The Strategy and Practice of Blended Learning in Open and Distance Learning: Experiences from GDRTVU

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Abstract. In this paper we introduce our experiences of blended learning for open and distance learning in our university in recent years. We form our basic philosophies to implementing blended learning and make one blended learning system with 10 subsystems, which is consisted of online learning environment, instruction design, interaction, space, time, curriculum, learning material, community of practice, instruction behaviour, and learning support service. We analyse their components and roles based on system theory, distance education theory, virtual learning community, instruction design, network flow measurement, and feedback information analysis method. We give some practical strategies, which include knowing and analysing our learners' characters, getting and analysing the feedback information, making compensated instruction dynamically, providing support services for different needs, integrating learning materials, forming virtual learning community, and introducing knowledge management. We also give a few cases.

Keyword: blended learning, distance learning, online learning environment, instruction design.

1 Introduction

Blended learning or hybrid learning has emerged in higher education for a few years, which combines online and face-to-face (F2F) instruction [1]. As a new delivery mechanism, it can bring effective learning, increase access and flexibility, and reduce cost [2][3]. But people today have to meet many complex challenges in the adaptive process in higher education [4][5].

For distance education institutes, some challenges come from the external socio-culture contexts and they add complexity of blended learning [6][7][8][9]. Few successful cases only give us finite solutions in special environments [10].

From the standpoints of pedagogy and effectiveness of technology application, the designers of blended learning should be seeking best practices for how to combine instructional strategies in F2F and e-learning environments that take advantages of the

strengths of each environment and avoid their weaknesses in varied contexts [11]. Like many other design problems, people can make some different solutions based on different contexts.

In China, the Chinese RTVU system is a national organization system to provide open and higher distance education. The organizational structure has three levels that parallel the government administration structure. Central Radio & TV University is in the top and produces curriculums and learning materials, makes unified examinations. Guangdong Radio & TV University (GDRTVU) is in the middle level of the system and has 89 branch schools in Guangdong province. It implements instruction, makes supplementary materials, appoints and trains teachers, and provides support services. The branch schools recruit tutors and provide some learning support services in F2F.

Now the university is in the evolutionary process of blended learning. Here we introduce our experiences in practice from the point of view of GDRTVU.

2 Blended Learning System Analysis

Before 1999, the university used transmission ways of television, videotape, audiotape, correspondence and F2F for distance learning. Pedagogy is teacher-centered and class-based.

Since 1999, the university has been trying to make a new blended delivery way by information and communication technology (ICT). ICT application for open and distance learning (ODL) in the university is based on cost, access, effectiveness and service for teaching and learning.

2.1 Basic Philosophy for Blended Learning

Blended learning means different things to different institutes in practice. The university thinks that is a combination of multiple elements including mixed the learners' characters, delivery ways, learning theories, technologies and other educational resources.

The motive to implement blended learning for the university comes from different dimensions of learner, teacher, government, society, technology, and culture. These factors drive the university jointly to make use of blended learning.

Our trial goal is that developes a learner-centered blended learning mode for ODL step by step, which integrates the sociocultural factors, ICT, the university resources and the learner need.

2.2 System Component

Valiathan put blended learning into skill-driven model, attitude-driven model, and competency-driven model [12]. Graham [3] divided the interaction in the environment into four critical dimensions: space, time, fidelity, and Humanness.

From the view of general system theory, the process of implementing blended learning in one institute can be considered as a system. For ODL, we think that one

blended learning system in distance higher education is a complex system, and it includes ten subsystems: online learning environment, instruction design (ID), interaction, space, time, curriculum, learning material, community of practice, instructional behavior, and learning support service.

2.3 Online Learning Environment

We use three network platforms to serve our information transmission. The first is the national TV network, which is consisted of the star TV and city cable TV system, it offers television programs and IP data transmission services. The second is Internet, the university and the branch schools separately connect Internet with 100M or 10M.The last one is the intranet based on the campus network and VPN, it connects the branch schools based on IP/SDH and IP/MPLS with 100M or 10M backbone. The university provides main application services with concentrated way. The learners can use these networks to access the university.

Our basic online learning environment (OLE) includes the university portal, learning management system (LMS), content management system (CMS), web-based videoconference system, web live broadcast system, e-mentoring system, digital library and some public application tools. The OLE can provide learning resources and virtual spaces. We not only need to build a usable OLE, but also need to overcome existent digital divide in our condition.

