Research Article

Application of Performance Technology and Blended Learning in Course Design of Students*

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Abstract

By mainly adopting the performance technology, this paper analyses the gap between the current teaching method and the ideal, and finds the related reason, in order to design the intervention measures to fulfil the ideal teaching and learning effect. It creatively applies the concepts and methods of both blended learning and performance technology into college course, make performance-oriented curriculum design, and then test the applicability of blended learning in the college information technology course to further improve the teaching effect. In this way, the students can not only effectively learn the knowledge, but also cultivate their abilities of collaboration, thinking, autonomous learning and innovation etc, to further adapt to the development requirements of information society.

Keywords

Performance Technology• Blended Learning• Course Design• Intervention Measure

At the information age, new demand has been raised for the education teaching; it put more emphasis on improving the information literacy of students. Classroom teaching is an important way for education teaching reform, and the key of teaching reform is to fully embody the students' spirits of inquiry, cooperation and innovation in classrooms (Arlandini *et al*., 2001; Smith and Rn., 2014; Rau *et al*., 2008). Despite the well-equipped hardware devices in the colleges and universities (colleges), they haven't been highly utilized yet, so how to effectively improve the students' overall ability and information literacy is the problem that needs to be addressed promptly (Audy, 2015; Kopcha and Alger, 2014; Green *et al*., 2012). Hence, it is very necessary to make design planning of input and output in terms of performance, develop the design from the perspective of promoting education structure reform, and probe into its utilization to support the traditional teaching for enhancing the teaching efficiency, and maximizing the learning effect at the least input.

Related Theoretical Research

Blended learning

Blended learning is to blend the digital or on-line learning with the traditional learning method (Haelermans and Blank, 2012; Lidgate, 1986; Hawkes *et al*., 2013). The blended learning aims to fully mobilize the students' initiative and creativity ability in learning, while the teacher should play a leading and enlightening role in the whole learning process for the students. Compared with the traditional education, the blended learning enables the students to be more efficient (Michael *et al*., 2014; Bowen *et al*., 2014; Winkelmann *et al*., 2014). Also on the dailiy life, it has an immeaurable impact.

Performance technology

The performance is defined as an organized activity and measurable result; technology is the systematic and holistic method to solve the problem.

As an organized activity, the performance is defined in two aspects: behaviour and value. The performance technology is to analyse "what is demanded" (Wang *et al*., 2015; Jia *et al*., 2012; Fu *et al*., 2014). "what is demanded" refers to the gap between now and later on the basis of the current state and future perspective, therefore, "the demanded" analysis means to present this gap and then analyse the related reason.

The performance technology is also mentioned in the definition of education technology. In classroom, combining the performance technology and blended learning together, i.e. fully integration of traditional teaching and on-line learning, not only make mutual complementation of the disadvantages, but also improve the advantages, so the information technology is more widely applied in the classroom than before. Hence, the performance technology analysis can be applied in the teaching, then to find the gap between ideal and practice in learning, and the reason for further improvement.

Blended learning model analysis

Human performance technology model is firstly mentioned in the International Society of Performance Improvement. As shown in Figure 1, this model plays a dominant role in practice. To integrate the model into the teaching, more emphasis should be put on analysing problems and presenting solutions, so as to focus on how to eliminate the gap of performance.
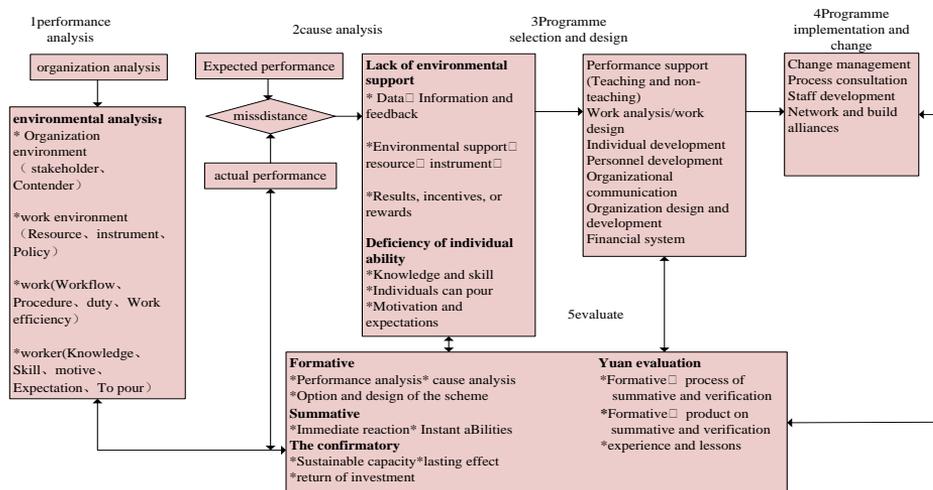

