TOWARDS INTEGRATING KNOWLEDGE AND PERFORMANCE SUPPORT FOR BLENDED LEARNING IN HIGHER EDUCATION

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ABSTRACT

During the last decade there has been a shift in the way learning process is conducted. One of the main reasons is that technology is changing. Due to this fast movement, concepts like class, workgroup and learning process are changing too. Learning processes are going beyond the boundaries of what was know as "class". Face-to-face models get mixed with online environments where students are remotely connected through the Internet. This new approach is called blended learning, and it is aimed at improving learning as well as bringing learning where it was impossible or complicated.   The principal aim of this paper is to applying the Blended Learning Model to Computer Programming of teaching in the education system. The online portion of our course can provide students with multimedia-rich content at any time of the day, from anywhere with internet access. Our proposition can reduce classroom time by 50% and can be used to engage students in advanced interactive activities.

Keywords - Technology, Interactions, Collaborations, Online Resources, Face-to-face

1. INTRODUCTON

"Blended learning" appears to have been in use since the popular advent of the Internet and the World Wide Web in the late 1990s. However, like many other Internet buzzwords around this time (e.g., new economy, e-learning), its precise connotations have changed and subsequently converged and stabilized. From 2006 to the present, blended learning has been understood as a combination of face-to-face and technology-mediated instructional forms and practices. At the same time, the phrases "face-to-face" and "technological mediation" themselves may generally benefit from further definition and contextualization. Blended learning designates the range of possibilities presented by combining Internet and digital media with established classroom forms that require the physical co-presence of teacher and students. As a result of the advancement in communication and network technologies, more innovative instructional delivery and learning solutions have emerged in order to provide meaningful learning experiences for learners in academic settings. Blended instruction is one of the various methods being used to deliver meaningful learning experiences.

The use of blended instruction is growing rapidly because instructors believe diverse delivery methods may significantly enhance learning outcomes as well as increase student satisfaction from the learning experience. Previous research has indicated learning quantity and quality suffers when learners are solely and completely immersed in technology-based instructional delivery methods. Reasons that help explain this learning decline include a lack of human interaction [1], acute learning curves in adjusting to the new technology tools, delayed feedback, procrastination in learning [2][3], and lower motivation to read online learning materials [4]. In order to eliminate the deleterious effects associated with the sole use of technology-based learning methods, many colleges and universities have adopted various forms of blended instruction to more effectively deliver instructional content to students and promote their learning.

Research has suggested a number of reasons in support of using blended instruction [5] found that blended instruction methods improved pedagogy, increased access to knowledge, fostered social interaction, increased the amount of teacher presence during learning, improved cost effectiveness, and enhanced ease of revision. Similarly [6] reported that blended instruction provided learners with greater control over the pace of learning, instructional flow, selection of resources, and time management. In studies involving self-regulated and interpersonal learners, blended instruction was found to be effective in addressing diverse learning styles [7]. While these findings support the positive effect of blended instruction on individual learner's learning, there is a lack of research to examine what learner and instructional variables within blended learning environment individually or collectively influence student learning especially in academic settings.

A lingering research question in college education is determining if traditional instructional methodologies satisfy high level learning needs like having opportunities to apply, synthesize, and integrate students' learning experiences throughout their learning processes as well as low level learning needs like the acquisition of information, knowledge, and skills. Previous research suggests that reinforcement of learning is amplified when students are given in-class opportunities to practice and apply what they have learned, or are encouraged to immediately transfer their learning upon returning to their jobs and tasks [8][9]. In this study, the phrase 'application of learning' refers to the degree to which students transfer, use, and apply learned knowledge and skills to their current studies or to current jobs and tasks. Given the growing accountability interest among instructors and stakeholders of college education for identifying and demonstrating tangible evidence of instructional effectiveness in college education, the assessment of learning application outcomes has become a critical issue for researchers in education discipline.

Blended learning at its simplest is nothing more than employing a variety of media and methods, most often a mix of online and face-to-face learning. However this combination is subject to a range of permutations in technologies, pedagogies and contexts [4]. Blended learning concept map identifying the three main components and related subcomponents. The degree of integration of each of the subcomponents is based upon evaluating specific attributes of each, resulting in the most appropriate blend to ensure attainment of the instructional goal. This is Depicted in Figure 1 below.

Figure 1: Blended Learning Concept Map

A survey of the research literature has provided a number of dimensions to blended learning that are found to be common within most tertiary educational institutions [10]. Table 1 outlines these core dimensions.

