UNIVERSITEIT HASSELT

FACULTEIT TOEGEPASTE ECONOMISCHE WETENSCHAPPEN

Constructivism Based Blended Learning in Higher Education

Master Thesis

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By: **Al-Huneidi AHMAD**

Promoter: **Prof. Dr. Schreurs JEANNE**

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Preface

First of all, I dedicate any success that I reach to throughout my life to my beloved parents, sisters, and brother for their unconditional support and great love. My special and deepest appreciation and thankfulness go to them.

In addition, a special thankfulness goes to my supervisor; Professor Dr. Jeanne Shreurs, whose advice, patience, guidance, support, and feedback, helped to raise the standard of my thesis to its present level.

I also would like to thank Mr. Wouter Hustinx; a teacher educator at PHL University College in Belgium; for offering me his time and experience, which helped me a lot in my thesis.

And Last but not least, I would like to thank Hasselt University, represented by its kind staff and everyone who stood beside me and gave me his/her support from my beloved family and friends.

Executive Summary

Blended Learning, which is a mix of online and face-to-face learning, can combine the benefits of both, traditional classroom learning and e-learning environments.[3] The aim of this thesis is to explore how to design and implement Blended Learning environment based on Constructivism theory, which focuses on students' experience to construct the knowledge, in order to increase learning outcomes, performance, and quality in academic institutions.

An affective and successful learning environment should consider each student's learning preferences, since the reality is that different students learn in different ways, and Blended Learning environment considers such differences by providing the best mix of different learning strategies, which makes it more effective and successful than other learning environments.

There are a variety of Constructivism Based Blended Learning scenarios and best practices in literature, that could be employed to improve learning process and increase learning outcomes, some of them are:

1. Project Based Blended Learning[38]: This scenario consists of three phases; in the first phase an introduction of the course, course objectives, learning techniques, and learning schedule are presented. In the second phase students' groups are created, each group select their project topic, the groups, projects' topics, and any document are put online in the team workspace and are made visible to other students for review and commentary. Thereafter each group prepares a presentation of their solution and presented it to other groups and to the teacher, in which they receive a feedback on their solution. In addition, online feedback facilities are provided. The last phase is the assessment phase, which consists of a mix of self-evaluation, peer-evaluation and evaluation by the teacher to provide as many perspectives as possible for all students.

Team work illustrated in this example contributes effectively in constructing and sharing knowledge among the students.

2. Blended Synchronous Classroom[42]: Many scenarios for Blended Synchronous classroom are found in the literature; one of them is using synchronous classrooms, in which students from different locations, who cannot participate in face-to-face class, can participate in the class synchronously using cyber classrooms technique, and join students setting in face-to-face classroom, while the teachers are participating in physical classrooms only, (See Figure 4.1). Another potential scenario is a combination of physical classrooms and cyber classrooms, in which both teachers and students have the option to participate in any of them. In this scenario, teachers are able to conduct synchronous classrooms either alone or with a group of teachers from different universities in different locations to form a collaborative and interactive teaching team. At the same time, students can participate alone from home or with a group of peers from multiple physical locations.[43] Blended Synchronous Classroom facilitates applying Constructivism theory in learning process through increasing the interaction, communication, and collaboration amongst students from different locations with different experience and knowledge.
3. Blended Learning Model Based on Face-to-face Classes[39]: This model is designed for health science's students and it is implemented based on the face-to-face class with minor amendments. The Class times and student interdisciplinary teams in this model, match those of the face-to-face class. This scenario includes three face-to-face classes; in the first class the students are evaluated by participating in a pre-test examination, in order to evaluate students. In the second face-to-face class the teams present a "health promotion program" to a community group. The last face-to-face class consists of a post-course practical examination. The online activities in this program were designed by employing both asynchronous and synchronous technologies. For example, students accessed library resources, viewed video clips, submitted work, and downloaded notes and assignments. The students submitted assignments a day early so they could be checked prior to the synchronous class. Synchronous online classes

used the Elluminate desktop virtual classroom environment (See Figure 4.2) to support students' interactions and Constructivism based learning.

4. A Web-Based Interactive Learning Environment (ILE) Example: The ILE was designed for the second year students, who were pursuing Diplomas in Education. It consisted of nine face-to-face and three online classes. All face-to-face classes were conducted in a computer lab, in which the teacher explained main concepts. After each face-to-face class, the students wrote online reflections as a follow-up activity. For the online classes, the students studied the lesson's materials independently and participated compulsorily in the online discussions. E-blogger (http://www.blogger.com) was chosen as a platform for hosting the ILE. Three forms of interaction were integrated into the ILE; individual reflection, small group collaboration, and whole class discussions, (See Figure 4.3), which promotes self-paced and Constructivism based learning.

These scenarios provide a variety of Constructivism Based Blended Learning strategies and activities. However, there is no one perfect solution in Blended Learning environment, every element in learning environment should be analyzed and evaluated in each case.

One of the harshest criticisms of Blended Learning is that it focuses on the teacher for creating the knowledge, rather than on the student.[11] This drawback can be overcome by applying Constructivism theory in Blended Learning environment. Moreover, applying Conversation theory, which focuses on the interaction and the communication between the teacher and the students and among the students, in Blended Learning environment supports Constructivism theory by facilitating collaboration, communication, interaction, and knowledge construction and sharing amongst the students.

ICT support tools play a significant role in Constructivism Based Blended Learning environment, since employing a variety of effective and interactive ICT tools, such as online interactive whiteboard, chat system, online conference system, and discussion forum, in

implementing and executing learning activities facilitates and increases collaboration, interaction, communication, and knowledge construction and sharing among the students, which improves learning outcomes and quality. For example, an online interactive whiteboard facilitates conducting an online sessions and meetings, in which students are able to communicate, interact, make a discussion, and present a power point presentation, which as a result, increases collaboration, communication, interaction, and facilitates knowledge construction and sharing among the students.

A Blended Learning model based on Conversation and Constructivism theories for "ICT Management" course for master of "Management Information Systems" program at Hasselt University is proposed to illustrate how to employ the concepts of Conversation and Constructivism theories and a variety of ICT support tools in Blended Learning environment in order to effectively improve and increase learning outcomes. The proposed model composed of a variety of online and face-to-face learning activities, which are differentiated for working students and regular students by employing a variety of ICT support tools in designing and implementing learning activities.

The conclusion of this thesis includes that applying Conversation theory beside Constructivism theory supported by a variety of innovative ICT tools in Blended Learning environment, increases learning outcomes and improves learning quality significantly.

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Chapter 1: Introduction

1.1 E-Learning and Blended Learning

Traditional or face-to-face learning is still popular as a teaching method, because most of people drew up in a traditional learning environment. Face-to-face learning has some advantages such as learning in a social interaction environment, which facilitate an exchange of ideas, and lower the possibility of misunderstanding. However face-to-face learning allows very limited room for self-directed learning and student-centered learning, limits the possibilities for customizing the course content to reflect learners' skills.[1]

At the end of 90s the e-learning became so popular in education and training, and people used to spend many hours in front of their computers. At the beginning e-learning was just uploading the traditional classroom instructional contents and materials to the internet. Afterwards it evolved to a real time and simultaneous interaction between learners and teachers, such as real time video or audio conferencing or instant messaging.

The experience gained from first generation e-learning, often riddled with long sequences of 'page-turner' content and pointed-click quizzes, is giving rise to the realization that a single mode of instructional delivery may not provide sufficient choices, engagement, social contact, relevance, and context needed to facilitate successful learning and performance.[2]

Although of the advantages gained from e-learning, such as possibility of learning at anytime and from anywhere, which reduced the cost, faster learning delivery, and servicing unlimited number of learners, there are a few disadvantages of e-learning, which include low motivation to complete courses, lower learner satisfaction, lack interaction with teachers and peers, difficult to use real tools, and high initial costs for developing courses.[1]

Thereafter, the Blended Learning model became more popular than e-learning and even replaced it. Blended Learning arose to overcome the disadvantages of traditional learning and to obviate the failure of e-learning by providing a combination of various learning strategies or models. It mixes various event-based learning activities, including face-to-face class room, live e-learning, student-centered learning, and self-paced learning, which increases learning quality, social contents, and learners' interactivity.

An affective and successful learning environment should consider each student's learning preferences, since the reality is that different students learn in different ways, and Blended Learning environment considers such differences by providing the best mix of different learning strategies, which makes it more effective and successful than other learning environments.

Researches and surveys on learning strategies show that Blended Learning not only provides more choices but also is more effective than e-learning and traditional learning; it improves pedagogy, increases access and flexibility, and increases cost effectiveness.

However, one of the harshest criticisms of Blended Learning is that it focuses on the teacher for creating the knowledge, rather than on the student.[11] To overcome this drawback, Constructivism theory may applied in Blended Learning environment, which increases students' interactivity and focuses on the student to construct new knowledge based on his/her previous experience.

1.2 The topic

Based on literatures and researches, Blended Learning became very popular among educational institutions, especially in higher education. Moreover, research showed that the performance of students, who learned courses using Blended Learning, is higher of the ones who

learned the same courses using traditional or pure online learning. Blended Learning is not just cost effective, but it also increases learning outcomes and learning experience by providing the best mix of learning technologies and strategies. Even of more interest is the employment of Constructivism learning theory in Blended Learning environment to increase its efficiency and improve learning quality by focusing on the student to create the knowledge, based on his/her previous experience.

1.3 Research Question

Blended Learning became so popular in higher education and replaced e-learning due to its proven efficiency in increasing learning outcomes and quality. An affective and successful learning environment should consider each student's learning preferences, since the reality is that different students learn in different ways, and this could be realized by applying Blended Learning program, which considers such differences by providing the best mix of different learning strategies.

However, one of the harshest criticisms of Blended Learning is that it focuses on the teacher for creating the knowledge, rather than on the student.[11] To overcome this drawback of Blended Learning, Constructivism and Conversation theories should be applied in Blended Learning environment and employed to increase students' interactivity, collaboration, and their contribution in knowledge construction based on their own experiences, which, as a result, increases learning outcomes.

Blended Learning should focus on student-centered learning by applying Constructivism and Conversation theories in designing and implementing learning activities. Moreover, Information and Communication Technology (ICT) support tools have to play a main role in implementing

learning activities to facilitate collaboration, interaction, and knowledge construction among the students.

1.4 Research Sub Questions

1. What are Blended Learning system, Process, and framework? And what are the benefits, challenges, and future trends of Blended Learning?
2. What are the different scenarios of Blended Learning Program?
3. What are the basic learning theories? And how can we apply Constructivism and Conversation theories in Blended Learning environment to increase learning efficiency?
4. What are the best practices of Constructivism Based Blended Learning in higher education?
5. What is an effective Constructivism Based Blended Learning model for "ICT Management" course, which is taught in Master of Management Information Systems program at Hasselt University?

1.5 Research Methodology

To answer the research questions and to get the best knowledge about the field of this research, I utilized literatures reading method to see what already have been written about my research. In addition to discussion interviews and best practices, such as making an interview with a teacher at the PHL University College which has implemented a Constructivism Based Blended Learning course in 2008.

Furthermore, I finalized my thesis by a case study of applying a Constructivism Based Blended Learning Model for "Information and Communication Technology (ICT) Management" course at Hasselt University.

1.6 Overview of Thesis Chapters

Chapter 2:

In this chapter I illustrated Blended Learning definition, benefits, processes, framework, models, success factors, the challenges of implementing Blended Learning program, and the future trends of Blended Learning.

Chapter 3:

In Chapter Three I explained Behaviorism, Cognitive, Constructivism, and Conversation learning theories. Thereafter, I explained how to apply Constructivism theory in Blended Learning environment (Constructivism Based Blended Learning).

Chapter 4:

This chapter illustrates different scenarios and best practices of applying Constructivism Based Blended Learning in higher education, in order to acquire familiarity in employing them to improve learning outcomes.

Chapter 5:

In Chapter Five I proposed a Constructivism Based Blended Learning model for "Information and Communication Technology (ICT) Management" course at Hasselt University.

Chapter 6:

Chapter 6 illustrates main concluded points and recommendations for future research.

Chapter 2: Blended Learning System

2.1 Introduction

Blended Learning is an evolution of e-learning; it provides the best mix of traditional learning and e-learning. In my point of view, every successful e-learning program should be at the end a Blended Learning model.

The successful Blended Learning program should consist of the best combination of different media tools to drive the best learning quality at the lowest cost possible. The decision of what the best media tools to combine depends on several factors such as students' IT skills, learning preferences, educational level, materials complexity…etc. The reality is that different students learn in different ways, and Blended Learning environment considers such differences by providing the best mix of different learning strategies, which makes it more effective and successful than other learning environments.

One of the simplest combination models is to provide electronic learning tools in parallel with the human interactivity (teachers), which provides a high level of student interactivity, accountability, and a true assessment of the Blended Learning program's outcomes. This model has been used in many universities, due to its simplicity in implementation.

Blended Learning deserves its popularity and the trends toward it, since it has a huge impact on learning quality as many research showed. Some of the important benefits of Blended Learning are:

1. Large student segment, since by utilizing Blended Learning the educational institute can reach a large segment than ever.

2. Fast time scale; by using Blended Learning the time consuming to teach students will be less than using other tools and more efficient.
3. If the courses are complex it will be difficult to implement it in a single web-based tool, but by using Blended Learning it will be possible to use multiple tools, which higher the success rate and completion of the course.
4. Many researches showed that e-learning does not lower the education cost as it was expected due to the continuous implementing of web-based programs and courses, tools, infrastructure upgrading…etc. But by using Blended Learning the possibility to lower the cost is higher, since the implementation of a Blended Learning model is as needed and can be customized to suit the course.

2.2 What is Blended Learning?

While there are a wide variety of definitions of Blended Learning, the most common is that which recognizes some combination of virtual and physical environments. According to Bonk & Graham[3], the most common definitions are:

1. The combination of instructional modalities or delivery media and technologies.
2. The combination of instructional methods, learning theories, and pedagogical dimensions.
3. The combination of online learning and face-to-face learning.

The third definition includes the first and the second definitions and it more accurately reflects the historical emergence of Blended Learning systems, which combine face-to-face instruction with computer-mediated instruction. This definition reflects the idea that Blended Learning is the combination of instruction from two historically separate models of teaching and learning: traditional face-to-face learning systems and distributed learning systems. It emphasizes the central role of computer-based technologies in blended learning.[3]

Blended Learning can also be defined as a learning program, where more than one delivery mode is being used with the objective of optimizing the learning outcome and cost effectiveness of program delivery.[32] Another definition of Blended Learning is the systematic integration of several complementary informational delivery mechanisms, in an effort to optimize learning and skills acquisition.[2]

Though definitions vary, Blended Learning basically means the combination of traditional face-to-face learning environment and e-learning technologies in order to optimize learning outcomes by applying various learning strategies and tools to match different learning styles. The importance of Blended Learning is that it focuses on optimizing learning outcomes by providing the best mix of various learning tools and strategies. Blended Learning strategies or approaches may include self-paced learning, student-centered learning, and collaborative learning.

