers and students finish homework, Q&A, collaborative inquiries and interactive communication activities in classroom together. Many researchers have conducted a series of researches about it. The main definition is elaborated from the view of its implementation process and the concept of its learning essence, and the definition from learning process can be roughly divided into two stages: knowledge instruction and knowledge internalization. The Flipped Classroom aims to reverse the two stages, and the method is: before class, students are required to complete the knowledge imparting by watching teaching videos; in class, students need to complete the internalization of knowledge through a variety of teaching forms, such as group discussion, homework and teachers' individual support. However, it does not give explicit information to the practitioners with the judgment standard for the flipped classroom. For example, if students firstly complete their self-studies before class, and then finish the discussions in class, can it be called a flipped classroom? Obviously, it is not the case. In the flipped classroom, only the teachers' teaching effect of imparting knowledge before class reach or even surpass the effect of traditional transferring teaching in classroom, which can be regarded as the completion of imparting knowledge, then the students can enter the stage of knowledge internalization.

Teaching video is not the focus of the flipped classroom. The subversion of the traditional teaching process and student-centered conception are the real meanings of the flipped classroom. The influence is not only the innovation of teaching method, but also the reversion of traditional teaching structure and methods by setting up a relatively thorough "student-centered" teaching mode. In this mode, teachers will become the organizers, facilitators and guides of students' learning.

Technology development realizes the concept of "learning before teaching" and improves its implementation. Based on the man-machine interaction technology, the flipped classroom can collect the data of student's learning process and behavior. Effective information of students' personalities, behaviors and abilities can be obtained through data mining, in order to provide empirical data for teachers' teaching diagnosis, summary and improvement.

From the existing researches and practices of the flipped classroom, the basic process of teaching is: students are required to read learning materials and resources - classroom exercises - teacher's guidance - summary and promotion. Compared with traditional classroom process "preview - lectures - practice", it has great differences in instructional design and teaching organization. The differences are shown in table 1.

Table 1. *The Differences between the Flipped Classroom and the Traditional Classroom*

	Traditional Classroom	The Flipped Classroom
Teachers' Role	Transmitting wisdom and imparting knowledge	Coach, Mentor, Facilitator
Learner	Passive listener and receiver	Active participant
Instructional Mode	Training lectures + Homework after class	Learning before class + In-class inquiry
Learning Content	Imparting knowledge	Q&A, discussion
Technology Application	Tools mainly for content	Tools for self-study, communication,

	displaying	cooperation and discussion
Evaluation	Exam	Multiple, various ways of evaluation

3. The Application in Vocational Training

The main object of vocational training is adult, whose learning are recognized as independent and explorative, and not applicable to use the traditional cramming interpretation. Adult learning should be given the priority to self-study. Students prefer learning basic theories outside class and conduct cooperative activities, such as in-class discussion, for better development. The Flipped classroom is completely in line with the teaching concept above, at the same time it also provides the operation scheme and procedure, and thus has good application prospect for vocational training. With the development of open online education, such as MOOCs (Massive Open Online Courses), teachers can use the curriculum resources (including teaching video) as their teaching basis in the future, and even their teaching work can be completed by referring to the teaching videos. In that case, teachers only need to play the roles of mentors and organizers of communication activities, which will have a deep impact on teachers' roles and their divisions of labor.

The flipped classroom requires training lecturers to become the organizers, facilitators and guides of students' learning. In the past, the time allocation between interactive discussion and teaching knowledge was 20%:80%, but now it turns to 30%:70%. And the interactive discussion time has increases from 20% to 70%, which requires training instructors to do well in learning program design and rigorous teaching logic design, and also requires employees to learn and be well prepared for class discussion with the questions in advance. However, it is difficult to ensure trainees to complete all the tasks by themselves in vocational training, so trainers need to build learning resources to enhance the training capacity and improve the ability for better control the process of the flipped classroom.

The Flipped Classroom application in vocational training can be divided into three steps, as shown in table 2.