Table 1: Dimensions of blended learning

Dimension	Description
Modes of delivery	The combination of traditional learning with web-based online approaches
Technology	The combination of media and tools (technologies) employed
Pedagogy	The combination of a number of pedagogic approaches irrespective of learning technology use
Chronology	Synchronous (real-time) and asynchronous approaches

2. LITERATURE REVIEW

For [11] the integration of a virtual classroom into learning managing systems has many advantages: a) opportunity is presented for provided blended learning; b) learning activities including both virtual classroom sessions and learning in a virtual classroom can be managed from a single location; c) information about learning activities is stored in a single location. Garrison [14] identified the challenges for blended learning from two perspectives: the learner and the teacher. From the learners point of view, the main challenges are: skills, e-skills, preferences, content interaction and design, learning interactions and assistive technologies. From the teachers perspective, the main challenges are: the issue of context, learning design and to facilitate inclusive learning. It is needed to ensure that the students can interact successfully with the technologies, among themselves (through reflection), with their peers, with their teachers, with the support workers and with the learning materials.Lim [10] concluded that face-to-face, blended learning and e-learning are difficult to understand separately, mainly because there are overlaps between then, as depicted in Figure 2. So, the different learning strategies are represented in two axes: use of technology and time spent on online learning. Blended learning is located between face-to-face and online modalities.
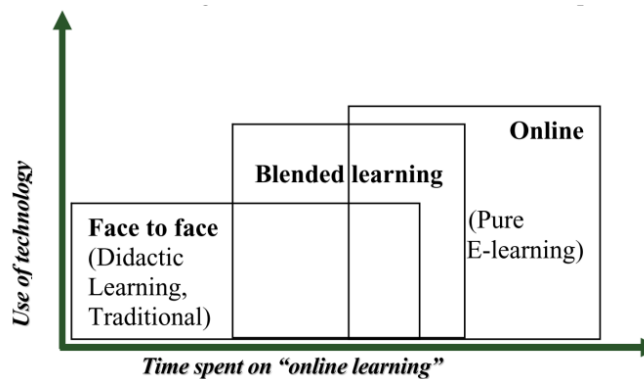

Fig. 2 Learning approache

Graham [15] described trends and future directions for blended learning systems. In Figure 3 it is depicted the progressive convergence of traditional face-to-face and distributed environments, by allowing the development of blended learning systems. Graham found six major issues relevant to designing blended learning systems: 1) the role of live interaction; 2) the role of learner choice and self-egulation; 3) models for support and training; 4) finding balance between innovation and production; 5) cultural adaptation; 6) dealing with the digital divide.
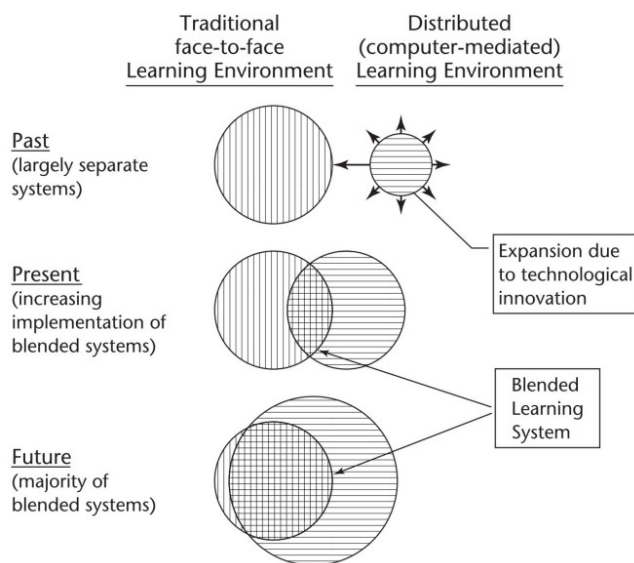
Fig. 3 Progressive convergence in blended learning systems

3. STRENGTH IN BLENDED LEARNING

The following are the main strengths found in blended learning:
- Compatibility with working life
- Flexibility
- Good student support
- Improved pedagogy
- Increased access and flexibility
- Increased cost-effectiveness
- Information from the face-to-face activities to total online interactions is stored in a single place.
- Promotion of social interaction
- Quick feedback to learners which will help them in their learning process
- It provides collaborative activities among teacher and students
- It allows access to everyone who needs training by providing it in different ways

These characteristics produced a shift in teaching and learning from simple knowledge transmission in which "content" is transferred to the devising of processes and activities that enable deep learning following the "triple A" paradigm: Anytime, Anywhere, Anyone. This change could be described by the Table 2 [11], where it is characterized the shift between traditional and blended learning from the point of view of the features of learning.

Table 2. Shifts Between Traditional And Blended Learning

Characteristics of learning	Traditional learning	BlendedLearning
Place	Mainly in class-rooms (Not flexible)	Combination of classroom / home, library (flexible)
Learning Methodology	Offline	Offline as well as Online Learning
Time of learning	Fixed as per the schedule (Not flexible)	Adjustable as per personal choice (Flexible)
Use of Technology	Not must up to the instructor to choose the teaching methodology	Latest use of technology is must