As we see in Figure 2.1, Blended Learning is a part of continuous convergence between Traditional Learning and Distributed Learning Environment (e-learning). On the one hand, there is the traditional face-to-face learning environment that has been used to apply for centuries. On the other hand, there are distributed learning environments that have begun to grow and expand rabidly as new technologies have expanded the possibilities for distributed communication and interaction.[3] From previous definitions of Blended Learning we can conclude that Blended Learning program may include traditional classes, virtual or online classes, online teacher, offline teacher, e-mail system, discussion forums, and a chat systems.

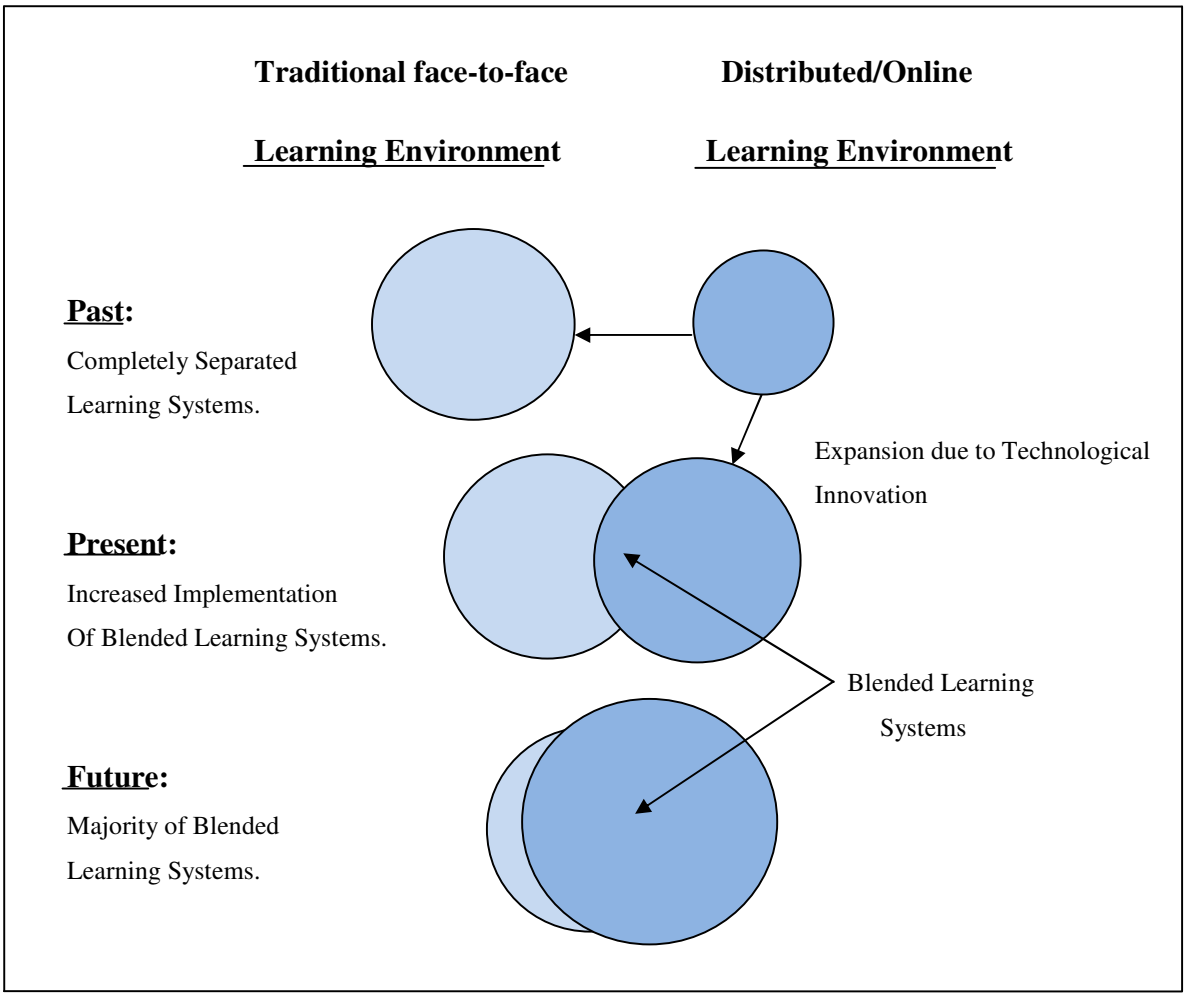

Figure 2.1: Progressive convergence of face-to-face and online learning environments allowing development of blended learning systems.[3]

Focusing on learning outcomes and objectives, in addition to select the best mix of different learning tools and strategies are the main elements of Blended Learning. Various learning ICT tools should be supported in order to reach a wider audience, each party in Blended Learning program including students play a significant role in learning experience, and in many learning models the best strategy is to provide the needed materials and contents to students just when needed.

2.3 Blended Learning Benefits

The concept of Blended Learning is based on the idea that learning is a continuous process rather than an ended process.[2] Moreover, the reality is that different students learn in different ways and Blended Learning environment considers such differences by focusing on using the best mix of different learning strategies and tools, which provides best learning experiences based on students preference.

There are many benefits which make teachers choose Blended Learning over other learning strategies, such as extending the reach, increasing flexibility, pedagogical richness, reusable patterns (reusable contents and functionality), optimizing development cost, social interaction, and easy to revision and customization.

1. **Extending the Reach/Flexibility:**

   A single learning delivery model limits the reach of important knowledge and learning experience. In traditional face-to-face learning, access to knowledge and learning experience is limited to only those who can participate at a fixed time and location, while a virtual classroom session is accessible and available for students at any time.[2] Blended Learning program provides a balance between flexibility and students' interaction experience by combining e-learning and traditional face-to-face learning.

2. **Pedagogical Richness:**

   One of the most important benefits of Blending Learning is pedagogical practice effectiveness. Blended Learning program increases the level of interactive learning strategies, peer-to-peer learning strategies, and student centered strategies used.8,9,10 Which as a result, increases knowledge sharing, collaborative between students, and enhances problem solving skills and learning experience.

3. **Optimizing Development Cost and Time:**

Mixing various delivery models optimizes learning program development and implementation costs and time. A completely online learning is too expensive to produce and maintain due to the need for continuous implementation. But combining online learning with face-to-face learning will be more cost effective in addition to increasing learning outcomes and performance by making the best blend of different learning strategies and tools. Moreover, Blended Learning increases the opportunity to reach a wide range of knowledge from anywhere in a short time.

2.4 Blended Learning Process

To implement and apply a successful and effective Blended Learning course, learning designer must analyze and identify learning objectives, goals, and challenges, evaluate and analyze students' skills, knowledge level and characteristics, design learning plan, learning strategy, course contents, and evaluation plan, implement the needed infrastructure, and a suitable blended learning model. More importantly, the implemented model should be managed, evaluated, and measured continuously. These steps are illustrated in Figure 2.2.

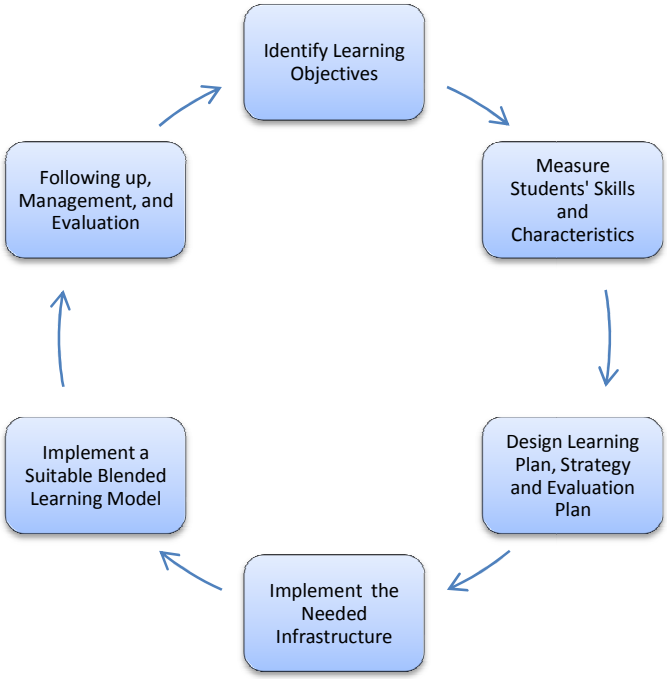

Figure 2.2: Blended Learning Process. By Al-Huneidi Ahmad.

2.5 Blended Learning Framework

Badrul Khan's Blended Learning framework (Figure 2.3) serves as a guide to plan, develop, deliver, manage, and evaluate Blended Learning model. It helps to create a professional and effective Blended Learning model.

Blended Learning framework provides guidance in[2]:

1. Planning and designing Blended Learning materials.
2. Organizing resources for Blended Learning environment.
3. Designing distributed learning systems.
4. Evaluating Blended Learning courses.
5. Evaluating Blended Learning tools and systems.

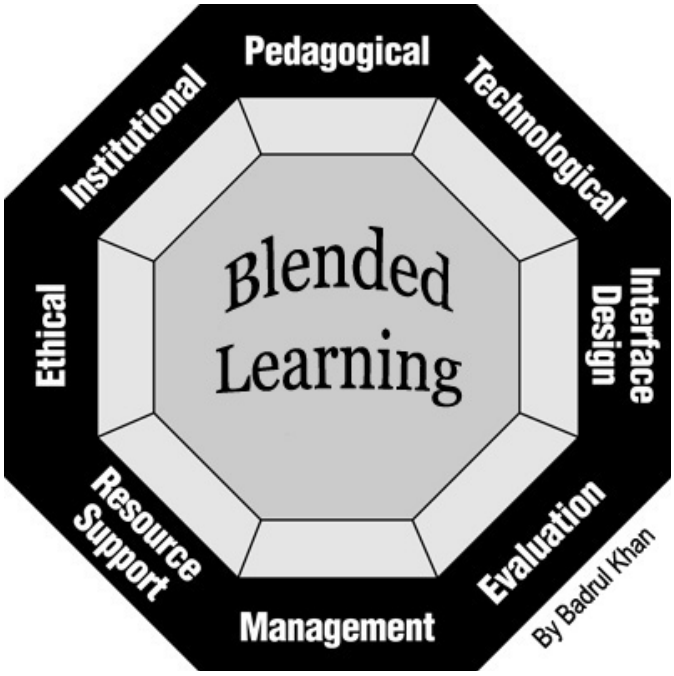

Figure 2.3: Badrul Khan's Blended Learning Framework.[2]

Figure 2.3 illustrates eight dimensions for Blended Learning that should be addressed to create an effective and meaningful Blended Learning environment[2]:

1. The pedagogical dimension of Blended Learning refers to teaching and learning. This dimension addresses issues concerning content analysis (content that has to be delivered), audience analysis (students' needs), goals analysis (learning objectives), design approach, methods and strategies of Blended Learning environments.

2. The technological dimension of the Blended Learning Framework examines issues of technology infrastructure and the tools needed to deliver the learning in Blended Learning environments, which includes infrastructure planning, hardware and software. This dimension also deals with the need for a suitable learning management system, which

manages different learning delivery types, and a learning content management system, which catalogs the actual online content modules for the Blended Learning program.

3. The interface design refers to the user interface of each Blended Learning elements. The user interface should support all the elements of the Blended Learning program, which will allow the students to use each learning delivery type and switch between the different types. Interface design dimension includes class sessions and site design, content structure, navigation, graphics, course design, and usability testing. The students should be able to absorb both the online learning and the class sessions equally very well in Blended Learning environment.

4. The evaluation of Blended Learning includes both assessment of students and evaluation of the instruction and learning environment and model. It examines the usability of a Blended Learning program, which should have the capability to evaluate the quality of learning model, and the performance of the students. In a Blended Learning environment, the appropriate evaluation method should be used for each delivery type.

5. The management of Blended Learning refers to the follow-up, maintenance, editing, and updating of learning environment and contents, managing infrastructure and logistics to manage different delivery types, managing registration and notification, and scheduling of the different elements of the Blended Learning course.

6. The resource support dimension of the Blended Learning framework deals with making the online and offline support and resources available for students to promote meaningful learning environments. Resource support could be also teacher always available in person, via email, or on a chat system.

7. The ethical considerations of a Blended Learning such as cultural diversity, students' diversity, equal opportunity, and nationality, should be addressed when developing a Blended Learning program.

8. The institutional dimension is concerned with issues of administrative affairs, academic affairs and student services related to Blended Learning. Personnel involved in the planning of a Blended Learning program should assure the availability of learning contents and infrastructure, students' needs, and the needed management for the Blended Learning environment.

2.6 Blended Learning Models

Adams J. and Morgan G.[4] have implemented four Blended Learning models, which highlight the important strategies choices that have to be made and how different Blending Learning models affect on learning practice in different levels. Models 3 and 4, illustrated below, are particularly effective in delivering high level impacts on learning performance and outcomes.

Model 1: In this model the primary mode of instruction are face to face classroom sessions and online learning resources made available as background material.

The impact of online materials in this model is usually very limited; it is similar to background readings or library resources in face to face classroom. Online materials mostly unused, it used by a small percentage of students.

Model 2: In this model there is a balance between online materials and classroom instruction; the online materials used as required in class room discussions to make tangible links, and motivate and guide students.

The impact on learning performance in this model is moderate. Effective pre-class coursework can prepare students, fill learning gaps and arouse thinking ahead of class; post class coursework can extend shelf life of learning process and facilitate systematic following up. But if the follow-up is optional it will usually adopted by active students and a relatively small percentage of interested students.

Model 3: In this model the classroom and online learning closely attached with personal learning objectives.

The impact on learning performance in this model high when there is obvious and direct accountability for students to integrate theory and practice. This model works best when explicit online resources are assigned as required follow up to classroom sessions. This model is extremely efficient if the assignment is submitted in written form as part of course completion, or if students assume to report outcomes in writing or orally to a teacher. The impact of this model is superior if supported by formal or informal education or evaluation or team conversation.

Model 4: The learning strategy in this model designed to deliver verifiable learning outcomes through individual or teams projects. Classroom sessions and online learning are directly focused on creating positive learning outcomes through verifiable project results and enhanced personal and team performance as the main goal.

The impact of this model on learning performance is very high and provides obvious outcomes on learning enhancement. In this model a positive percentage of students are regularly capable to make a positive effects on learning performance. Every student who makes a real commitment to the learning program is mostly to achieve a high personal learning performance. Explicit learning outcomes and objectives are needed for evaluation and assessment. This model can be efficient for both individual and team learning. Classroom sessions, teaching, evaluation, and assessment should be designed as basics and supports for this model to achieve a high learning performance.

2.7 Success Factors for Blended Learning

Many factors affects on Blended Learning program's success and efficiency. The design of the Blended Learning program, time flexibility, mix of media and learning styles, student support, administrative support, content, learning styles, technology, students' and teachers' readiness, pedagogic considerations, and evaluation are the main success factors for Blended Learning program.

1. **Design of the Blended Learning program:**

   A professional design of the blended learning program, management, and evaluation systems plays a significant role in the success and the quality of learning process. The design of the Blended Learning program should include students' characteristics and preferences, and identification of the amount of time students will have to access the content, which includes connectivity issues.5 Blended Learning program should be flexible and support redesigning when needed to cope with changes in either course contents or technology, rather than be fixed.