Table 2. *Three Steps of the Flipped Classroom Application in Vocational Training*

Training Steps	Training Objectives
1.Self-Study	Before the trainees participate in formal classroom training, students are required to learn basic theory knowledge and skills, complete self-study and evaluation in advance through e-learning platform, knowledge manuals, textbooks and other teaching means
2.Face-to-Face Training and Learning Experience	Trainees attend face-to-face training with questions. Trainers reduce the time of knowledge imparting; spend more time in case discussion, scene simulation, question & answer, and action learning; encourage students to participate. It helps employees combine theoretical knowledge with daily work practice for reflection and learning experience, and step into a higher cognition stage. The effect of classroom training has also been fully developed.
3.Practice after Class	After class, staffs need to complete the follow-up review and study using e-learning or cell phone tools, which helps employees convert the short-term training into long-term persistent learning. Training brings further promotion and greater work support for employees.

By now, more and more enterprises have gradually realized the values of vocational training. The value that "training is mainly for knowledge popularization and professional quality improvement" is changing, and at present vocational training is not only focusing on the required knowledge and skills according to the current job settings, but also turning to pursuit what problems can be solved by training. An attempt of combining training methods "going out", "bringing in" and "do-it-yourself" becomes popular. So trainers can change the original business knowledge imparting, and pay more attention to the practical

training. The flipped classroom is a new thing, when applied in the enterprise training, and there are four key issues to be considered and resolved:

- *How to use "video" to vividly present knowledge, skills and values.*
- *How to reasonably allocate and effectively join the inside and outside training class time.*
- *How to effectively connect face-to-face training classes with online classes.*
- *How to overcome the limitations of the reliability and validity of the training content, methods and evaluation.*

4. The Effect of the Flipped Classroom

4.1 The Flipped Classroom Can Reflect Advantages of the "Blended Learning"

The flipped classroom can not only increase the interaction between teachers and students as a means of personalized learning, but also provide a kind of brand-new blended-learning mode. In fact, from the beginning, the flipped classroom mixed two ways of learning - watching teachers' videos before class and doing homework or experiment under the guidance of teachers after class. Later, the flipped classroom absorbed the characteristics and strengths of MOOCs, and further developed into the mode of blending open online courses and classroom teaching. The flipped classroom emphasizes the interactions between teachers and students, the interactions among students, and self-learning and collaboration based on problems and resources. It is the achievements of reform implementation in classroom teaching mode guided by the "Blended Learning" education thought.

4.2 The Flipped Classroom Accords with the Cognitive Rules

In the 2011 INTEL digital learning annual meeting, Brian Gonzalez, the director of INTEL global education, said "The flipped classroom makes educators give students more freedom, puts the process of knowledge outside the classroom, lets the students choose the most suitable way to accept the new knowledge, whereas put the knowledge internalization process in classroom, so that gives more time for more communication and exchange between classmates, between students and teachers." This is a representative viewpoint to analyze the function and effect of the flipped classroom in terms of the human cognitive rules. This view has been responded by many scholars from China. For instance, Professor Tian Aili from East China normal university said "The flipped classroom is more in line with students' learning rules. It is a form of learning before teaching. Compared with general guidance in the form of learning before teaching, micro video learning is livelier and video learning can replace teachers' knowledge teaching. Students most need teachers' help, while students encounter difficulties and confusion, during doing homework. And the flipped classroom can achieve this point."

4.3 The Flipped Classroom Is More Learner-Centered

In traditional face-to-face teaching process, both the teacher's teaching and the student's dialogue are in the one-to-many "teacher-centered" form. The flipped classroom changes the form of class completely: whether students watch teaching videos at home, or teachers and students interact face-to-face in the classroom, the teaching activities will always revolve students. Students can control their own video learning schedules, put forward their own problems and ideas, and communicate with teachers or peers, so as to gain the initiative in learning. Teachers change their roles from knowledge teaching instructors and classroom controllers in traditional classrooms to the developers of teaching resources, learning mentors and facilitators. At the same time students change their roles from passive recipients into active researchers. Besides, some scholars emphasize that the flipped classroom gives students more discretionary time through the reallocation of learning time, so that the students can control their studies according to their own paces. It truly achieves the return of students learning, and reflects the subjectivity of students learning.