Figure 1. ISPI performance model

Performance analysis

Performance analysis consists of three important steps: expected state, the second current state and the gas between these two states. The principal process to implement the performance technology is performance analysis, to identify the defects and deficiencies hidden in the system; generally, it means to analyse the problems through the gap, and take measures to minimize the gap.

Organization analysis. Now, the online learning method has been applied in many colleges, but producing an unsatisfactory effect. In this method, the teacher often ignores the interaction with the students, while the students are easily distracted with the network. Besides, the students feel boring about the traditional education method, leading to lower teaching efficiency. therefore, the blended learning is the best choice, i.e. combining these two methods together, to eliminate their respective defects, enable the learner to develop the greater learning efficiency within the limited learning time, and finally improve the teaching efficiency.

Environment analysis. The teaching method of college students is always one concern of the whole society, which requires the teachers to fully consider the students' individuality, variety and their difference in knowledge structure during the teaching process. In blended teaching, continuous attention should be paid to

the states in different aspects, e.g. learning environment, the conditions that the education institutions can offer, current education situation, learning style of students, evaluation of online learning and traditional education. The earlier survey is shown in the following tables:

Table 1
Survey Analysis Table on Student Learning Style

Active type/ passive mode (%)		Ordinaltype/ synthesizing (%)		Intuition/understanding (%)		Investigative/receptive (%)	
active type	35	Ordinaltype	58	Intuition	65	Investigative	31
passive mode	65	synthesizing	42	understanding	35	receptive	69

Table 2
A Survey of Students' Demands for Multimedia

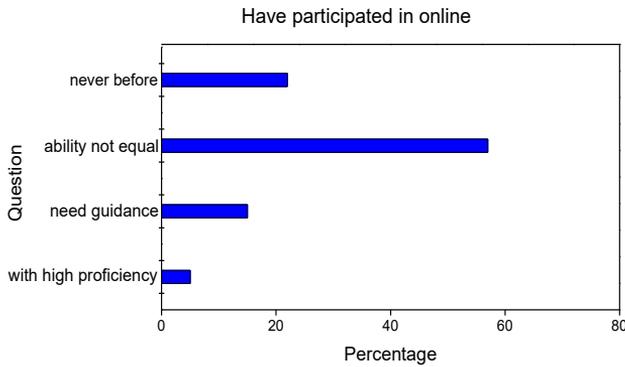| The advantages far outweigh the disadvantages	The advantages outweigh the disadvantages	Balance the pros and cons	more harm than good	The disadvantages far outweigh the advantages
7.06%	59.12%	27%	5.83%	0.36%

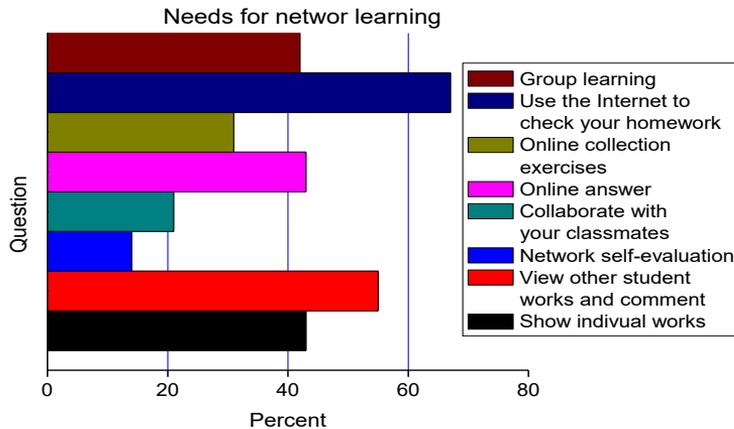*Figure 2.* Survey of the students participated in online learning

Figure 3. Survey of students' demand for online learning

The tables above are indicated as: Due to the gap between the learners in learning style, learning strategy and learning foundation, the teachers should make individualized teaching for the different learning learners. Now the colleges and universities are all basically equipped, e.g. digital reading room, multi-media classroom and computer room etc. also, the campus network has been fully covered in campus, mostly being ready for blended learning. Furthermore, the survey shows that the students prefer to take blended learning.