2. **Time Flexibility:**

   The flexibility in scheduling learning courses and a diversity of learning materials formats is critical to success. Blended Learning program's flexibility and availability enable students to study wherever and whenever they want.

3. **Mix of media and learning styles:**

   The flexibility and diversity in media and courses' materials formats provides best learning experiences based on students' preference. To select the right learning tools and formats, the learning models and the education level and skills of students should be considered.[5]

There is no one perfect solution in Blended Learning, every element in learning environment should be analyzed and evaluated in each case.

4. Student Support:

Ongoing support from teachers and technical or logistical support staff are needed for effective communication between students, teachers, and technical staff. The positive effect of continual and real time support, which can be represented by online chat system, phone calls, and face-to-face conversations, adds an important and essential value to learning experience, outcomes, and performance.

5. Administrative Support:

Blended learning needs administrative support to be succeeded and adapted by teachers as well as students. Continual administration and management is an important success factor for Blended Learning program.

6. Content Quality:

The type and quality of learning content are significant for Blended Learning success. Choosing the suitable type of content and the consideration of up to date information are very importance for Blended Learning success.

7. Learning Styles:

Choosing an appropriate learning style or model is another success factor for Blended Learning system. There are a diversity of different Blended Learning models and each case and learning environment has its characteristics which determine the suitable Blended Learning model. Recently learning styles and what called "neomillenial" students, students who grew up using interactive media and technology, opened up the area of research on the impact of the use of social software and technology on learning styles.[6] In a publication for Felder and Brent[7], they state how learning styles, approaches

to learning, and different intellectual development form a diversity in students that can only be fully addressed by applying various models for each of these aspects.

8. Technology:

The technology used to implement Blended Learning environment is very important for learning efficiency, students' acceptance and satisfaction. Accessibility and technology limitation, bandwidth, firewall, connection speed, and easy access should be taken into consideration in Blended Learning implementation. Technology issues should be subservient to the desired learning outcomes and quality.

9. Students' Readiness:

Students' readiness and expectations should be considered in Blended Learning environment. Students' expectations such as the idea that says "less face-to-face classes, means less work" aroused the need to develop more responsibility for students' learning and time management skills. In addition, there is a need for continual communication around the new expectations to help students to understand and cope with Blended Learning environment.

10. Teachers Readiness:

Continual professional development for teachers' skills should be considered. There is a need to deal with teachers' fears of loss of control, lower students' results, and the impact of online learning on traditional class sessions should be also taken into account.

11. Pedagogic Consideration:

The combination of online and traditional learning environments should be based on understanding of each environment's strength and weaknesses, in addition to appropriateness of choice to students. For a successful Blended Learning program the combination between online and traditional learning environment should reflect the

strengths of each environment. Furthermore, the role of the teacher in Blended Learning environment is essential and effective by providing a feedback in face-to-face sessions on students' performance in online activities, in addition to his/her important role in guidance, management, and evaluation. The teacher role in both online and face-to-face learning activities is essential and should be considered for the success of Blended Learning program.

2.8 Blended Learning Challenges

A variety of challenges face Blended Learning design and implementation, such as the role of online interaction, the role of students' choice and self management, models for support and training, finding balance between innovation and production, cultural adaption, restructuring the class, and responsibility for learning.

1. **The Role of Online Interaction:**

   Online interaction adds a great value for learning experience and performance by building and leveraging information and knowledge among students. Online interaction creates an opportunity for students to exchange knowledge and experience, which, as a result, increases learning outcomes. However important related issues should be considered, such as when we should consider human interaction such as collaboration and learning communities, and how does online interaction versus low reliability affects the learning experience?[3]

2. **The Role of Students' Choice and Self Management:**

   Students basically make a choice of the kind of blends they are participating in based on convenience and access.[3] However there is a need for guidance and support that

should provided to students to help them to make the best choice of blends which affects their learning experience and performance.

3. Models for Support and Training:

Many issues are related to support and training in Blended Learning environment that should be taken into consideration, such as providing students training on technological skills, providing a professional training for teachers on Blended Learning program, increase the workload and demand on teacher's time, and changing institution cultural to adapt and cope with Blended Learning environment.

4. Cultural Adaption:

It is important to consider the role of Blended Learning program in adapting materials to local audience. There is a need to make a balance between global and local interests. The teachers play a significant role in face-to-face sessions to make globally distributed materials culturally relevant and meaningful.[3]

5. Restructuring the Class:

One of the most difficult challenges in transforming traditional classes to Blended Learning classes is the requirement to make a change in teacher's teaching pattern. Instead of preparing the needed material for offline sessions, the teachers should prepare the needed materials and management for both offline and online sessions in Blended Learning environment, which requires time planning, management, and teaching and evaluation restructuring.

6. Responsibility for Learning:

Responsibility for learning is one of the most recent challenges in Blended Learning environment. Most students have the idea which says "few classroom sessions means less work". Teachers in Blended Learning environment argue that students are less prepared and do not take their responsibility in learning process. One of the solutions for

this challenge is that each students' activity should be linked with online or offline assessment quiz.

7. **Finding Balance Between Innovation and Production:**

In the designing phase of Blended Learning program, there is a challenge in finding a balance between innovative learning technologies and designing a cost effective Blended Learning program. On one hand there is a need to choose the best and appropriate innovative learning technologies, and on the other hand, there is a need to design and implement a cost effective Blended Learning solution.

2.9 Future Trends of Blended Learning

As stated in Chapter 1, Blended Learning is a replacement or extension of face-to-face learning. For example, it can be used to promote learning experience, increase practical experience, provide a wide variety of rich resources and materials, provide a high quality evaluation and assessment systems, and present online sessions and activities. However, these uses are not perfect or fixed. On the contrary, the usage, learning tools, forms, formats, and innovative technology of Blended Learning will be extended and developed. In this section a few future trends of Blended Learning environment are stated.

1. **Mobile Blended Learning:**

We can easily expect that Blended Learning will be increasingly involved in handheld devices; especially mobile phones where students can use as needed or demanded. With the increasing use of mobiles and wireless technologies, there will be no time or place restriction for learning. These technologies will make learning more easily and accessible for a wider range of students.[3]

2. **Greater Visualization and Individualization Learning:**

Blended Learning is expected to support a wider range of learning styles and individual differences in learning. Blended Learning environment will be rich with graphs, charts, animations, and video clips, which increase the quality of learning outcomes. The blending of delivery tools, teaching methods, and technologies will evolve to support learning which is individualized yet collaborative and interactive, and timely and directed toward a specific need yet part of a lifelong learning experience.[3]

3. **Self-paced Learning:**

Blended Learning will increase the opportunity for greater use of investigative and self-paced learning. Students will take more responsibility for their own learning as well as making their own decision about choosing the best learning model; fully online, blended, face-to-face,...etc. depending on their needs and learning objectives.

4. **Increased Collaboration and Community:**

Another future trend for Blended Learning is that it will foster and increase collaboration and global awareness. Blended learning connects people, actions, behavior, knowledge, and events. It will be a key tool for building shared cultural understanding on a global basis.[3] Blended Learning environment will be rich of experts' opinion and knowledge, online simulations, evaluation systems, information exchanges and knowledge sharing, cross-cultural projects, and global work teams, which increase the need for shared knowledge, communities of practice and learning, and collaborative learning.

5. **Increase On-Demand Learning:**

Blended Learning environment will increase on-demand learning style, which required for a global work force with fast-changing outlook and job requirements. The web will be demanded to provide access to up to date information which improves learning experience and quality, and makes learning experience more meaningful and

relevant to real life experiences. Blended learning will present online case-learning, scenario learning, simulations and role play, and problem-based learning, which will improve learning outcomes quality.[3]

6. Linking Learning Environment and Workplace:

Another expected trend associated with Blended Learning environments is that with new teaching technologies and innovations, the gap between workplace environment and learning environments will continue to shrivel. As Blended Learning program facilitates adapting more meaningful and real life knowledge by using the best blend of teaching strategies and ICT tools.

7. Time Flexibility:

The expansion of ICT learning tools in Blended Learning environment will make learning time flexible. Students can choose the best time for them to learn and they will be less restricted to fixed learning schedule. On the other hand, as learning schedule is flexible, teachers, learning designers and administrators will have to deal with increased complexity when designing Blended Learning programs. Learning will be just in time, when needed, and when the student is available, not when the institution has prearranged it.

8. Blended Learning Course Designations:

Blended Learning will be more popular in universities as universities find that Blended Learning not only cost effective but it increases learning outcomes and improves learning quality as well. With various Blended Learning models universities can design the best fit of blends, which reduces costs and improves learning experience, quality, and outcomes.

9. Changed Teacher's Role:

The role of the teacher in Blended Learning environment will absolutely continue to change. Blended learning environment increases the need for teacher's skills in multiple teaching and learning environments[3]. The use of Blended Learning program will not reduce the need of the teacher, on the contrary, it will increase the need to access to the teacher, and the work load on teacher's time will increase as a result. In effect, as Blended Learning provide more choices and learning opportunities and as students need someone for support and guidance various teaching skills will become more essential, which include training, mentoring, and consulting.[3]

10. The Emergence of Blended Learning Specialists:

Blended Learning is characteristically more complicated than either fully online or face-to-face learning.[3] Blended Learning teachers should have essential learning skills in both traditional and online learning environment. In the soon future there will be specialist certificates for Blended Learning teachers.[3]

Chapter 3: Constructivism Based Blended Learning

3.1 Introduction

The use of Information and Communication Technology (ICT) support in learning process impacts the way of students' interaction with one another and with the teachers. One of the main characteristics of Blended Learning environment is increasing students' interaction, which is examined and explored from the perspective of various learning theories, such as Conversation and Constructivism.

One of the harshest criticisms of Blended Learning is that it focuses more on the teachers for creating the knowledge, rather than on the student.[11] Therefore, it is essential to apply a blend of effective learning theories, such as Constructivism and Conversation, in Blended Learning environment to make it more effective and successful. Combining Cognitive, Conversation and Constructivism theories supports self-paced learning, student-centered learning and collaboration, which as a result improves and increases learning outcomes.

The increased development of new learning theories can be confusing and makes it difficult to differentiate between various learning theories. The following sections of this chapter explain basic learning theories, which are: Behaviorism, Cognitive, Constructivism, and Conversation, to gain a better understanding of them.

3.2 Behaviorism Theory

Behaviorism theory of human and animal learning focuses on the study of observable and measured behaviors.[16] It considers learning as acquisition of new behavior and denied the thought process and activities in the mind.

Behaviorism is contrasted constructivism. Behaviorists believe that knowledge is not a result of mental analysis and processes. Behaviorists focus on the external observation which is a result of responses to observable stimuli. In Behaviorism a valid knowledge should be observable, and mental activities can be ignored.

In an academic perspective, behaviorists replace physical behavior with verbal behavior, such as giving a correct answer to a question. The behaviorists consider student's correct answer a sign of successful learning, and encourage correct answers by giving good marks. Therefore, the student is engaged in the learning process only if he/she gives a correct answer (appropriate verbal behavior).

3.2.1 Behaviorism Assumptions

Behaviorism theory has the following assumptions for teaching and assessment[17]:

1. Learning is an incremental adding of new knowledge.
2. Learning is constructed hierarchal and sequential.
3. Learning materials should be structured sequentially in a way that promotes learning.
4. Students should be taught each subject explicitly.
5. Evaluation and assessment should be used extensively.
6. Evaluation is a part of learning progress.

7. Students should be provided with evaluation results and feedback, so that they can assess themselves.
8. Motivation is based on external encouragement and support.

3.2.2 Behaviorism Strengths and Weaknesses

Weakness: The students may not able to respond when there is no observable stimulus for the correct response. Moreover, the students will not be able to respond when an anomaly occurs because they do not understand the subject. Behaviorists also were unable to explain certain social behaviors which appear without reinforcements.

Strength: The student is concentrated on an obvious goal and can respond directly to achieve that goal.

3.3 Cognitive Theory

Cognitive theory is based on the thought process and mental activities that make certain behavior to occur. In Cognitive theory behavior changes are observed and used as indicators to what is happening in learner's mind.[12]

Cognitivists consider learning as a mental process and activities that involve memorizing, thinking, analyzing, abstraction, enthusiasm, and so on. Cognitivists believe that learning is processing information inside learner's mind, where different types of mental activities happen during learning process.

Cognitivists recognize that much learning realized by practice and repetition. They also acknowledged that reinforcement is also important for learning, although they consider its role as providing feedback of learning outcomes rather than as a motivator.[16]

3.3.1 Concepts of Cognitive Theory

Cognitive theory has the following key concepts[13]:

1. Schema: This is related to knowledge structure. Schema is the process of comparing new information with the existing knowledge structures. The result of this comparison will restructure the knowledge in learner's mind by combining new and existing knowledge, or modifying existing knowledge to absorb the new information.

2. Three Phases of Information Processing Model: Information first enters to a sensory register, then it processed to a short term memory, and finally it is transferred to long term memory for storage and retrieval.

3. Meaningful Effects: Meaningful information is easier to learn and memorize. If meaningless information linked with prior schema in student's mind, learning and memorizing processes will be easier.[16]

4. Serial Position Effects: It is also easier for students to memorize information from the beginning or end of a topic or a list, rather than in the middle, unless that information is markedly different.

5. Practice Effects: Practicing or repeating improves memorizing and learning outcomes. By practices students associate the material with many contexts rather than the one context.

6. Transfer Effects: The effects of prior knowledge on learning new knowledge or skills.

7. Interference Effects: This occurs when prior knowledge interferes with the learning of new knowledge.

8. Organization Effects: It will be easier to memorize when students organize information.

9. Levels of Processing Effects: some words may have a simple processing in learner's mind, while others have a deep processing which makes memorization easier.

10. State Dependent Effects: If learning process takes place within a certain environment or context, it will be easier to memorize and retrieve information within same context rather than in a new context.

11. Mnemonic Effects: Mnemonics are tools used by students to categorize relatively meaningless data into more meaningful images or related contexts.

12. Schema Effects: If received information does not fit a student's schema it will be more difficult for him/her to remember and memorize that information, and what students learn may also affected by their previous knowledge.

13. Advance Organizers: Students' prior preparation of the material that they are about to learn, will make it easier for them to understand and to make more sense out of the lesson.

3.3.2 Cognitive Theory Strengths and Weaknesses

Weakness: In Cognitive theory, students learn how to accomplish a task in a certain way, but it may not be the best way, or suitable for the student or the context.

Strength: The goal of Cognitive learning theory is to train students to do a task in the same way to enable uniformity, which may avoid some problems in standardized environment.

3.4 Constructivism Theory

Constructivism theory is based on the idea that people construct their own knowledge through their personal experience. The effectiveness of Constructivism is that it prepares students for problem solving in complex environment.[12] In Constructivism theory; the students are more active in building and creating knowledge, individually and socially, based on their experiences and interpretations. As a result, there will be differences between the taught knowledge and the learned knowledge, since each student interprets taught knowledge based on his/her experience and builds his own meaning of that knowledge.

