

**The Development and Evaluation of Integration of Inter-
sessional Facilitated Online Discussion in Problem-Based
Learning in Undergraduate Medical School Curriculum**

Ahmad Saleh Alamro

Submitted in accordance with the requirements for the degree of Doctor of
philosophy

Supervisors:

Professor John Sandars

Professor Trudie Roberts

The University of Leeds
Leeds Institute of Medical Education

September, 2014

The candidate confirms that the work submitted is his/her own and that appropriate credit has been given where reference has been made to the work of others.

This copy has been supplied on the understanding that it is copyright material and that no quotation from the thesis may be published without proper acknowledgement.

© 2014 The University of Leeds and Ahmad Alamro

Dedication

The dissertation is dedicated to

The kindest hearts: my parents

To

My wife: Somayah Alhawas

And to

My lovely daughters, Retal and Bateel

Acknowledgements

I would like to thank many individuals for their support, advice and guidance in the completion of this study but particular thanks go to:

Professor John Sandars and Professor Trudi Roberts: My supervisors; for the unlimited guidance and support throughout the study to complete it successfully.

Staff of the Leeds Institute of Medical Education: for the help they offered during my study.

Dr. Yasir Alwably and Dr. Moteb Alotaby: for the support given during the study.

Dr. Hani Al-Shobaili and Dr. Abdullah Alghasham: for trusting me and giving me the opportunity to conduct this study, and for standing behind the success of it.

I would like to extend my thanks to all PBL tutors who participated in this study.

Another of special note:

Somayah Alhawas: my wife; for all the evenings and weekends she sacrificed, her unconditional love and support that maintained my motivation to complete this study for our future.

Publication arising from the study

The study has been presented and the abstracts were published in the following conferences:

1. Alamro A, Sandars J. Integration of facilitated online discussion forum with PBL: a model to improve students' learning, Association of Medical Educators in Europe (AMEE), Prague, Czech Republic, 2013
2. Alamro A, Schofield S, Sandars J. Blended problem-Based learning, 3rd Saudi medical Education Conference, Riyadh, KSA, 2012
3. Alamro A, Schofield S, Sandars J. How to increase learning on a PBL course by the use of a facilitated online discussion forum between sessions. Association of Medical Educators in Europe (AMEE), 27-31 August 2011, Vienna. Austria 2011

Abstract

Problem-based learning (PBL) has been used extensively in medical education but its educational potential may not be fully realised due to several factors, including the variable interaction between students and tutors. Qassim Medical School (QMS) in Saudi Arabia implemented PBL 10 years ago. Three previous studies evaluating the Qassim curriculum have been published, which together with this researcher's experience as a student at the same school, identified some difficulties and challenges with the collaborative learning aspect of PBL. A previous pilot study was conducted at QMS in 2010 exploring the integration of facilitated inter-sessional online discussion forums with PBL. The evaluation showed that students and tutors liked the integrated forums, and that the forums helped students to achieve the learning objectives effectively, enhanced collaboration, and increased use of learning resources. Students wanted the forums to be implemented in the other courses.

Understanding the challenges and difficulties existing at QMS, the findings of the pilot study of integrated online discussions, and the lack of literature on the integration of the two teaching and learning methodologies have led to the development of the research question: 'Does use of an inter-sessional facilitated online discussion forum between PBL sessions improve student learning?' To address the research question, a conceptual model was developed, a training program was conducted, and a mixed-methods approach was applied. Analysis of the posts showed that knowledge construction occurs when discussion fora (DFs) are integrated between PBL sessions; student perception reported in this study validated the pilot study's findings.

This study gives insight for QMS and similar institutions that integration of facilitated DF can enhance students' knowledge construction, overcome current issues with PBL, and improve student skills such as English writing.