4.4 The Flipped Classroom Can Promote the Effective Use and R&D of Teaching Resources

With the rise of "MOOCs", the flipped classroom absorbs the advantages and features of open online courses. Teachers pay special attention to the extensive collection, effective utilization, deep research and efficient development of online teaching related resources, and also the academia generally believes that the flipped classroom is very beneficial to promote the effective utilization, research and development of teaching resources. It is not only the ideal platform to promote the utilization of teaching resources, but also a powerful force to promote the further research and development of teaching resources. In the flipped classroom, the contents of a lesson are further refined into several knowledge points. For each knowledge point, the flipped classroom uses a "micro video" to explain knowledge, and equips with specific corresponding exercises to consolidate knowledge. The length of micro video is generally from 5 to 10 minutes.

5. The Restrictions and Challenges of Implementing the Flipped Classroom

5.1 The Research and Development of High Quality Teaching Resources for Various Subjects

The Flipped Classroom requires learners to watch some illustrative materials from their teachers before class. At the early stage, those materials were recorded in the traditional ways of “teaching videos”, and subsequently, they were developed into “micro videos” equipped with a series of separated “Knowledge Points” combining their targeted practices. As a matter of fact, there are significant differences for each subject in teaching content, knowledge architecture and knowledge point packet. Thus in order to promote the Flipped Classroom which has been recognized as a brand new teaching mode in multiple subjects and strive to achieve its "normalization", the demand scale of micro videos and learning resources is estimated to be huge. With the support of nonprofit Khan Academy, the United States can solve the problems in the research and development of high quality teaching resources for various subjects, however, there is still lack of local NGOs similar to the "Khan" in China, so there are still many grim challenges in this aspect.

5.2 Instructors' Educational Thought and Conception Need Update Urgently

The flipped classroom is based on "blended" learning mode, and its teaching process includes two sections before class, which are e-learning and face-to-face classroom teaching. The former one is characterized with independent self-study by learners, but instructors' inspiration, support or guidance should not be neglected; on the other hand, the latter one focuses on the guiding roles of instructors, what’s more, it pays great attention to the learners on how to promote the internalization of cognition and emotion through independent study and group cooperation and exchange under the guidance of instructors. Obviously, in order to carry out these two parts of teaching and realize scheduled teaching goals effectively, instructors' educational thought and conception need to be updated. Instructors should set up their educational thoughts as neither "instructor centered", nor "learner centered ", but be marked with the Blended-Learning thought which combines the advantages of e-learning and traditional teaching and learning methods. Therefore, it is necessary for instructors to make their roles as not only inspiration, guidance, or monitoring, but also fully reflect the initiative and creative matters of learners during the process of learning.

5.3 The Flipped Classroom Puts Forward Higher Requirements for Instructors

In order to achieve the extracurricular self-directed learning goal, instructors should construct a completed learning support system in advance, regardless of importing and pretesting knowledge points, or organizing of learning resources, study carefully, and build a virtual learning environment for suitable self-directed learning and accessing learning resources conveniently. On one hand, it is essential to guarantee learners to conveniently access to learning resources in the process; on the other hand, setting up some incentive measures and guiding means to stimulate learner's intrinsic motivation is also acceptable.

Because the flipped classroom has changed the "classroom" into the stages of "knowledge deepening and internalization", learners from different levels can make full use of their advantages and

expertise, and achieve improvements by "reporting", "questioning" and "debating" in class. Therefore, in this process, instructors should be given full play to their own duties, and also be given really guide, manage and control during the process of discussion. And this can play the "finishing touch" role in critical moments, which actually impels the deepening of learner's learning.

5.4 The Flipped Classroom Puts Forward Higher Requirements for Learners

Firstly, the Flipped Classroom requires learners to have their own abilities of independent study. Secondly, because the mainstream learning support systems run in the Internet environment, learners need digital terminals to access learning support systems. Therefore, learners have to master certain IT knowledge and skills before easily accessing learning support systems and teaching resources, and complete extracurricular self-directed learning. Thirdly, it is necessary for learners to pay more efforts to in-depth thinking during the teaching based on the flipped classroom, and students need to spend more time and energy on each class. Fourthly, traditional teaching mode is still an effective and quick means of transferring knowledge for the students who have weak foundation and especially are lack of self-directed learning abilities.

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