4. APPLYING THE BLENDED LEARNING MODEL TO COMPUTER PROGRAMMING

integrating the use of technology in course design and delivery involves taking a blended learning approach to your course can be used to support face-to-face teaching, large group and small group learning, self-directed learning, communication between the teacher and individual students or groups of students, as well as between students themselves. You can "blend" time (e.g., face-to-face vs. recorded lectures), place (small group tutorial on-campus vs. online discussion forum; traditional field trip vs. 'virtual' field trip using web sites and online chat with industry personnel), people (podcast of guest lecturers, or virtual classroom to include both on-campus and off-campus students), resources and activities (textbook vs. online readings; in-class vs. online quiz). Figure 4 illustrates just some of the possibilities for integrating blended learning into your course.
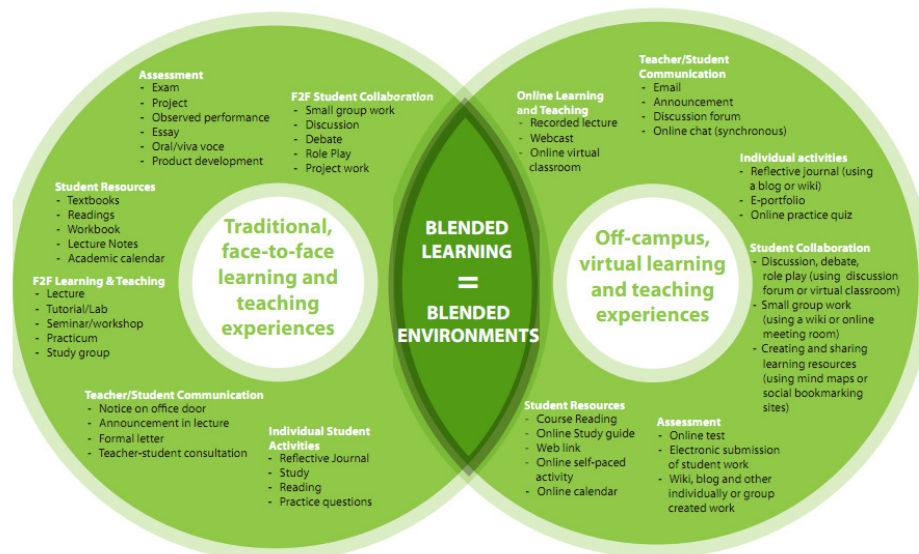

Figure 4: Possibilities for blended learning

A case study approach was used to explore the application of the blended learning model to Java programming taught during the first semester. The course was given in the form of two hours of lectures and four hours of laboratory work per week during a 15-week semester.

4.1 Conceptualization Phase: Programming Concepts

The course was designed to support the conceptualization phase of the blended learning model, that is to say the process of interaction between the students' pre-existing knowledge structures and the key concepts of the subject matter [16]. At any time, it is quite important for the instructor to be aware of the current state of the students' pre-existing knowledge in programming and misconceptions about programming. Accordingly, the instructor needs to prove the knowledge that the students previously constructed and evaluate whether this knowledge conflicts with the knowledge being taught.

4.2. Construction Phase: Programming Activities

The course was designed to support the construction phase of the learning model, that is to say the process of building computer programs through the performance of task-based activities. The process of constructing new programs is the product of Java program constructions. Thus the process is recursive and organized in a spiral manner so that students continually build upon what they have already learned. Important to the programming construction process is the design of authentic task-based activities that are intrinsically motivating [3]. The activities should be designed to "anchor" new concepts to previous ones by working on representative problems.

4.3. Dialogue Phase: Interactions, Collaborations, and Discussions

The course was designed to support the dialogue phase of the blended learning model, that is to say the testing of students' understanding of programming concepts and programming activities during dialogue. This phase can be performed separately or in parallel with the first and second phase of the learning model, depending on the situation.

4.4. Online Resources

The online resources of the blended learning model were designed to promote the learning cycle with the three phases: conceptualization, construction, and dialogue. The platform of the online resources was a Web-based LMS [16]. To support the conceptualization phase, the online resources were designed as primary courseware to present the subject matter, enabling the access to resources that offer various types of information. The most important criteria for designing the online resources for conceptualization were a well-structured presentation, easy accessibility, and powerful explanation of the information in order to effectively transmit knowledge to the students[17]. The course was designed to support the dialogue phase of the blended learning model, enabling students to discuss their programming solutions, through e-mail and LMS-enabled discussions with the instructor and fellow students. Thus, the online resources were designed as tertiary courseware to support collaborative learning.

4.5. The Blended Learning Model in Use

The use of the blended learning model follows the learning cycle with three phases. First, each week of a 15 week-semester course the instructor decides in advance the concept(s) to be taught and the underlying programming activities to be performed. The activities are formulated in such a way to connect the new concept(s) to be taught to previous ones by working on representative and motivating problems. The objective of classroom teaching is to generate understanding of programming concepts. By using situated examples, the instructor enables the students to understand programming concepts.

5. CONCLUSION

In this paper we adapt the blended learning approach, which combines the best elements of online and face to face learning, to the education system. This combination is helpful and makes learning more interesting. In our training, the classroom time is reduced from eight hours to four hours per month. Lectures were replaced by a series of interactive multimedia lessons. The in-class time was altered to allow students to meet with peers in small groups. These group meetings provide students with the opportunity to review their team members works and offer feedback and suggestions to each other. The replacement of face-to-face classroom meetings with online interactive activities, helps to overcome material constraints to lecture.

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