Reason analysis

Reason analysis means to find the root reason for the gap between the actual performance and ideal; it is a process to analyse the total individual by analysing the different factors of performance. Generally speaking, the influencing factors on performance results can be analysed in two aspects: environment and condition restriction; its inner ability and character.

Environment analysis. Provide few feedbacks for the learning data and information in daily learning of students; Good learning condition and environment, and abundant learning resources; Determine the advantage of every student in the proper way; For some limited hardware, e.g. the computer room, the online resources are unable to be searched anytime or not applicable.

Teacher skill analysis. Lack of multi-media theory; Excessive dependency on new technology; Courseware quality in teaching; Lack the combined training of theory and practice; Teaching depth and breadth cannot reach the requirements.

Student ability analysis. Personal knoledge and competence: Different computer skills; Different inclinations: the students are easily lost in the network, needing the teachers' continuous guidance; Students' motivation and expectation: the boring instruction mode cannot hardly arouse the students' learning interest, expecting the teachers to improve the teaching skill.

Selection and design of intervention measures

This paper analyses the performance objective carefully, finds the reason to make analysis, and then formulate the most appropriate and complete plan by integrating all factors.

Selection of intervention measures

The selection of intervention measures means, in blended learning, due to the students' different learning foundation and habits, the teachers should adopt different methods for different students, ensuring them to learn freely. The teachers offer necessary guidance and help for the students, while the students can well distribute their time for learning freely, thus, for the students to obtain the teacher's guidance, and also make good use of the resources around.

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Design of intervention measure

Analysis of learners. In terms of characters of learning objects, they have strong learning enthusiasm for the information technology course; In terms of students' innate capacity, they have certain foundation of learning information technology; In terms of the information capacity, whether do the students often use the network for handling the social and learning issue?

Design of learning objective. Knowledge and skill objective: the students are required to be basically familiar with the computer, and have overall concept of the multi-media technology principle; Process and method objective: in the blended learning, the students can be trained to develop the ability in collaborative learning and autonomous learning, understanding the importance of these abilities; Emotional attitude and value objective: simulate the students' enthusiasm for information technology and cultivate the related ability.

Design of learning content. Make targeted selection of the content; Combine the theory with practice.

Organization design of learning process. Task assignment; Group collaboration; Independent inquiry.

Design of learning evaluation method. (1) Evaluation method, Evaluation mainly includes self-evaluation of the students, mutual evaluation between students, and evaluation for the teachers. For self-evaluation, the students make objective analysis for themselves, find the solution to the disadvantages, and better finish the learning tasks by making continuous adjustments; in this evaluation method, the students shall experience an obvious mental change, preferring to be better, then they are motivated to be more initiative. In the evaluation of this paper, the students need to make self-evaluation by answering several questions at the end of every unit. (2) Evaluation forms, There are investigations, on-line Q&A, questionnaire survey, and e-learning portfolio evaluation methods etc.

Implementation and reform of intervention measure in blended learning

Intervention of project-based group collaborative learning. The project-based learning means more professional and detailed learning, to be also called as "subject learning", i.e. the students make collaborative learning in groups on the basis of their existing knowledge. Besides, the Moodle platform is applied to carry on the related teaching and learning activities in the subject-based learning mode. On Moodle platform, the website can be directly created, greatly reducing the operation difficulty; also, the course can be organized and sorted out into different majors on the platform. The homepage of Moodle platform is shown as Figure 4.

During the subject-based learning, the course includes 6 phases: assign the task, raise the questions, teach the course knowledge, offer the case, make evaluation, and extend the resource.

Intervention of resource-based online learning. Resource-based online learning means to conduct the learning activity by searching for certain resource information and learning content on the internet. The course design can be defined as: based on an on-line software, search for and organize the information on the internet according to the assigned subject, analyse its demands according to the education resource, and reflect on the learning characters by comprehensive consideration of the students' merits and demerits.