Table of contents

Chapter1: Background/Introduction	1
1.1. Overview	1
1.2. Background to the Problem-based learning approach	2
1.3. Qassim Medical School's expectation of PBL	3
1.3.1. Qassim Medical School context	4
1.4. Evaluation of Qassim Medical School Experience	8
1.5. Rationale for integration of facilitated asynchronous online discussion forums between PBL sessions	11
1.6. Challenges of using online Discussion Forums	13
1.7. Research Question	13
1.8. Thesis outlines	16
Chapter2: Literature review	18
2.1. Search terms	18
2.2. Data sources and time limit	20
2.3. Bibliographic databases	20
2.4. Grey literature	21
2.5. Ph.D. Thesis	22
2.6. Additional process to enhance comprehensiveness	22
2.7. Results	23
2.8. Limitation	23
2.8.1. Summary	23
Chapter3: Theoretical framework	24
3.1. Knowledge construction in the discussion forums	24
3.1.1. Social Constructivism	25
3.2. Evaluation of knowledge co-construction in discussion forums	29
3.2.1. Development of IAM	30
3.3. Sustainability of educational experience in the online discussion	33
3.3.1. Medium of interactivity/Community of Inquiry	33
3.3.2. Student orientation and tutor training	38
3.3.3. Technical support	38
3.4. Conceptual model of the proposed integrated, facilitated online discussion model	40
3.4.1. Asynchronous vs. synchronous communication	40
3.4.2. Facilitated vs. Student-led discussion	41
3.4.3. Discussion forum vs. blog	43
3.4.4. Marked vs. not marked	43
3.5. Summary	43
Chapter4: Methods and Methodology	45
4.1. Research design	45
4.1.1. Determine and define the research questions.	51
4.1.2. Select the case/s and determine the data gathering and analysis techniques	52
4.1.3. Preparing to collect the data	77
4.1.4. Collect data in the field	78

4.1.5.	Evaluate and analyse the data.	89
4.1.6.	Prepare the report.	96
4.2.	Quality issues of the case study	96
4.2.1.	Research methodology limitation	98
4.2.2.	Role of the researcher (insider-researcher)	99
4.2.3.	Ethical consideration	101
4.3.	Summary	103
Chapter5:	Results	105
5.1.	Introduction	105
5.2.	Demographic data	105
5.3.	R Q 1: Knowledge construction in the online discussion forums	109
5.3.1.	Evaluation of knowledge sharing and construction on DFs (content analysis)	110
5.3.2.	Evaluation of social presence (content analysis)	112
5.4.	R Q 2: participants' perception towards the training	114
5.4.1.	Questionnaires results	114
5.4.2.	Interview results	116
5.5.	R Q 3: participants' perception towards the Interaction/Collaboration	119
5.5.1.	Questionnaire results	119
5.5.2.	Interview results	122
5.6.	R Q 4: participants' perception towards the flexibility, feasibility and accessibility	125
5.6.1.	Questionnaire results	125
5.7.	R Q 5: participants' perception towards the learning	128
5.7.1.	Questionnaire results	128
5.7.2.	Interview results	132
5.8.	R Q 6: participants' satisfaction	137
5.8.1.	Questionnaires results	137
5.9.	R Q 7: Advantages and limitations of the integration	139
5.9.1.	Focus group (students)	139
5.9.2.	Individual interviews (tutors)	142
5.10.	Other evidence	147
5.10.1.	Participants' expectation of the intervention	147
5.10.2.	Participants' attitude in the discussion forums	151
5.11.	Summary	164
Chapter6:	Discussion	166
6.1.	Overview	166
6.2.	R Q 1: Knowledge construction in the online discussion forums	167
6.3.	R Q 2: Participants' perception towards the training	170
6.4.	R Q 3: Participants' perception towards the Interaction/Collaboration	171
6.5.	R Q 4: Participants' perception towards the flexibility, accessibility and technical support	172