The role of the teacher in Constructivism theory is to try to understand how the students interpret knowledge and try to guide and help them to refine their understanding and interpretation to correct any mistaken understandings and improve learned knowledge quality.

3.4.1 Types of Constructivism

We can differentiate between four types of Constructivism theory, which are Realistic Constructivism, Radical Constructivism, Social Constructivism, and Cognitive Constructivism.

1. In Realistic Constructivism, students build their knowledge by ultimately constructing intellectual structures based on external structures in the environment.[13]

2. In Radical Constructivism, the role of knowledge is to systematize students' experiences rather than constructing a new cognition.[13]

3. Social Constructivism emphasizes how knowledge interpretations and understandings evolve in social interactions.[14]

4. Cognitive Constructivism is about how each student understands and interprets knowledge, in terms of developmental phases and learning models.[14]

3.4.2 Constructivism Assumptions

According to Merrill[15], Constructivism theory has the following assumptions:

1. Knowledge is constructed based on students' experiences.
2. Learning is a personal understanding and interpretation of the knowledge.
3. Learning is a continued and active process in which knowledge is developed based on experience.
4. Knowledge evolution is a result of discussion of different interpretations, sharing of various understandings and changing of students' intellectual knowledge representation as a result of efficient collaborative learning.
5. Learning must be positioned in realistic models; evaluating and assessment must be integrated with a project or a task rather than a separated activity.

3.4.3 Constructivism Impacts on Learning

Constructivism affects learning process in three dimensions:

1. Curriculum: Constructivism supports the elimination of a standard learning system by promoting the use of a student customized curricula, based on students' experience and previous knowledge. It also promotes and improve students' problem solving skills.

2. Instruction: In Constructivism theory teachers focus on making a link between taught knowledge and supporting new students' understandings and interpretations. Teachers design their teaching models and tools to support and encourage students to investigate, search, interpret, analyze and expect information. In addition, teachers depend on open-ended and discussion questions and support interaction and collaboration between students.

3. Assessment: Constructivism supports the abolition of grades and standard exams. Based on Constructivism theory evaluation and assessment should be a part of the learning process in which students play a great role in evaluating and assessing their own learning achievements.

3.4.4 Teaching Recommendations Based on Constructivism Theory

For implementing effective and successful learning model based on Constructivism theory, there are some important suggestions and recommendations for teaching progress, which are[34]:

1. Promote and accept students' independence and initiative.
2. Use pure data and primary resources, in addition to interactive, visual materials.

3. Use learning terms such as discuss, analyze, investigate and create in teaching and particularly in assessment and evaluation process and assigning tasks or projects to students.
4. Depend on students' responses and suggestions in making decisions about teaching methods, instructional tools, activities, teacher assessment, and course materials.
5. Explore students' interpretations, understandings, and experiences about a topic before teaching it.
6. Support and promote communication and interaction between the teacher and the students as well as amongst the students themselves.
7. Promote students' critical thinking and questions by asking them open ended questions and encourage discussion between students.
8. Assign a preparation tasks after students' initial discussions and interaction.
9. Create a challenging learning environment for students that might affect and improve their previous knowledge and experiences as well as encourage discussion.
10. Give the students enough time to think and discuss certain topic/question, and to construct their own knowledge.

3.4.5 Constructivism Strengths and Weaknesses

Weakness: In an environment where there is a room for discussion and arguing different point of views, problems may arise, such as confusing students and lack of needed standardizations in some topics such as tax system.

Strength: In Constructivism environment students have the opportunity to interpret various realities and knowledge and improve their problem solving skills. As a result, they will have the ability to deal with real life situations more effectively.

3.5 Conversation Theory

Conversation theory is based on discussion of the learning system. It believes that the interaction and collaboration between students and teachers play an important and essential role in learning process. It focuses on continued and ongoing interaction between students and teachers. In this sense, Conversation theory of learning fit into the constructivist framework, since the emphasis is on student as an active maker of knowledge.

3.5.1 Conversation Theory Assumptions

Conversation theory has the following basic assumptions[18]:

1. Human beings are learning systems.
2. Motivation should concentrate on what to learn and how to learn not on learning.
3. If the learner can teach back what he learned, then the learned information is remembered.
4. The exact understanding that students have of certain subject, can be classified as "knowing why" and "knowing how".[19]

3.5.2 Conversational Framework

Conversational Framework was developed by Diana Laurillard[23] based on basic ideas of conversational tools developed by Pask[20] and Ramsden[21]. Conversational Framework is widely used in educational institutions to analyze educational technologies. Educational institutions have used this framework for planning the blend of online educational tools required to implement an effective learning model.[22]

Conversational Framework illustrates and analyzes the interaction and communication process that happens between the teacher and student in learning process.

Conversational Framework identifies four elements of the learning process as shown in Figure 3.1; which are: Teacher's Conception, Student's Conception, Teacher's Constructed Environment, and Student's actions.

As we see in Figure 3.1, there are 12 recommended stages for teaching students, in which a student has the opportunity to interact with the teacher. In addition, the teacher has the opportunity to assess students' learning at an early stage and take any needed correction action if there is any misunderstanding. Using conversation theory in teaching progress makes learning relationship more transparent and open to both students and teachers.[18]

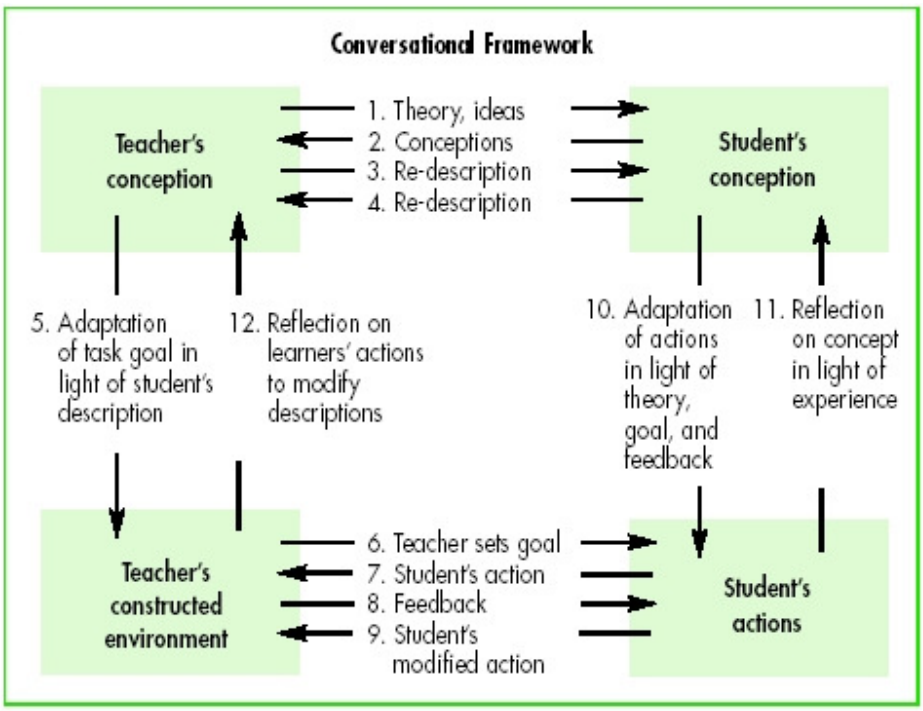

Figure 3.1: Conversational Framework.[23]

The iterative learning cycles underline the conversational nature of the model. By applying Conversational Framework in learning process, a student will have the opportunity to learn from theory, action, and feedback (Arrow 10, Figure 3.1). According to Laurillard[23], there is no one right medium for the conversation; each medium has its own weaknesses and therefore, ongoing evaluation and maintenance for the various dialogic aspects is essential for effective learning outcomes.

3.5.3 Conversation Theory Strengths and Weaknesses

Weakness: According to Draper[24], there is a lack of management of learning process and the need for learning negotiation between the students and the teacher in Conversational Framework. Moreover, as Laurillard[23] states, there is a need for further concentration on student-student interaction and communication which leads to effective learning.

Strength: Applying Conversation theory in learning process increases learning outcomes and makes learning process more effective and successful by increasing the opportunity for interaction and communication between students and teachers, which as a result, increases the opportunity for earlier and effective evaluation as well as correctness if needed.

3.6 Applying Constructivism Theory in Blended Learning Environment

As stated in the Introduction of this chapter, one of the harshest criticisms of Blended Learning is that it focuses on the teacher for creating the knowledge, rather than on the student.[11] Therefore, to improve learning outcomes, Blended Learning should focus on student-centered learning by applying Conversation and Constructivism theories in designing and implementing learning activities.

3.6.1 Designing a Constructivism Based Blended Learning

Blended Learning course should be carefully designed and implemented so that students can easily add new knowledge into existing knowledge. Teacher's role should be guiding and supporting the acquisition of new knowledge to help students practice new skills by applying their knowledge. These interactions and activities between students and teachers and among the students are consistent with Conversation and Constructivism theories of learning, which tend to focus on the processes of communication and interactions between students and teachers and among the students to facilitate and improve knowledge acquisition, construction, organization, retrieval, and application.

In Constructivism theory, learning is a process in which the student takes new information, and adds it into existing schema. Each student constructs his/her own understanding based on his/her previous experiences. Teacher's role is essential and important in learning process, to guide knowledge construction and correct any misconception arises between students.

To apply Constructivist theory, a learning environment should be designed, implemented, and then guided through the process of collaboration and interaction between students, so that learning is constructed by the group, rather than just the individual.[25]

In face-to-face learning environment, groups are constructed through discussion, as a popular method. The teacher usually begins the discussion by asking a question, and then invites the students to make spontaneous answers, students then respond to each others, and a discussion develops. In this way, students are exposed to several perspectives, and the answer to the original question is constructed for each student based on the individual's assessment of the group's answers.[26]

Blended Learning environment has the characteristics to adapt, support, and facilitate applying Constructivism and Conversation theories in learning process (see Figure 3.2). Blended

Learning environment facilitates and improves discussion, communication, and knowledge construction processes as discussed later in this chapter.

Moreover, by applying Conversation theory beside Constructivism theory in Blended Learning environment, the students have the opportunity to interact with the teacher; in addition, the teacher has the opportunity to guide and assess students' learning and knowledge construction at an early stage and take any needed correction action if there is any misconception. Conversation theory supports Constructivism theory by facilitating collaboration, communication, interaction, and knowledge construction and sharing amongst the students, which improves learning outcomes and quality more effectively.

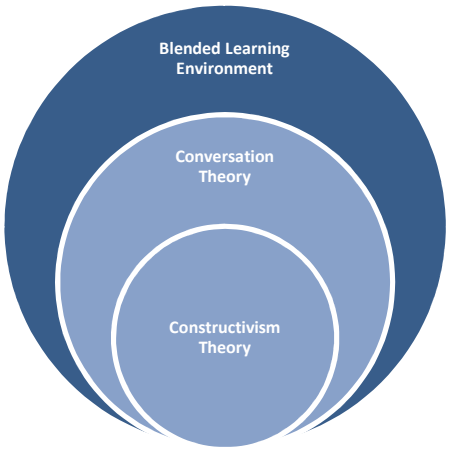

Figure 3.2: Adapting Conversation and Constructivism Theories in Blended Learning Environment. By Al-Huneidi Ahmad.

A Constructivism Based Blended Learning model has been developed by Koohang[45]. Koohang's model includes three categories for elements of Constructivism (see Figure 3.3), which are[46]:

1. The design of learning activities (online and face-to-face); which includes collaboration, interaction, cooperation, multiple perspectives, real life examples/case studies, sharing of ideas and knowledge, discussion, and social negotiation.

2. Learning assessment; which includes teacher's assessment, teams' assessment, and self-assessment.

3. Teacher's roles; which includes guiding, teaching, mentoring, providing feedback, and assessment.

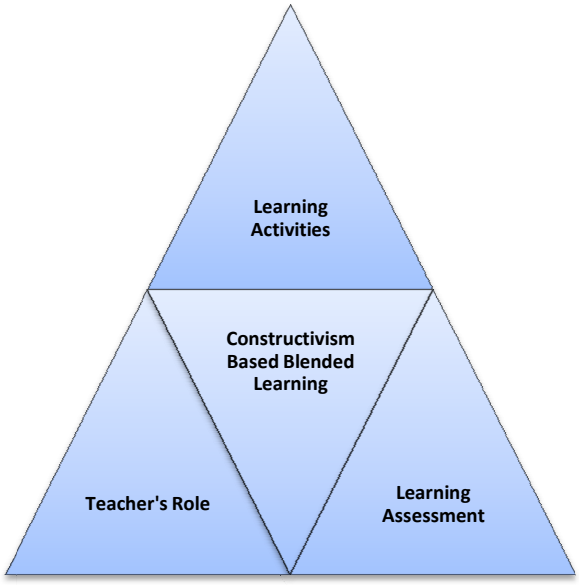

Figure 3.3: Koohang's Constructivism Based Blended Learning Model. By Al-Huneidi Ahmad.

The design of learning activities in Blended Learning environment typically starts with presenting a case study/real life situation, and then the students are encouraged to develop their own goals and objectives and apply their own experience/knowledge in solving problems. Then the student is asked to reflect on what he or she has learned and to give justification for his/her solution, which will encourage the student to be responsible for his or her own learning.[46]

According to Erwin[47], learning assessment is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using information to increase students' learning and development. Learning assessment is essential and important for designing effective Constructivism Based Blended Learning environment. The reality is that students associate their participation in learning activities to assessment; therefore, it is essential to link students' activities in Blended Learning environment with the assessment system in order to encourage students to actively and effectively participate in learning activities.

3.6.2 Synchronous and Asynchronous Communication Methods

In Blended Learning environment, teachers should use a variety of ICT tools such as synchronous and asynchronous learning technologies to facilitate and encourage collaboration, interaction, communication, and knowledge construction and sharing among the students.

The online discussion could be held synchronously in group chat, or could be held asynchronously in a forum, in which students post responses and are able to respond to several topics at once. Since an asynchronous discussion can continue over a longer period of time, students have enough time to prepare and post effective responses, and can respond to a particular part of a topic or post, even if the discussion has taken another path, which as a result, increases learning outcomes and improves its quality.

Online discussions or synchronous chats enhance students' learning, increase and improve learning outcomes, and may lead to cognitive development.[27] Moreover, preconceived notions of race, gender, educational abilities or social status of the students is virtually erased.[28] Which can be extremely beneficial if there is any social cliques in school environment.

The effectiveness of collaboration in a live or synchronous learning environment depends on dynamic and active communication between students that fosters knowledge construction and

sharing.[29] Synchronous discussions are very beneficial and important for students who might not participate actively and collaboratively within face-to-face classroom. Moreover, synchronous discussions facilitate fast and efficient exchanges of ideas.[30] On the contrary, in face-to-face classroom; participation of all students in discussion process is often difficult due to time constraints or students' nervousness or shyness.