E-monitoring system is an important part of the OLE. It is a base for improving blended learning and provides feedback information of the system. It monitors the operation of the OLE, the resources using and the learning behavior [13].

2.4 Learning Support Service

Distance learners usually have many difficulties and especially need individual learning support services. The main services are information, resource, people, interaction, technological establishment, tutoring assistance, counseling, and personal development.

Blended learning also has particular need for strong learning support and provides learners with capacity to interact with systems and persons in the learning process. Effective learning settings must involve some forms of learner support.

In a word, we need to help distance learners to overcome obstacles in blended learning process.

2.5 Interaction

Interaction is important and necessary in ODL. It has three kinds: learner to learner; learner to teacher, tutor, and service worker; learner to learning content. The interaction between learner and teacher is the most welcome, but it needs to make much more great efforts to get the same effect in OLE than in F2F. The interaction between learners is a challenge problem.

Moore thought that the depth of talk, the flexibleness of self-paced learning and the structure intension of the course design affect the learning efficiency. The ID needs to blend online, offline, interaction based on technology-based and F2F into the system. In our instructional process we need to hold interaction.

2.6 Space and Time

The space and time in ODL are separated relatively. We usually can't finish an interview in F2F with all learners of registering the same course in classroom. Only some learners from the same location may be able to take F2F learning. We divide the virtual space into a few dimensions by communication way such as BBS, IM, and online read. In each space the learnering behaviors are time involved.

2.7 Community of Practice

We need to finish many tasks with a team way. Teachers, lecturers, tutors, instructional designers, technicians, support service workers, experts, and learners can be organized to form a community of practice for distance learning. This can promote learners' blended learning.

2.8 Behavior Analysis and Instruction Design

The active instruction behaviors in the space and time can show the state of the technology system, the time and period of the interaction, the using rate of the learning materials, and the participant rate of learners.

Based on the feedback information from the e-monitoring system, we can discover the information and knowledge of quality, instructional effectiveness, and learning behavior characters in the system. Then we can control and improve the blended learning system. Analysing the learning behaviors in the OLE is one of the important activities in blended learning.

The ID needs to make some learning media resources for self-directed learning, interaction activities based on problem and group collaboration learning, and curriculum learning guidance, etc.

3 The Practice and Strategy

Based on above our analysis and understanding to our blended learning system, we set up some action strategies and introduce a few practical cases of the course instructions for adult ODL here.

3.1 Knowing and Analysing the Learners' Characters

The characters of adult distance learners are much complex and there are many differences [14]. Before our ID based on learner-centered, we have to know our learners' characters and consider them how to affect blended learning.

A basic learner character system should include the information about the basic population, physiology, psychology, sociology, geography, ICT infrastructure, e-learning skill, learning behavior, learning favor, motive and wish, and the view on ODL and learning material.

We made an investigation form which has 47 questions based on above information classifications. Before our ID and making learning resource, we need to get some data.

Case 1: In 2005, we took a questionnaire investigation for the 5149 learners from 4 subjects, 3 registered years (2002, 2003, 2004), and 3 kinds of regions. The 689 samples were chose in 12% scale and returned 551 valid forms. We got some statistic data.

Almost all learners have their jobs and the main reasons of choosing ODL are that learning is part-time and self-paced. About the relations between the subject and the work, 20.9% are the same, 45.9% are correlative, 23% are adjacent, 9.1% are not correlative.

About Internet access, 32.3% can use Internet in home and 10.9% in work place.29.4% are less 2 hours-online time in one week, 30.9% are in 2-4 hours, and 23.6% are in 4-6 hours. Only 4.4% can get 2 hours one day. Network speed, stability, virus, and cost affect learning efficiency.

3.6% are short of the ability of using computer and Internet. 17.2% need improvement. 4.5% don't know online learning method.

About delivery mode, 3.8% agree total online learning, 18.5% agree that online learning is in the majority and F2F is assistant, 31.9% agree that online is assistant and F2F learning is in the majority, 21.6% agree that F2F learning is in the majority, online and based-resource learning are assistant. The reasons for F2F are tradition learning habit, the need of social intercourse and getting support service in time.

68.7% like to use different ways to talk with others, such as phone, email, MSN (QQ), mobile SM, BBS and F2F.

About learning materials, 31.4% like printing, 32.3% like multimedia, 4.5% like television program, 22% like integration of different media materials.