Figure 4. Home page of Moodle platform

Performance evaluation and feedback

Performance evaluation. The blended learning is performance-oriented, so there are specific requirements for the related evaluation system. The performance evaluation is related both to the learning effect and the practical content, which mainly includes how the experiment is done and the idea about the experiment

Select one compulsory in the major-specific courses of one college. By taking the "teaching method" and "learning objective" as the main object of survey, make evaluation in the following aspects for the students: (1) Classroom performance (20%): students' initiative and accuracy for answering the questions in the classroom; (2) After-class homework (30%): the students' time control capacity and accuracy after finishing the homework, and the e-learning portfolio evaluation method can be used; (3) Group interaction (10%): divide the students into different groups, and make evaluations by group in classroom; (4) Final exam (40%): take close-book exam, to focus on the students' comprehensive ability.

Performance feedback. At the end of performance-oriented blending learning course, the deeper investigation in different aspects is made for the students' learning process, situation and results. By statistical calculation of the students' performance before and after the blended learning, the results are compared to verify its performance.

(1) Students are more satisfied about blended learning course, Before the official application of blended teaching, more than half students took pessimistic attitude towards the multi-media teaching, because in their opinion it had huge disadvantages. But after adopting the blended learning, the students have changed their attitude greatly when they find that the blended learning is helpful for learning. Now only few students still persist in "more harm than good" for blended learning.

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(2) The students' cognition and skills have improved obviously, In the performance evaluation of the students, how much the students have learned from different courses can be concluded. To know completely about themselves, the students can make better use of different resources for further learning, and better finish the homework; also, in actual life, this knowledge can be applied. The investigation is concluded as:
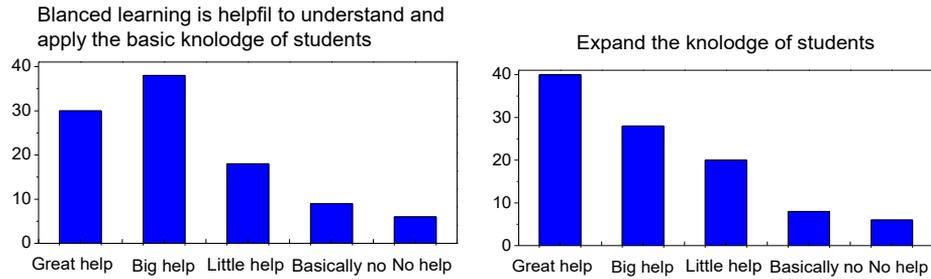

Figure 5. A questionnaire for knowledge understanding and knowledge expansion under blended learning

(3) The students' autonomous learning ability has been cultivated. The survey shows that blended learning is indeed helpful for the students' autonomous learning. Most students agree about it, but only with few students disagreed.

Table 3
Survey and Statistics About the Influence of Mixed Learning on Students' Autonomous Learning Ability

		Frequency	Percentage %
	A great help	17	32.10
	A big help	21	39.62
	A little help	12	22.64
Ability to learn independently	Basically, no help	2	3.77
	Without any help	0	0
	Total	53	100

(4) The students' ability of team collaboration and interactive learning has significantly improved. The main points to measure the collaborative behaviour of the individual in the team learning include whether one individual can integrate into the team, whether sharing the knowledge and experience with his team members, whether striving for the common goal with other members, and whether have the sense of responsibility and honour. So, we have made the related evaluation for these points. The results of the survey "what do you think of the relationship between team collaboration and project completion" are shown as Figure 6. It can be found that more and more learners take positive attitude towards the team collaboration learning, with few students in negative attitudes or no response.
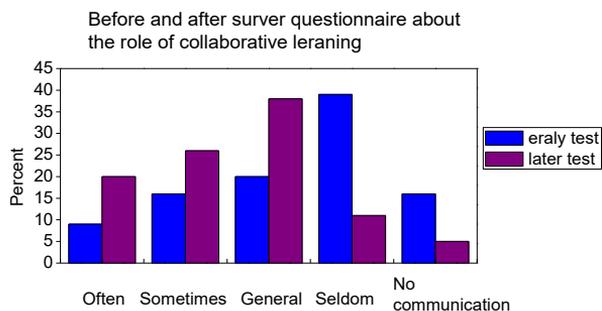
Figure 6. Before and after survey questionnaire about the role of collaborative learning

Conclusion

By creatively applying the performance technology concept into the education field, this paper combines the performance concept with the blended learning, conducts the course design of blended learning to guide the practical research, and then make the empirical summarization of the implementation effect of blended learning in various research methods.

It is found in the investigation and statistics, the concept of performance technology can be applied in the current education, because the design of effective blended learning activity can improve the students' abilities of cooperative learning and autonomous learning; furthermore, the good platform construction in blended learning is very helpful for promoting the learning performance of students.

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