Collaborative learning emphasizes the following factors[26]:

1. Active participation and interaction between students.
2. Knowledge viewed as a social construct.
3. Environments that facilitate and support students' interaction, evaluation, and cooperation.
4. Students who benefit from self explanation when more experienced or knowledgeable students contribute.
5. Students who benefit from internalization by verbalizing in a conversation.[31]

Asynchronous communication facilitates students' discussion, interaction, collaboration, and knowledge sharing and construction. In addition, students can interact, communicate, and submit questions to teachers at any time and expect reasonably quick responses. Asynchronous communication allows students to construct knowledge effectively without or fewer time constraints. The use of online learning tools in Blended Learning environment allows students to have access to information at all times. Constructivism based Blended Learning environment has a variety of asynchronous ICT tools, including but not limited to:

1. Documents and web pages.
2. Web based training modules.
3. Online Assessments.
4. Questionnaires and surveys.
5. Online assignments and tasks.
6. Simulations.

7. Recorded lectures, conferences, discussions, or live events.
8. Online Discussion Groups (ex.: Yahoo Groups).
9. Blogs (form of asynchronous online discussion).
10. Online learning communities and discussion forums.[32]

According to Hew and Cheung[33], there are five phases for effective knowledge construction that are applied through asynchronous ICT tools, as illustrated in Table 3.1.

Table 3.1: Knowledge Construction Phases in Asynchronous Communication.[26]

Phases	**Example**
Phase 1: Sharing and comparing of information.	Students can discuss an assignment with each other for clarification or sharing data to be analyzed as a group.
Phase 2: Discovery and exploration of conflict or inconsistency among the ideas, or statements presented by different students.	Multiple student participation ensures feedback with possible differing opinions. Differences can be examined and analyzed while using the internet or teachers' opinion for further clarification.
Phase 3: Negotiation of meaning.	Heterogeneous grouping would allow many students to share their "meaning" and define it for others. Concepts can be explained at many different levels based on students' experience.
Phase 4: Testing and modification of proposed constructed knowledge.	Students can assess and evaluate each others' constructed knowledge with no face-to-face threat, and may be more honest. Students can collaborate on written assignments.
Phase 5: Statement or application of newly constructed knowledge.	Students can analyze and discuss their group work, opinions, or knowledge and use this information to improve their own work.

These phases fit into Blended Learning environment, as they extend face-to-face classroom learning to further online learning using asynchronous ICT tools.

Asynchronous and synchronous ICT tools effectively involve students as well as teachers and therefore improve communication, conversation, and interaction among them, which as a result, facilitates knowledge construction and improve learning outcomes.

Chapter 4: Different Scenarios of Constructivism Based Blended Learning and Best Practices

4.1 Introduction

Although standard features of Constructivism Based Blended Learning technologies such as discussion forum, chat, e-blackboard, and others are well defined, much remains to be done in restructuring and redesigning learning processes to exploit the available learning technologies to a maximum degree by offering radically novel learning scenarios, which can be utilized and employed in order to improve learning quality and outcomes.[36, 37]

The rapid growth of Information and Communication Technology (ICT) has facilitated knowledge accessibility from anywhere and at any time. However, people must have critical thinking skills so that they can analyze and compare information, construct arguments, respect diverse perspectives, and construct new knowledge.[48] Moreover, solving complex real life problems requires a variety of knowledge from different people with different experiences.

Constructivism Based Blended Learning environment has the characteristics to improve students' critical thinking, analyzing, problem solving skills, knowledge construction, and collaborative working, through its variety of learning strategies and ICT support tools.

One of the main goals for designing a Constructivism Based Blended Learning model is to encourage students to actively construct and share new knowledge.[46] This chapter illustrates various scenarios and best practices of applying Constructivism Based Blended Learning

program in academic institutions in order to acquire familiarity in employing them to improve learning outcomes.

4.2 Constructivism Based Blended Learning Scenarios

4.2.1 Project-Based Blended Learning[38]:

This scenario consists of three phases as the following:

1. **Preliminary phase:** In this phase an introduction of the course are presented; students are informed about learning objectives, mode, tools, and schedule. In addition, students get to know each other by introducing themselves personally, and all needed learning materials and resources are uploaded online before the preliminary meeting.
2. **Project-based learning:** This is the main phase of the course and consists of a number of introductory activities as well as of a sequence of project milestones, as the following:

    2.1 Team building and project selection: Students should solve real life problems they choose as their projects in teams of 3–5 students. A list of topic proposals are provided online and each team gets an individual workspace on the learning platform.

    2.2 Information gathering: Brief presentation and discussion of the projects' topics, which allows collecting multiple ideas on projects. The teams and projects' topics are put online.

    2.3 Iterate project milestone: Any milestone is a separate section in the team workspace.

        2.3.1 Motivation and orientation: The teacher motivates the current milestone and presents relevant contents and materials to provide some orientation for the students.

2.3.2 Elaboration of milestone solutions: Students search for contents and explore it, and they discuss and decide on what is relevant for their specific task. They elaborate their milestone solutions and prepare them for presentation. Any document could be stored in the team workspace and is made visible to other students for review and commentary.

2.3.3 Presentation: Students present their milestone solutions to other groups as well as to the teacher.

2.3.4 Feedback: After the presentation the students receive feedback on their solutions and presentations by other groups and the teacher. Online feedback facilities are provided to allow for directly commenting individual contributions, and for making them visible for others to benefit from them as well.

3. **Assessment Phase:** The assessment process in this scenario consists of a mix of self-evaluation, peer-evaluation and evaluation by the teacher to provide as many perspectives as possible for all students. Students provide feedback to the teacher through reaction sheets. Online support and visibility of all kinds of feedback is provided.

There are several benefits of project-based Blended learning, some of which are[38]:

1. More active interaction of students and teachers and more communication lead to more group orientation, collaboration, Constructivism based learning, and more self-directed learning with more responsibilities of the students and the group (student-centered learning).
2. More views and ideas on the theories and materials can be discussed.
3. A higher degree of realism can be achieved by encouraging students to select real life problems and to effectively participate in the discussion activities.

4. Students take on multiple roles. Besides being authors and presenters, they are resourceful peers, reviewers, and active listeners.

4.2.2 Applying Blended Synchronous Classroom[42]:

There are many scenarios of applying blended synchronous classroom in learning environment; two of them are explained below:

1. The First Scenario of Applying Blended Synchronous Classroom:

In this scenario the teachers are participating in physical classrooms only and the students are participating both in physical classrooms and in cyber classrooms. This model of Blended Learning environment uses synchronous classrooms, in which students from different locations, who cannot participate in face-to-face class, can participate in the class synchronously using cyber classrooms technique, and join students setting in face-to-face classroom (physical classrooms), as shown in Figure 4.1 below.

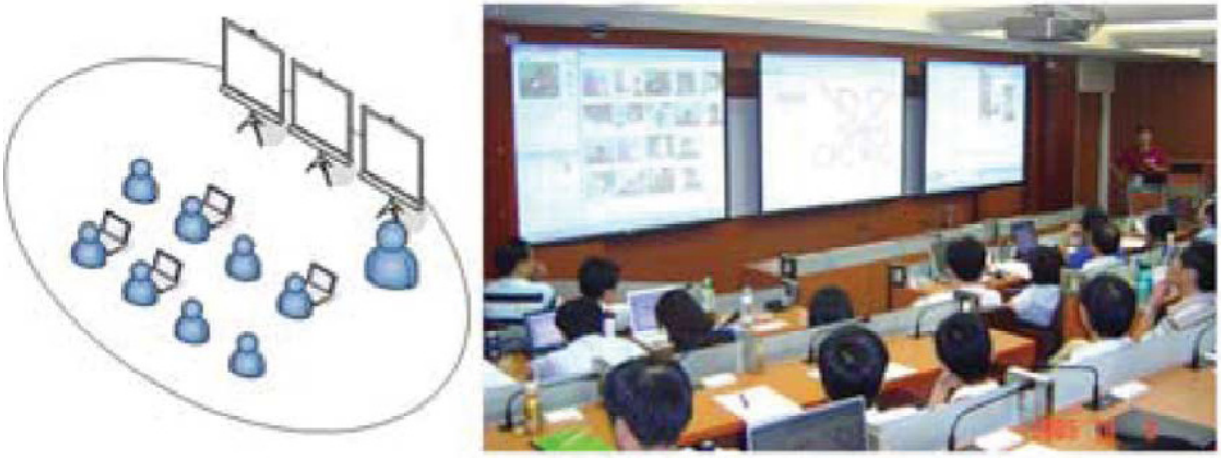

Figure 4.1: A snapshot from the physical component of a blended synchronous classroom.[42]

Another possible application for this scenario would be linking two or more blended synchronous classrooms together with teachers teaching the same subject in different universities for collaborative and interactive team-teaching.

The main benefit of this scenario is that it leverages traditional classroom teaching for online students who cannot attend physical classroom, in addition the interaction and communication between students from different locations, with different experience and knowledge, facilitate Constructivism based learning effectively. However, online students might feel less attended by the teacher if he/she does not paying enough attention to the presence of online students.

2. The Second Scenario of Applying Blended Synchronous Classroom:

Another potential scenario of applying blended synchronous classrooms is a combination of physical classrooms and cyber classrooms, in which both teachers and students have the option to participate in any of them.

In this scenario, teachers are able to conduct synchronous classrooms either alone or with a group of teachers from different universities in different locations to form a collaborative and interactive teaching team. At the same time, students can participate alone from home or with a group of peers from multiple physical locations.[43]

Using this scenario, multiple universities can align themselves strategically to recruit top faculty members from around the world to offer the best learning quality for students. This scenario characterized by high flexibility and possibility for international collaborations. However, to benefit from this scenario, teachers and students must be experienced in blended synchronous learning environment.

The collaboration and interaction between teachers described in the above scenario have many benefits for students, teachers, and academic institutions which include:

1. Educational and social benefits for students, such as applying Constructivism theory in learning process through increasing the interaction, communication, and collaboration amongst students from different locations with different experience and knowledge.
2. Educational and professional development for the participated teachers.
3. Economic benefits for academic institutions.
4. Participating in international educational networks.

4.3 Constructivism Based Blended Learning Best Practices

4.3.1 Blended Learning Model Based on Face-to-Face Classes[39]:

In this example the Blended Learning program is designed and implemented based on the face-to-face class with minor amendments for "Interprofessional Team Development" course for health science's students. This model was developed by the Interprofessional Initiative at University of Alberta's Health Sciences Council in Canada.

The Class times and student interdisciplinary teams in this model, match those of the face-to-face class. The designed Blended Learning environment includes the following face-to-face classes:

1. The first class; so that the students could meet and the teams could participate in a pre-test practical examination (Team Objective Standardized Clinical Examination (TOSCE)) in order to evaluate students' teams.
2. In sixth class the teams presented a health promotion program to a community group.

3. The final class consisted of a post-course practical examination (TOSCE).

All students enrolled in the "Interprofessional Team Development" course were contacted by e-mail. Students interested in participating in the Blended Learning program attended an information session explaining Elluminate's virtual classroom system.

The teacher role in the Blended Learning program was altered slightly. In the face-to-face environment, two teachers supervised six teams, while in the Blended Learning program one teacher supervised four teams. The modification was due to the capacity to train only one teacher to use the synchronous technology. In this program, the teacher should be experienced in the face-to-face environment so that he/she did not have to learn course specifics.

The online activities in this program were designed by employing both asynchronous and synchronous technologies. The Blended Learning environment, allowed the students to work online asynchronously. For example, students accessed library resources, viewed video clips, submitted work, and downloaded notes and assignments. The students submitted assignments a day early so they could be checked prior to the synchronous class.

Synchronous online classes used the Elluminate desktop virtual classroom environment to support students' interactions. The teacher and students could interact through a combination of interactive e-whiteboard, instant messaging, voice communication, and/or WebCam. The real-time voice communication used a 'walkie-talkie' mode whereby only one student could speak at a time.[40] At any time a student could raise a hand to request to speak. All student speaking requests were logged in ascending order.

Figure 4.2 shows a typical Elluminate session in the Blended Learning course. On the left hand side, in the Participant Info box, student D-Pamela has access to the microphone, instant messaging, and both writing on and viewing the whiteboard. The whiteboard itself can be used to display PowerPoint slides, websites, or for the teacher and students to write information to share

with the class. Emoticons (happy/unhappy faces, hands clapping and thumbs down) are used to express emotions quickly. All sessions can be recorded for later playback (information regarding the operation of Elluminate is located at: http://www.elluminate.com/support/training/).

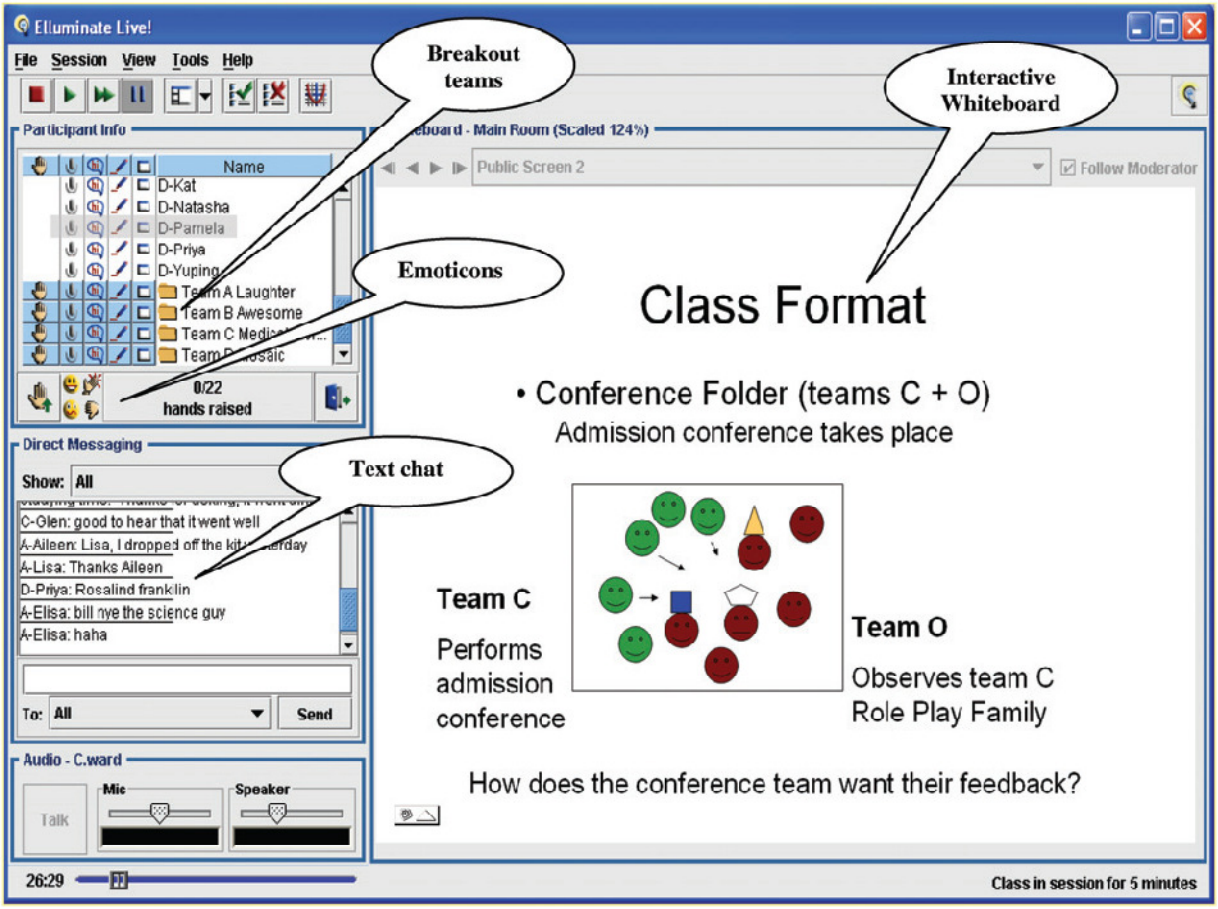

Figure 4.2: Typical Elluminate Session in Blended Learning Course.[39]

As students log-in to the virtual classroom, they are able to interact with one another and with the teacher. To start working with their team, the teacher moves each student into breakout rooms or 'folders' where private communication amongst the team occurs. The teacher then 'drops in' to work with these teams. At any time the teacher can come together with the teams

into a single class. This team interaction was a critical aspect of the course redesign process as developing team-based collaborative skills were a fundamental goal of the course.