The data show the learners' characters and preferences are multiplex, most of them like to blended learning mode. If we want to hold our instructional philosophy and make use the advantages of blended learning, our ID system and the instructional processes have to satisfy their needs. The learners also drove us to adapt blended learning. The following cases show us how to adapt these new changes.

3.2 Getting and Analysing the Feedback Information of the OLE

We apply the tools of IP flow measurement, Sniffer, MRTG, and AWStats system to build a traffic-based monitoring system, and get some feedback information about the utilization of the web resources by IP flow function.

The online time, interactive time, media-based material use rate, people number and the involved learning contents are four kinds of critical data. Four mathematical functions are introduced that describes the learning behavior with above four variables and time variables. Dynamical system, statistics, and data cluster methods are applied for modeling [15].

These data can help us discover some information whether the materials are designed well, how many learners take part in interactive talk in BBS or hold self-paced online learning, and attention degrees on some topic in BBS, etc.

We define a real time traffic flow measurement function based on the IP flow. The function can be described online rate and attention degree on material or interaction.

Case 2: By the data clustering on the traffic flow data of visiting the LMS and the CMS from the March to the May in 2005, we find that learners' online time distribution. The learner numbers are the most in the time from 20 o'clock to 22 o'clock. The other online time are from 9 o'clock to 11 o'clock, from 15 o'clock to 17 o'clock. In these time tutors easily organize their online learning activity.

By the webpage clicking number and byte-based IP flow number, we also find that the most interested materials for the learners in the course, “Tax and Accountant”, are multimedia coursewares.

3.3 Making Compensated Instruction Dynamically

Generally traditional ID models have “modifying teaching” module. The modifications rely on formative assess, like the famous Dick & Carey's model. Here we modify the blended learning system based on the dynamical feedback information from the system and make compensated instruction in the process.

The modification process of the ID system has 8 steps:

1. Evaluate requirement and make sure compensated teaching goal.
2. Analyze feedback information, learner's character and goal error.
3. Write instruction goal and content, construct online community.
4. Develop teaching and learning tactic.
5. Select media resource, design interaction.
6. Design formative assess.
7. Finish formative assess, collect feedback information.
8. Finish summarization assess.

Case 3: For the course, “Tax and Accountant”, from the time of 10:47, March 3, 2006 to the time of 14:30, March 3, 2006, the feedback information in the BBS shows that learners' questions are different. Based on the web text analysis, we can get the following data table:

Table 1. The knowledge classiffication of the questions

Question & Number	Technology & Resource	Learning Method	Preparative Knowledge	Course Content	Profession Development
Total	4	2	2	9	4
Question Click	22.5	17	30	22	13.75
Reply Click	21.25	10.5	25.5	14.44	15.5

Based on the clicking numbers of learners and knowledge classifications, we chose corresponding pedagogical tactics for different groups: adding learning case materials, reinforcing self-paced learning material, guiding group to finish collaborative learning tasks, amending navigation, replying the problems individually by email and BBS, and holding few online lectures.

3.4 Providing Support Services for Different Needs

We not only provide some support services for different groups, but also pay attention to learners whose need are special and give individual support in time.

Case 4: One learner in the course “Tax and Accountant”, his name was Alex200406, asked one question about the new change of The Chinese Value-Added Tax Regulation on 21:51:49, November 28, 2005. The question led enthusiastic talks during following two days in the community. 53 learners read the question, 33 learners answer the question. Follow on, he gave another correlative question, then 79 learners read it, 50 learners answer. In last, he gave anther correlative question and also got satisfaction answer. This time 35 learners read the question, 25 learners answered. This group interactive behaviors showed that some learners were short of the knowledge.

For response to the group needs, we made two new learning cases in multimedia and gave two online lectures in webcast. In one week there are 182 learners to use these resources. In the end test of the term, 85% participants could apply the method to solve some practical problems.

Case 5: In the course, “Information Management Theory”, 48 learners registered the course in Guangzhou, two of them had never been able to attend the F2F lecture or synchronous network talk, because of their works in nighttime. But our lectures were often arranged in daytime in the weekends and online talks were arranged in the nighttime for most learners. The teachers had to provide advices for each one by email or BBS. They passed the course in the end of the term.

3.5 Integrating Learning Materials

For one course, we usually arrange learning in F2F for about 30% contents and give live webcast in the same time. We also make them as digital resources in the CMS. The F2F teaching mode includes teacher-center lecture and learner-centered lecture, learning in practice, discussion, and seminars, etc.