In this example a synchronous online classroom technology is used to facilitate the interaction, collaboration, and communication among the students and with the teacher, which as a result, increases Constructivism based learning and knowledge sharing among the students.

4.3.2 A Web-Based Interactive Learning Environment (ILE) Example[49]:

The Interactive Learning Environment (ILE) was designed based on Constructivism learning theory, aimed at promoting students' critical thinking and knowledge construction. The ILE was designed to support the students who were taking the elective course of "Instructional multimedia design" in National Institute of Education (NIE) at Nanyang Technological University in Singapore. It was a two credit module for the second year students, who were pursuing Diplomas in Education.

The course ran once a week and lasted for 12 weeks. It consisted of nine face-to-face and three online classes. All face-to-face classes were conducted in a computer lab. During each class, the teacher explained main concepts and demonstrated on certain features of the multimedia authoring tool: "Multimedia Builder". Thereafter, the students had some practices on the authoring tool. After each face-to-face class, the students wrote online reflections as a follow-up activity. For the online classes, the students did not come to the computer lab for tutorials. Instead, they studied the lesson's materials independently and participated compulsorily in the online discussions.

E-blogger (http://www.blogger.com) was chosen as a platform for hosting the ILE. Three forms of interaction were integrated into the ILE as shown in Figure 4.3.

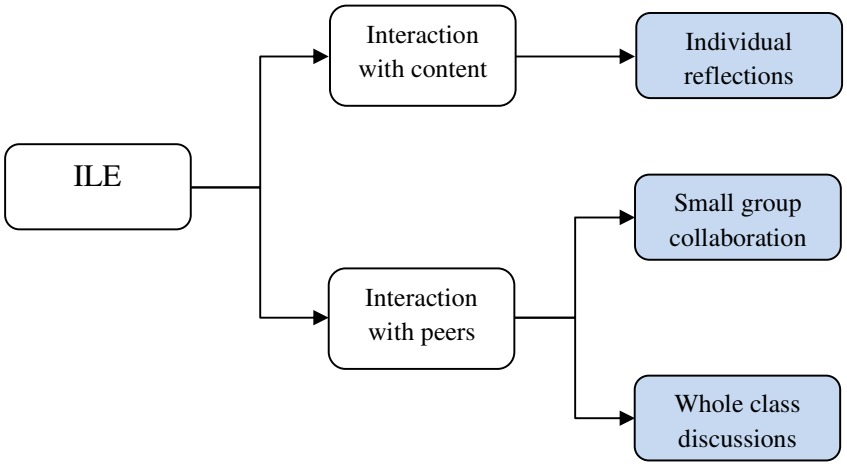

Figure 4.3: The interactive design model for the ILE.[49]

The first form of interaction was at the individual level, which promotes self-paced and student-centered learning. The students interacted with the course content and wrote weekly reflections on what they learned. All reflections were graded and accounted for 10% of their final marks.

The second form of interaction was at the group level. Students interacted with peers, shared, negotiated, and discussed their final projects in groups of two. This small group collaboration was graded and carried 5% of their marks.

The third form of interaction occurred at the class level, targeted at fostering whole class interaction. The ILE involved three online discussions. The first discussion was to debate whether media could influence learning. The second was to criticize the final project proposals. Every group was required to post the final project proposal to the discussion forum. Each student should criticize at least two proposals of other groups. The third discussion was designed to collect feedback on the course design and delivery. Each online discussion contained 10% of their final marks.

This example shows how Blended Learning environment has the characteristics to facilitate applying Constructivism theory in learning process. The three forms of interaction (individual reflections, group collaboration and whole class discussions), illustrated in this example, had the potential to encourage students' critical thinking, analyzing skills, problem solving skills, and knowledge construction and sharing.

4.3.3 Flexible Blended Learning Model Based on 50/50 Mixes of Traditional Classroom and Online and Learning Activities [41]:

A Blended Learning model for Master of Business Administration (MBA) degree at Weber State University (WSU) in USA has been designed and implemented with approximately one half of the teaching delivered in a traditional classroom setting and the other half through online learning tools. Each course meets one evening per week over a period of eight weeks.

Over the same eight-week period, students engage in a variety of synchronous and asynchronous online learning activities, such as online discussions, online chat, group project boards, online research tools, online quizzes and online examinations, etc.

The MBA program's traditional face-to-face classrooms are facilitated with white boards as well as computer projection systems. Faculty can bring laptops or can use a computer that is already linked with the classroom's audio-visual technology. The faculty's building offers students and teachers with a secure Wi-Fi connections. A dedicated MBA computer lab was established to serve the graduate students in the program.

MBA students normally start their graduate studies with a course entitled "Tools for the Effective Manager". Part of the course description is: "This course is designed to be taken at the beginning of formal course work in the MBA program. Students will explore various aspects of moral reasoning and apply these concepts to common ethical issues faced in business. Students in

this course will be introduced to analytical, communication, and technological tools used throughout the program".

Course sessions make use of several guest speakers, including a former vice-president of Nike who speaks about teamwork, a former business professor and university president who addresses issues on networking and career development, and a former business dean and university provost who discusses issues around leadership styles. Students work in small groups to discuss ethics cases.

Online work includes discussion of ethics readings and cases. This provides students with enough time to read and reflect on various real-life ethical problems and cases faced by managers in the workplace. Students post their comments in an asynchronous online discussion forum, and have the ability to comment on each others' posts and comments. This allows the small-group weekly discussions of ethical issues and cases to continue throughout the following week.

Students have had the option of completing a group project or conducting an executive interview as part of the course requirement. Those who complete the group project can communicate with each other using online discussion tools, with a separate area for discussion postings available for each group. Students complete a comprehensive final exam using ChiTester, the university's computerized testing software.

Students may enroll in the program on a year-round basis and attend full time (two classes each eight weeks) or part time (one class each eight weeks) as they choose. Students are free to switch between part-time and full-time system based on their work and social commitments. In the event of an extended absence due to family or work commitments, students can "stop out" for one or more eight week terms and resume their studies upon their return.

Asynchronous online discussion forum used in this model facilitates Constructivism based learning and knowledge sharing among the students. Moreover, one of the main benefits of

applying Blended Learning model for MBA degree at WSU is the flexibility of learning, which increases the number of enrolled students in this program noticeably.

4.3.4 Undergraduate "Project Management" Course Example[18]:

This example illustrates the implementation of a "Project Management" course, in a Constructivism Based Blended Learning environment, as the following:

1. In the face-to-face classes, students were provided with handouts, which contained the theory and ideas that were utilized in class for discursive exercises. These exercises provided students with the opportunity to share their knowledge and for the teacher to re-describe the exercises if required. Multiple-choice questions were developed for each topic and delivered on a weekly basis in order to allow students to improve their understanding of the theory. Every class started with a review of the previous week together with exercises that were assigned for home self-study.

2. As a motivator for further discussion, students were provided with past exam papers, which were related to the topic covered in the face-to-face class. Students were encouraged to attempt to solve these exam questions and share their answers with other students for discussion on an online discussion forum that was set up within the Blackboard Virtual Learning Environment (VLE).

3. Students were given an assignment that related to practical theory application. For about six weeks students were working on the assignment in practical sessions where they were formatively assessed on their actions. Students' actions and feedback were discussed verbally in the face-to-face classes. As an alternative, email and online discussion forums were utilized for further support, since students were not always able to attend the face-to-face classes or wanted more feedback at other times. On the discussion forums students

were able to openly share their experiences and construct a new knowledge, whilst benefiting from the feedback given to individuals from the teacher. Finally, an accumulative assessment of the practical work was concluded by a demonstration and a report that included a reflective section of theory and practice.

4. A further cumulative assessment came in the form of a written exam, where students were encouraged to use examples from their own experience.

This example applied and adapted Conversational and Constructivism theories in Blended Learning environment. Most of the learning activities in this example were linked to an online discussion, and students were continually encouraged to discuss and share their knowledge and experiences through the online discussion forum, which as a result, increases the interaction, collaboration, and knowledge construction among them. Furthermore, students were continually provided by teacher's feedback, which improves learning outcomes' quality.

4.3.5 "Current Educational Issues" Course Example[50]:

In the year 2008, Blended Learning model was developed and implemented in the final year of a teacher training program at PHL University College in Belgium (www.phl.be). At PHL each student has a personal laptop at his disposal, and can connect wireless to the internet all over the campus. The course, in which this design was initiated, is titled "Current Educational Issues". Students' technical computer skills were high, since they work with their computers for both learning and personal purposes on a daily basis. Along the learning process, it has become clear that teacher guidance at the formal level is essential for successful implementation and execution of the model. Moreover, students tended to look for confirmation from the teacher. For the responsible teacher, it was striking that even advanced students with an extensive amount of self-regulative and collaborative skills needed such an amount of guidance. On the other hand, this guidance enforced and motivated them to accomplish the learning tasks at a high-quality level.

Table 4.1 illustrates course activities implementation. The course lasts for 7 weeks, in which various Blended Learning activities implemented and applied.

Table 4.1: Course Activities Implementation in Constructivism Based Blended Learning Environment.[50]

Week	Learning Activities	Grouping Mode	Teachers' Guidance	Assessment
1	Exploration of the topic by online brainstorm with videoconferencing software.	Small group	The topic is selected by the teacher (each group researches a different topic). Submission deadline at the end of the week.	Electronic group mind map.
2-3	Internet search and readings. Active participation in the group online discussion forum.	Individual	Making controversial stands. Follow-up of the discussion. Defining the role of moderator.	Personal bookmark list. Minimum of threads per person.
4-5-6	Creation of a wiki about the topic.	Small group	Defining the global structure of the wiki. Weekly briefing.	Critical analysis of wiki's content. Group process.
7	Each group presents their topic to other groups (face-to-face session).	Small group	Defining presentation criteria. Defining peer assessment criteria.	Evaluation of the presentation. Peer assessment.

The illustrated example above applied Constructivism learning theory in Blended Learning environment; the student is central in the Blended Learning course, and constructs knowledge in social interaction with others starting from real life and meaningful tasks. It employed the Internet for students to allow them to create, upload and share information using various social software applications such as wiki's, weblogs, social bookmarking, etc. that facilitate creativity, communication, collaboration, and sharing among students.

Most of the tasks in this example are based on interaction and collaboration between students in a small group under shared responsibility. Higher quality of understanding and knowledge construction are likely to emerge because of students' discussions on the content, preparation of shared knowledge, and selection of relevant materials (cognitive skills).

Figure 4.4 shows the design levels of this model. The learning objectives of this course are open-ended, and hard to define. The external guidance on the content level is minimal; the teacher and each subgroup of students select the research topic by mutual agreement. The students are responsible for the interpretation of the content. The teacher, however, has to structure the learning environment in a very detailed way in terms of task instruction, the order of learning tasks, wiki structure, imposed deadlines, available time, etc. (formal guidance). This formal guidance helps students to complete the learning processes successfully.

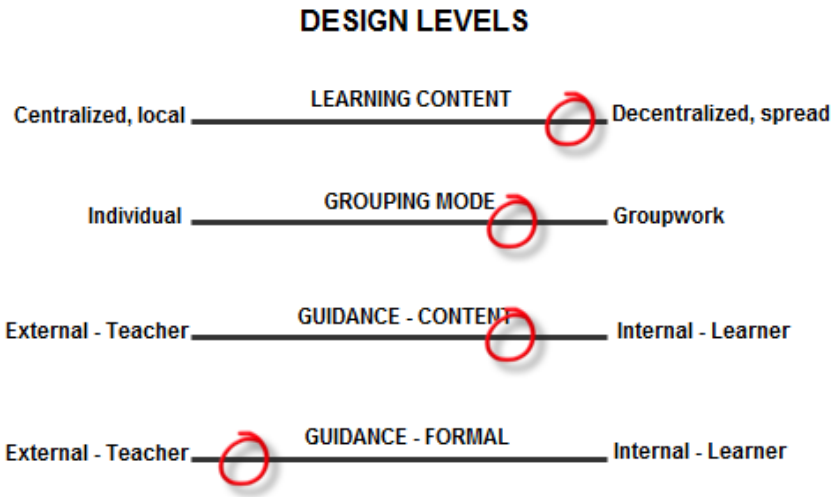

Figure 4.4: Design Levels of Blended Learning Model.[50]

During the learning process, the teacher performs the role of a coach who enhances learning by creating cognitive conflicts, and who assists the students into the zone of proximal development.

The examples analyzed above have demonstrated that a learning designer can take the individual differences among students into consideration by designing the learning model in a Blended Learning environment, which creates varied learning strategies. External guidance at the formal, structural level is high in most of the Blended Learning designs. As Figure 4.4 suggests that in this model the learning content is more decentralized which means more personalization, it also stimulates group work, finally the student has the ability to guide himself during the learning process.

4.3.6 Basic Small Class Blended Learning Course[44]:

This model is for a small class Blended Learning design for a second year political science course. The course was traditionally delivered via three one-hour lectures per week supported by case studies. Students had two essential assignments and a final exam.

The Blended Learning design for this course was that three lectures per week were reduced to two supported by online discussion. All course materials were uploaded to the e-blackboard for easy access.

Students were prepped for online discussion in the first lecture of the week with the introduction of case studies. More effective use of case studies was achieved using online discussion that required reflection and well formulated written discourse.

The discussions were guided and moderated by the teacher, who received a professional development guidance to effectively manage an online discussion such as creating smaller groups and time management. Moreover, guidelines were provided for the students regarding the nature, frequency, and the length of messages. Credit for online discussion was 10 percent of the final grade.

This design involved student in a more meaningful and sustained discourse. Moreover, most of the students agreed that the online discussion contributed to a better understanding of the course content. The online discussion increases the collaboration, interaction, and knowledge construction and sharing between students.

The most important success factor for the online discussion in this scenario is the role of the teacher, which include guidance, management, and assessment. To encourage students to participate effectively in the discussion, it is important to link their participation with the assessment system.

4.3.7 Assignment Implementation Example[46]:

This assignment is designed based on Constructivism Based Blended Learning environment. It's a 14 weeks in duration. The class will be divided into teams which will be required to research a recently introduced technology. The team should then find a company listed on the New York Stock Exchange (NYSE) for which they think this technology is appropriate. Lastly, they will present information about the new technology and how the chosen Company could use this technology. This presentation will be for their classmates who will be role-playing as investment bankers deciding whether to lend the company money for the technology or not.

Implementation:

Week One - Technology essay: Each student has to post a 250 to 300 words essay on the discussion forum, describing an emerging, important technology that has "appeared" in the last 2 years.

Week Two - Vote on technologies: Each student has to read all his/her classmates' technology essays. Thereafter, she/he has to choose and post on the discussion forum what he/she thinks are the six most important technologies.

Weeks Three through Eight - Teamwork Project: Students will be divided into teams, and each team will be assigned to one of the technologies. The team will then need to thoroughly research the technology. Thereafter, the team will find an organization on the NYSE that can benefit from the use of this technology. Once the team has chosen its organization, the team should complete the following two tasks:

1. A Research paper:
   Each team should write a 3000 words paper, which includes a complete explanation of the assigned technology, a description of the chosen company, and an analysis of how the chosen company can use and benefit from that technology.

2. A PowerPoint presentation with audio for students' classmates:
   Each team should prepare a PowerPoint presentation with audio about their findings. The audience for this presentation is students' classmates who will be role-playing as "Bankers". These "Bankers" are attempting to determine whether to loan money for the assigned company or not.

Both Tasks 1 and 2 are due at the end of week 8.

Weeks Nine through Thirteen – Presentations: Each team will present his presentation in front of other teams in face-to-face class, in which classmates can ask questions and discuss the project. Other students will be serving as a "Bankers". "Bankers" are expected to ask at least one question which should help them to determine whether to lend money or not. Seven days after the presentation, each student must prepare a two page paper, that indicates whether he/she has chosen to lend money to the company or not and why.

Week Fourteen - Reflection Paper: At the end of Week 14, each student will submit a paper (500 to 600 words) describing their contribution to their teams' work, a description of each of

their teammate's contribution, and what they learned that they didn't know prior to this project.

This example applied essential characteristics of Constructivism learning theory in a Blended Learning environment through a real life experience. Students' collaboration, critical thinking, analyzing, evaluating, problem solving skills, self-reflection, social negotiation, and knowledge construction will all take place within the process of the team creating their research paper and presentation. Furthermore, the three assessment elements are included in this project, which are: self assessment, collaborative assessment, and teacher assessment.

Chapter 5: Applying Constructivism Based Blended Learning to "ICT Management" Course at Hasselt University

5.1 Introduction

"Information and Communication Technology (ICT) Management" is a compulsory course in Master of Management Information Systems program at Hasselt University. Part of the course description is as follows: "ICT management is responsible for ICT project management including the development and implementation of ICT solutions for the company. ICT management is organising the ICT services enterprise-wide, supporting the business processes and the management decision making".

ICT Management course basically ran once a week and lasted for 14 weeks. The course guidelines states 10 essential topics that should be covered during the semester which are:

1. ICT management in the information age.
2. Managing application portfolio and application development.
3. Developing and acquisition alternatives.
4. Managing e-business applications.
5. Developing and managing customer expectations.
6. Managing computer and data resources.
7. Knowledge management.
8. Managing e-business and network systems.
9. Controlling and securing information resources.
10. The chief information officer's role.

5.2 Current Teaching Method

ICT Management course consists of two parts; theory and project. The current teaching method are mainly based on face-to-face lectures, in which a theory part is introduced and taught; in addition, the current method utilizes asynchronous tool, which is an online forum discussion. In order to initiate the online discussion, the students should read about a specific topic from different resources, make a summary, post it into the discussion forum, and then start the discussion by asking each others about their posts. The teacher role in this discussion is to guide, promote, and encourage students to actively participate and share knowledge in the discussion.

On the other hand, in the second part of the course, student teams are taking part in a project. Every year a project's topic is selected in consultation with a business companies. Based on the selected topic, the students attend a business conference prepared by related business companies, and then each group is requested to share their knowledge by preparing a report based on learned knowledge from the business conference, in addition to additional literature study.

5.3 Applying Constructivism Based Blended Learning

By applying Constructivism Based Blended Learning to "ICT Management" course, the lecture component will evolve from a fairly traditional teacher-centered learning to a much more interactive student-centered learning, in which Blended Learning environment and ICT tools will be utilized to facilitate and adapt Constructivism and Conversation theories in learning process. Employing Conversation theory in Blended Learning environment supports Constructivism theory by facilitating collaboration, communication, interaction, and knowledge construction and sharing amongst the students, which increases learning outcomes and improves learning quality more effectively.

One of the main goals of applying Constructivism Based Blended Learning is to make it possible for working students to complete their studying in a high quality learning environment. Constructivism Based Blended Learning environment has more pragmatic considerations, such as timing of the class and learning activities, which will be suitable for both full time and part time students, class size, and learning styles, in addition to the other benefits of Blended Learning and Constructivism theory as explained in previous chapters.

The process of applying Constructivism Based Blended Learning program composed of four main phases which are: analysis, design, implementation and execution, and evaluation, as illustrated in Figure 5.1.

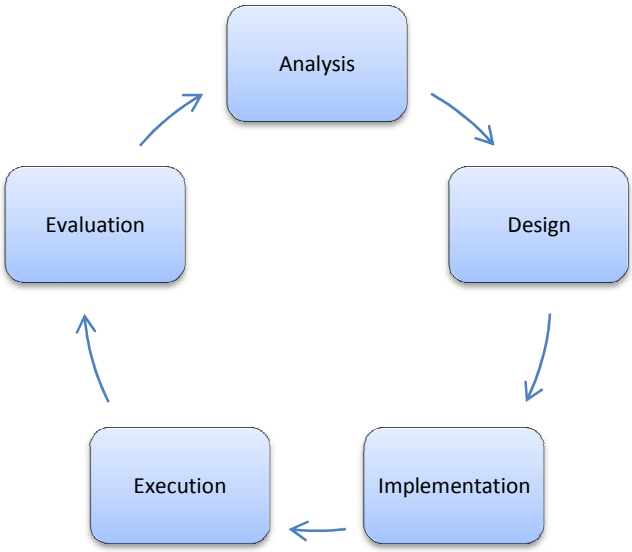

Figure 5.1: Applying Constructivism Based Blended Learning Phases, By Al-Huneidi Ahmad

5.3.1 Analysis

This phase identifies learning objectives and knowledge to be taught in ICT Management course and their interrelations. Moreover, student skills, needs, and characteristics are measured

and evaluated to ascertain what kind of learning environment to be implemented and what resources are available or needed. Students should be familiar with online learning tools and basic IT skills to participate effectively in learning process and activities. Therefore, students' IT skills should be evaluated to determine if there is a need for IT skills training sessions or not.

Furthermore, working students should be taken into consideration by designing and implementing a suitable learning program for them. According to Biggs[35] in what he calls "Constructive Alignment", it is important to know what the student is doing before designing a learning model. Learning depends on both students' physical and intellectual activities, and despite the fact that we cannot control these things directly, we can create a learning model and environment that affects on what the student does. To implement effective learning model, Biggs[35] stresses the importance of aligning teaching methods, curriculum, assessment procedures, the educational environment we create and the learning objectives we want our students to achieve.

5.3.2 Design

The design phase defines how to teach "ICT Management" course using Constructivism Based Blended Learning model. It is important to have a clear model of learning in which to design the curriculum and the learning system rather than just to use the available tools and technologies. Thus before choosing the blends of face-to-face and online learning tools, it is important to identify how each component would contribute in improving learning outcomes.

The proposed Constructivism Blended Learning model consists of a variety of face-to-face classrooms and online learning activities. The learning process starts with a face to face lecture to give an overview of the course, discuss the most significant knowledge that will be taught, and learning strategies and tools that will be used. In this model a variety of online and face-to-face learning activities are differentiated for working students and regular students, in

which Constructivism and Conversational theories are applied. These activities include collaboration, communication, and interactions between students themselves, the teacher, and the business people. In the last week of the course, the students attend a face-to-face class to make a written open book exam. Moreover, permanent email system is provided during the semester, in which the students can communicate with the teacher and expect response within 24 hours. ICT support tools such as synchronous chat system, online conference system, online interactive whiteboard, and discussion forum play a significant role in learning process by facilitating communication, collaboration, interaction, and knowledge construction among the students.

The evaluation method used in this model, is a combination of online assessment and traditional assessment (written exam and project work). The teacher evaluates students' interactivities, participation, and their works in the online activities. In addition, at the last week the teacher evaluate the students based on their projects and their results in the written exam. Figure 5.2 illustrates the proposed Constructivism Based Blended Learning Model for ICT Management course.

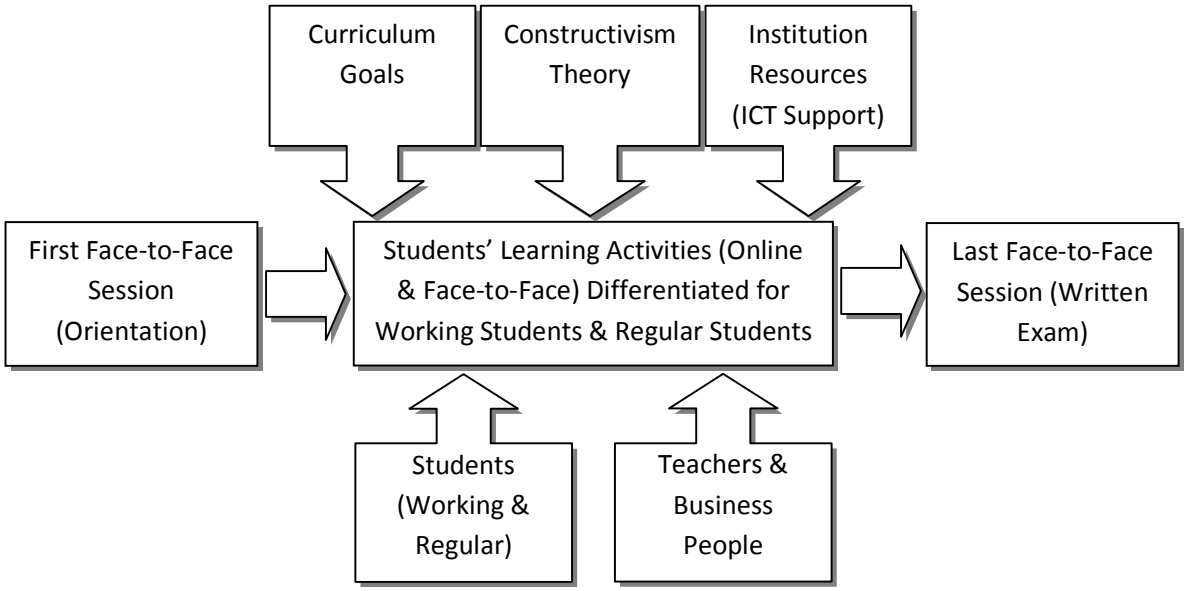

Figure 5.2: Constructivism Based Blended Learning Model. By Al-Huneidi Ahmad.

The main benefit of this model is that it takes into consideration working students in designing and implementing learning activities. Therefore it could be applied for both working students and regular students, in addition to the benefits of applying Conversation and Constructivism theories in Blended Learning environment as explained in previous chapters.

To gain a better understanding of how to apply Constructivism characteristics in learning process, Table 5.1 illustrates various Constructivism characteristics and their correspondent learning activities and ICT support tools.

Table 5.1: Constructivism Characteristics and their Correspondent Learning Activities and ICT Support Tools. By Al-Huneidi Ahmad.

Constructivism Characteristics	**Learning Activities**	**ICT support Tools**
Personalization/Customization	Reading about a selected topic on the internet and discuss it with other students and with the teacher.	- Online chat system. - Internet access.
Responsibility	- Conducting an interview with one of the business people, followed by a presentation and discussion about the interview outcomes to the whole class. - Self reading followed by whole class discussion. - Attending an online conference with a selected business people, followed by a report requested from each	- Online Whiteboard system to present the power point presentation to the whole class in addition to the discussion. - Online discussion forum. - Online conference system.

Constructivism Characteristics	Learning Activities	ICT support Tools
	student about what he/she learned and an online discussion.	
Critical Thinking	Presenting a real life problem and asking the each group of students to solve it and make a report of their solution, followed by a discussion of the proposed solution.	- Online discussion forum. - Online meeting system or interactive whiteboard system.
Self and Collaborative Assessment	Group preparation of a report about selected topic, followed by exchanging the reports among students to assess each others' reports and then send them to the teacher.	Email System.

5.3.3 Implementation and Execution

In this phase the proposed model is implemented and executed; the needed infrastructure, and ICT support tools, such as online video conferencing software, synchronous chat system, and asynchronous discussion forum are provided and implemented in this phase. Each student has an access to the online learning system by his/her user name and password.

The proposed model consists of 4 main phases, in which various scenarios could be applied, as illustrated in Table 5.2. During these phases the students are building up and

constructing the knowledge through a variety of learning activities linked with a continuous evaluation process.

Table 5.2: Learning Phases of Constructivism Based Blended Learning Model for "ICT Management" Course. By Al-Huneidi Ahmad.

Phase No.	**Phase Description**	**Period**	**Scenarios**	**Main Activities**
1.	Presenting the foundation of the theory by the teacher.	One week	One scenario	- Presenting course guidelines, and objectives. - Discussing the most important knowledge to be taught.
2.	Self-paced learning.	One week	One scenario	- Self study of course materials and presentations.
3.	Search for additional knowledge/ expanding the knowledge.	Two weeks	Three scenarios	A. Self reading and asynchronous online discussion.
				B. Internet search, preparing a presentation, and making a discussion.
				C. Internet search, writing a report, and collaborative assessment.

Phase No.	Phase Description	Period	Scenarios	Main Activities
4.	Link with business practices/ people.	Two weeks	Two scenarios	A. Attending a conference presented by selected business people, preparing a presentation/ summary, and making a discussion about it.
				B. Making an interview with one of the business people, preparing a presentation, and making a discussion about it.
5.	Applying learned knowledge.	Three weeks	Four scenarios	A. Writing a report and making a video presentation about it.
				B. Making a research about the last theory or technology in a selected topic, preparing a

Phase No.	Phase Description	Period	Scenarios	Main Activities
				presentation, and making a discussion about it.
				C. Preparing a presentation about the challenges and future trends of a selected topic and making a discussion about it.
				D. Proposing a solution for a real life problem, selected by the teacher, and making a discussion about the proposed solutions.
6.	Self-paced learning.	One week	One scenario	Self studying, intensive communication with the teacher, and preparation for the exam.
7.	Written exam.	One session	One scenario	Open-book written exam.

The execution of the proposed Constructivism Based Blended Learning model is illustrated in Table 5.3, in which learning scenarios and activities are described in details.

Table 5.3: Constructivism Based Blended Learning Model for "ICT Management" Course. By Al-Huneidi Ahmad.