For each course in blended learning, we generally make some learning materials based on digital media for self-directed learning. They maybe are problem-based, context-based, or case-based. Multimedia coursewares are often short and small for depth learning and self-directed learning.

Sometime we provide network-based self-test exercises and some open resources from Internet. Before that we often select adaptive materials and amend them to accord with learners' needs.

Case 6: In the course, “Tax and Accountant”, we provide 9 small multimedia coursewares for self-experiment, every one runtime does not exceed 5 minutes. The

problems come from former many learners' wrong practices. 90% learners have read the materials. After that the later learners were able to solve the problems by using the materials.

3.6 Forming Virtual Learning Community

The basic framework for the virtual learning community in online setting is our good reference [16]. It is consisted of teachers, instruction designers, technicians, tutors and learners of learning the same course or subject. Sometime we maybe invite a few experts to attend our community activities.

Some tactics are effective for the vigor of the community:

1. Finding some protagonists.
2. Encouraging all learners to participate interaction by formative asses.
3. Making quick response to learners.
4. Talking between teacher and learner equally.
5. Designing value discussion topic from their work experiences.
6. Trying problem-based group collaborative learning.

Response to learners by interaction and designing the public topics by the teachers are the most important factors for the community. Here we also introduce a web2.0-based tool, called as the My Campus Space (MCS), to help to form some online learning communities from the course forum in BBS.

If it is possible, we arrange one tutor online to answer questions. Most of the questions can be solved during 24 hours. The community for the course, “Tax and Accountant”, is the most welcome. The 80% learners had become the members of the community.

3.7 Introducing Knowledge Management

Knowledge management (KM) and distance education share some common elements such as knowledge sharing and knowledge creation. The distance education institutes can use the potential energy of KM to enhance learning and improve management efficiency.

Our basic KM goals are to share knowledge in the community, to improve support service, and to enrich the repository of the digital media resource for the course.

Some steps, programs, and strategies are applied to our work [17][18][19]. Data mining techniques and web-based text analysis methods are also applied to our knowledge discovery.

In the application process, we discover that some good questions are from the work experiences of some experienced learners, their social intercourse, the subjects of self-directed learning, and challenges in the professional development. The questions and their advices often attract some other learners' attentions. These can enrich the repository in the community.

Learning behavior can happen in the work and the social context. Our teachers and technicians need to help to transform the tacit knowledge to the explicit knowledge in the community by recording, collecting, dealing and presenting their individual

information, problems and experiences. These tacit knowledges are especially useful to some learners which are short of similar experiences.

In fact, the problems in the case 6 are based on our discovery form accumulating information in the blended learning system. This is a typical KM application.

3.8 The Effect Analysis and Challenge

Although we are short of a systematic assessment method to the practice, we try to show some successful works. We take above cases and the course "Tax and Accountant" as example. The assessive method is based on the formative assessing and the term examination. If one can not pass because of lower examination score, we give one makeup in the same year. From the following table, we know that our instruction effects have been improving gradually since 2003.

Table 2. The pass rate of the learners from 2003-2006

Year	Total Registration Num.	Accepted Assessing Num.	Pass Num.	Pass Rate
2006	13545	1231	1168	91.18%
2005	966	918	826	89.98%
2004	542	510	399	78.24%
2003	591	567	362	63.84%

In one questionnaire investigation for 2813 graduates based on 5 subjects in 2005,the usable return forms have 546.We use 5 level satisfactional degree. The satisfactional rate for the instructional effect is 84.49%; The satisfactional rate for the instructional mode is 80.1%; The satisfactional rate for the instructional resource is 76.66%. The satisfactional rate for the skill of self-directed learning is only 6.6%,it is much lower.

From the investigation and our practice, the challenges are much more. Such factors as the learning resources, the tutors professional development, the skills of self-directed learning, and learning support service have been affecting the effect of blended learning.

4 Conclusion

Blended learning in ODL is a complex system with the integration of different medium, delivery methods, learning theories, instruction strategies, course knowledge, and support services. Distance higher institutes can apply blended learning to improve learning for open and distance learners and to enhance organization management efficiency. Since the factors are depended on the contexts, people maybe find some different solutions.

In order to implement blended learning for ODL, the teachers, support service workers and their institute have to meet many new challenges from the university, ICT application and socio-cultural contexts.

In here, our trials are not systematical and are short of assessment, but we have been able to improve ODL efficiency in some degree for our adult and distance learners. We will continue to research some problems further in the future.

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