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
1.	- In the first classroom session, the teacher presents learning guidelines and tools that will be used, introduces the course objectives, discusses the most important knowledge to be taught, and provides learning activities' schedule.	Same.	- The students have an overview of course's contents, objectives and assessment tools. - Face-to-face interaction between students while forming their groups, and with the teacher during the discussion as well.	- The students are requested to attend IT skills assessment after this session. - Thereafter and based on the assessment, the students may requested to attend additional IT skills sessions if needed.	Computer projection system.	Working students have separated groups from other students to facilitate the executio n of learning activities .

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	- The students are requested to form their groups.					
2.	In the second week the students are requested to study course material's presentations, which are available on the e-blackboard. Thereafter each student has to write a blog about what he/she is expecting to learn during the course and suggest any ideas that may increase	Same.	- Responsibility, Self-paced learning, critical thinking, and writing skills. - Communication and sharing the ideas among the students. -The students will have a foundation of the theory and what they will learn during the course.	No need.	- Blog website. - E-blackboard.	

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	learning outcomes and experience. - All students may comment on each other's blogs.					
3 & 4 (A)	- The students are asked to read about a selected topic and post a summary into the discussion forum. - Each student starts asking about other students' posts or any question related to the topic. - The teacher encourages students, guides, and	Same.	- Responsibility, Self-paced learning and Constructivism based learning. - The knowledge is constructed based on students' experience as well as the literatures. - Collaboration; sharing and exchanging knowledge and ideas.	No need.	Online discussion forum.	The teacher may choose activity A or B or C for the weeks 3 and 4.

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	participates in the discussion.					
3 & 4 (B)	- The students are asked to prepare a selected topic from the internet. Afterwards they have to make a discussion, in the classroom, about the topic and what they have learned. -The teacher guides knowledge construction process.	- The students are asked to prepare a selected topic from the internet, and then they have to participate in a chat session for one hour together with the teacher to discuss the topic using synchronous chat system. -The teacher guides knowledge construction process.	- Responsibility, Self-paced learning, Constructivism based learning and Conversation based learning. - Extensive interaction and communication between students and with the teacher as well. - The knowledge is constructed based on students' experience as well as the literatures. - Collaboration; sharing and exchanging knowledge and	- The teacher assesses students' interactivity during the discussion.	Synchronous chat system.	- The chat session is held at the evening to be suitable for working students.

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
			ideas. -Immediate feedback.			
3 & 4 (C)	- Each group of students is asked to search on the internet and read about a selected topic, and then prepare a paper about that topic. - Thereafter, each group exchanges their paper with other groups in the classroom; and then they are requested to assess other groups' papers and hand them	- Each group of students is asked to search on the internet and read about a selected topic, and then prepare a paper about that topic. - Thereafter, each group sends their paper to all other groups; in addition, each group is requested to write an evaluation about other groups' papers	- Responsibility, Self-paced learning and Constructivism based learning. - The knowledge is constructed based on students' experience as well as the literatures. - Collaborative assessment is applied; the students learn some assessments skills; in addition, they have the opportunity to learn from each others' mistakes.	The students assess each others' work, in addition to the teacher's assessment.	Email system.	

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	to the teacher.	and send them to the teacher.				
5 & 6 (A)	- The students attend a conference about a selected topic prepared by selected business people. - Thereafter, each group of students has to prepare a presentation of what they have learned from the conference, present it to other students in the classroom. -The teacher guides knowledge	- The students attend an online conference about a selected topic prepared by selected business people. - Thereafter, the students have to prepare a summary of what they have learned from the conference, post it on the discussion forum, and start discussing each others' posts. - The teacher encourages	- Self-paced learning, Constructivism based learning and real life experience. - Collaboration; sharing and exchanging knowledge and ideas. - The knowledge is constructed based on students' experience as well as business people knowledge and experience.	The teacher assesses the interactivity of each student in the discussion.	- Online conference system. - Online discussion forum. - Computer projection system.	- The teacher may choose activity A or B for the weeks 5 & 6. - The online conferen ce is held at the evening to be suitable for working students.

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	construction process.	students, guides, and participates in the discussion.				
5 & 6 (B)	- Each student is requested to make an interview with one of the business people related to a selected topic. - Based on the interview each student is asked to prepare a presentation about what he/she learned from the interview. - Thereafter the students present their	- Each student is requested to make an interview with one of their coworkers about a selected topic. - Based on the interview each student is asked to prepare a presentation about what he/she learned from the interview. - Thereafter the students attend an online session/ meeting	- Responsibility, Self-paced learning, Personalization, Constructivism based learning, and real life experience. -The students learn some interview and presentation skills. - The knowledge is constructed based on students' experience as well as business people knowledge and experience.	The teacher evaluates each student's presentation and interactivity .	- An online interactive whiteboard (See Figure 4.2). - Computer projection system.	- The online session is held at the evening to be suitable for working students.

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	presentation to the whole class and discuss it with their classmates.	together with the teacher, present their presentations, and discuss it with each other.	- Collaboration; sharing and exchanging knowledge and ideas.			
7, 8, & 9 (A)	- Course Project: Each group of students is requested to write a report about a selected topic. - Thereafter, and as a part of the project, each group is requested to make a video presentation about the same topic and present it in the presentation	- Course Project: Each group of students is requested to write a report about a selected topic. - Thereafter, and as a part of the project, each group is requested to make a video presentation about the same topic and send it to other groups in	- Responsibility, Self-paced learning and Constructivism based learning. - Students learn some video presentation skills. - Collaboration; sharing and exchanging knowledge and ideas. - The knowledge is constructed based on students' experience as	The teacher evaluates each group's work (course project).	- Email and synchronous chat systems. - Computer projection system.	The teacher may choose activity A, B, C, or D for the weeks 7, 8, and 9.

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	session to the whole class.	addition to the teacher during the presentation week.	well as the literatures.			
7, 8, & 9 (B)	- Each student is requested to make a research on the internet about the last theory or technology in a selected topic, prepare a presentation about it, and present it to the whole class in the presentation session, in which the students start discussing each others' presentation. - The teacher	- Each student is requested to make a research on the internet about the last theory or technology in a selected topic, make a presentation about it, and then present it to the whole class in the presentation session on a Webinar. -Thereafter, the students start discussing each others' presentation.	- Responsibility, Self-paced learning and Constructivism based learning. - The knowledge is constructed based on students' experience and the literatures. -The students learn some research methods and skills. - Collaboration; sharing and exchanging knowledge and ideas.	The teacher evaluates each student's reports and his/her interactivity in the discussion.	- Webinar application. - Computer projection system.	

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	guides and participates in the discussion.	- The teacher guides and participates in the discussion.				
7, 8, & 9 (C)	- Each student is requested to read about a selected topic, and try to predict its future trends. -Thereafter, each student is requested to prepare a presentation about the challenges of that topic in real life, as well as his/her prediction of its future trends. -Finally, each student	- Each student is requested to read about a selected topic, and try to predict its future trends. -Thereafter, each student is requested to prepare a presentation about the challenges of that topic in real life, as well as his/her prediction of its future trends. -Finally, each student presents his/her	- Critical thinking, Responsibility, Self-paced learning and Constructivism based learning. - The students learn some research and analysis skills. - The knowledge is constructed based on students' experience and skills as well as the literatures. - Collaboration; sharing and exchanging knowledge and	The teacher evaluates students' interactivity in the discussion as well as their analysis skills.	- Webinar application. -Computer projection system.	

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	presents his/her presentation to the whole class in the presentation session and the students start discussing each others' presentation. - The teacher guides and participates in the discussion.	presentation to the whole class in the presentation session on a Webinar and the students start discussing each others' presentation. - The teacher guides and participates in the discussion.	ideas.			
7, 8, & 9 (D)	The teacher presents a real life problem to the students in the classroom and makes a discussion with the students about its possible solutions.	The teacher posts a real life problem into the discussion forum about a certain topic, and then asks each group of students to propose a solution for	- Critical thinking, Responsibility, Self-paced learning, Constructivism based learning and real life experience. - The students learn some	The teacher evaluates students' analysis and problem solving skills as well as their proposed solutions.	Online discussion forum.	

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	Afterwards, each group of students is asked to propose a solution for that problem and post it to the discussion forum, in which the students discuss each others' proposed solutions. - The teacher guides and participates in the discussion.	that problem and post it to the discussion forum, in which the students start discussing each others' proposed solutions. - The teacher encourages students, guides, and participates in the discussion.	problem solving skills. - The students apply their knowledge and experience in trying to solve the problem. - Collaboration; sharing and exchanging knowledge and ideas.			
10.	Presentation session, in which the students present and discuss their	Presentation session on a Webinar, in which the students present and	Responsibility, Constructivism based learning and presentation skills.	The teacher evaluates students' presentations.	- Webinar application. - Computer projection system. - Email	

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	presentation(s), with their classmates. In addition they hand their reports, papers, and projects to the teacher.	discuss their presentation(s) with their classmates. In addition they send their reports, papers, and projects to the teacher.			System.	
11.	The students are requested to study the theory, and prepare any questions that may need to ask during the questions and answers' session.	Same.	Self-paced learning.	No need.		
12.	Questions and answers session, in which students ask the teacher questions	Online question and answers session on a Webinar, in which students ask the teacher	- Guidance, corrective answers, and exchanging knowledge and ideas.	No need.	Webinar application.	

Week	Regular Students Activities	Working Students Activities	Learning Outcomes	Evaluation	ICT Support	Notes
	about the course and about what they learned.	questions about the course and about what they learned.				
13.	The students start studying and preparing for the exam.	Same.	Self-paced learning.	No need.		
14.	Written open book exam.	Same.	- Learned knowledge and skills for each student are evaluated. - The students assess themselves and evaluate their knowledge.	The teacher evaluates the students based on the written exam, in addition to their projects.		The students' evaluation and are based on the project, online and classroom activities, in addition to the written exam.

5.3.4 Evaluation

In order to evaluate and determine the success of the proposed learning model, the teacher should gather the constructed knowledge in each activity, analyze and evaluate it based on learning objectives. Moreover, the time that each student spends on online activities should be stored, the communication and interaction between students and with the teacher should be recorded and the number of questions were asked during the discussions by the student should be recorded as well; furthermore, the student's marks in the written exam, project, and online activities should be measured and evaluated.

By analyzing the gathered information and learning outcomes by educational experts, the quality of the model will be evaluated and it will be possible to determine if any adjustments are needed to improve its quality.

5.4 Conclusion

The proposed model applies and combines Constructivism and Conversation theories in Blended Learning environment through a variety of learning activities and scenarios supported by innovative ICT tools, which increases and improves learning quality and outcomes more effectively.

The main characteristics and benefits of the proposed learning model are:

1. Although learning objectives are predefined, they are open ended as well.
2. Constructivism and Conversation theories are applied extensively.
3. Self-paced learning, self-regulation, and Constructivism based learning are essential in learning process.
4. A variety of learning strategies, activities, and ICT support tools are used.

5. The level of collaboration, communication, and interactivity between students are very high.
6. Real life skills and experience are obtained.
7. More independent problem-solving skills are obtained.
8. More meaningful learning outcomes.
9. Very flexible; applicable for both working students and regular students, which increases the number of enrolled students.
10. The proposed model avoids the drawbacks of Constructivism theory, such as constructing the wrong knowledge, by stressing the importance of teacher role in each student's activity.

However, the proposed model may have some drawbacks, such as the role of the teacher will be more complicated, and the load of work on him/her is higher. Furthermore, the assessment process is more complex and difficult.

Chapter 6: Conclusion and Recommendations for Future Research

6.1 Conclusion

As stated in first part of this thesis, Blended Learning provides the best mix of learning strategies from both face-to-face and online learning environments, which increases learning outcomes and quality. Blended Learning arose to overcome the drawbacks of traditional learning and to obviate the failure of e-learning by providing a combination of various learning strategies or models to optimize learning process. Blended Learning environment reflects the strengths of face-to-face and online learning environments. Moreover, individual differences among students could be taken into consideration by designing the learning model in a Blended Learning environment, which creates varied learning strategies.

The role of the teacher in Blended Learning environment is essential and should be considered for the success of Blended Learning program. Teacher's role in Blended Learning environment includes but not limited to development, management, guidance, providing feedback, and evaluation.

There are many benefits which make teachers choose Blended Learning over other learning strategies, such as extending the reach, increasing flexibility, pedagogical richness, reusable patterns (reusable contents and functionality), optimizing development cost, social interaction, and easy to revision and customization.

However, Blended Learning system tends to focus on the teacher for creating knowledge rather than on the student.[11] Therefore, there is a need to improve Blended Learning environment in order to apply student-centered learning methodology to increase learning outcomes, which has been achieved by applying Constructivism and Conversation theories.

Constructivism theory tends to focus on the student to construct new knowledge based on his/her experience, which increases and improves learning outcomes. Blended Learning environment and strategies has the characteristics to facilitate adapting and employing Constructivism theory's principles and elements in learning process, which improves students' critical thinking, analyzing, problem solving skills, knowledge construction, and collaborative working, through its variety of learning strategies and ICT support tools.

There are a variety of scenarios and best practices for applying Constructivism Based Blended Learning program in academic institutions, which some of them are stated in this thesis in order to acquire familiarity in employing them to improve learning outcomes.

In order to increase learning outcomes and improve learning quality more effectively, I employed Conversation theory beside Constructivism theory in Blended Learning environment model for "ICT Management" course, which is a compulsory course in Master of Management Information Systems program at Hasselt University. Since Conversation theory supports Constructivism theory by facilitating collaboration, communication, interaction, and knowledge construction and sharing amongst the students.

By applying Conversation theory beside Constructivism theory in Blended Learning environment, the students have the opportunity to interact with the teacher; in addition, the teacher has the opportunity to guide and assess students' learning and knowledge construction at an early stage and take any needed correction action if there is any misconception.

Furthermore, I applied a variety of innovative ICT support tools which play a significant role in Constructivism Based Blended Learning environment, since employing an effective and interactive ICT tools, such as online interactive whiteboard, chat system, online conference system, and discussion forum, in implementing and executing learning activities facilitates and increases collaboration, interaction, communication, and knowledge construction and sharing among the students, which improves learning outcomes and quality.

The proposed model has many benefits and characteristics such as Self-paced learning, Constructivism based learning, collaborative assessment, independent problem-solving skills, critical thinking, collaboration, communication, interactivity, knowledge sharing, and flexibility.

6.2 Recommendations for Future Research

The aim of this thesis is to explore how to design and implement Blended Learning model based on Constructivism theory in higher education, which have been achieved through the proposed Constructivism Based Blended Learning model for "ICT Management" course.

The work of this thesis was limited by time and scope. Nevertheless, further research remains to be done on different levels and wider scope, such as designing and implementing a more customized, dynamic, and flexible learning model, and utilizing more innovative ICT tools and strategies, such as social media, in learning process. Moreover, future research should focus on primary education and how to design and implement a Constructivism Based Blended Learning model for primary levels. The new generation of students in primary levels is more familiar with ICT tools and able to learn new ICT skills more quickly, which can be employed to design and implement a Constructivism Based Blended Learning model for primary levels to increase and improve learning outcomes.

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