6.6. R Q 5: Participants' perception towards the learning of PBL in the integrated system	173
6.7. R Q 6: Participants' satisfaction	175
6.8. R Q 7: Advantages and challenges of the integration	176
6.9. Synthesis of overall findings	177
6.10. Conclusion	178
6.11. Limitations.....	179
6.12. Recommendation for further researches	180
Chapter7: References	182
Appendix 1: Qassim Medical School pre-clinical phase blocks' calendar 2011/2012	202
Appendix 2: Search strategy for what has been done in the topic: learning impact of inter-sessional facilitated online discussions in problem-based learning.	203
Appendix 3: The four scenarios/problems given to students during course	224
Appendix 4: Example of a week timetable in Growth and Development block	229
Appendix 5: Coding schema of the interaction analysis model (Gunawardena et al., 1997).....	230
Appendix 6: Coding schema of the social presence analysis model	231
Appendix 7: Students' questionnaire.....	232
Appendix 8: tutors' questionnaire	235
Appendix 9: Individual Interview Questions Schedule.....	238
Appendix 10: Focus Group Questions Schedule	239
Appendix 11: Vice dean's email encouraging tutors to participate	240
Appendix 12: Tutor training slides.....	241
Appendix 13: students training slides	245
Appendix 14: steps of how to access the discussin forums.....	248
Appendix 15: Reminder from the vice dean encouraging them to contribute	251
Appendix 16: example of text was coded using Microsoft Word	252
Appendix 17: Sample of quotes translation table (focus group analysis)	253
Appendix 18: Ethical approval by Medical Research Ethics Committee, Qassim Medical School.	254
Appendix 19: Ethical approval by The Medicine and Dentistry Educational Research Ethics Committee (EdREC) of the University of Leeds, UK.....	256
Appendix 20: Participant's information sheet (content analysis-tutors and students)	258
Appendix 21: Student's and tutor's consent form (content analysis).....	260
Appendix 22: Participant's information sheet (marks analysis-students) .	261
Appendix 23: Student's consent form (marks analysis)	263
Appendix 24: Participant's information sheet (questionnaires).....	264
Appendix 25: Tutor's information sheet (individual interview).....	266
Appendix 26: Tutor consent form (interview).....	268
Appendix 27: student information sheet (focus group).....	269
Appendix 28: student consent form (focus group).....	271
Appendix 29: Knowledge construction coding results	272
Appendix 30: Part of a transcript of students' discourse in the discussion forum in one of the weeks	273
Appendix 31: Male groups (A-J) Social presence coding results	286
Appendix 32: Female groups (AF-EF) Social presence coding results	287

Table of figures

Figure 1: cognitive/mental process of knowledge construction according to Piaget (1952)	25
Figure 2: Social Constructivism cycle: Vygotsky's social interaction (red) + Piaget's individual cognitive constructive theory (black)(Swan, 2005)	26
Figure 3: The Zone of Proximal Development	28
Figure 4: Interactivity and Learning Online (community of inquiry) (Swan, 2003 adapted from (Garrison et al.1999))	34
Figure 5: Participants' satisfaction	39
Figure 6: Conceptual model of the inter-sessional facilitated online discussion in PBL	40
Figure 7: Students support needs in PBL (adopted from Davis and Harden, 1999)	52
Figure 8: Introduction of the block on e-learning	56
Figure 9: Weekly theme and PBL forum	57
Figure 10: The case to be studied and the embedded units of analysis	58
Figure 11: The block page shows students' questionnaire	65
Figure 12: Student form for focus group participation	77
Figure 13: Convergence of evidence	78
Figure 14: Conceptual model of the inter-sessional facilitated online discussion in PBL	79
Figure 15: Grouping students and their tutor in the online model	80
Figure 16: Control of topic visibility	80
Figure 17: PBL forum created per week	81
Figure 18: A topic for each group for the weekly problem	81
Figure 19: Appearance of the questionnaire on the online interface	86
Figure 20: Students' questionnaire appearance in Moodle	86
Figure 21: Tutor's questionnaire	87
Figure 22: Embedded units and entire cohort data analysis	90
Figure 23: Example of knowledge construction model's phases	91
Figure 24: Categories and indicators of social presence model	91
Figure 25: Themes, codes and quotes in NVIVO	94
Figure 26: The three highest and lowest coded groups	111
Figure 27: Comparison of means of social presence evaluation	113
Figure 28: Social presence evaluation results of groups with highest and lowest number of posts of the 15 groups	113
Figure 29: Example of learning issues posted by a student	151
Figure 30: Example of learning issues posted by a student	152
Figure 31: Students of one group's posts at different times of day	152
Figure 32: Students' posts/replies in different days	153
Figure 33: Tutors posted/replied at different times	153
Figure 34: A word document shared	154
Figure 35: sharing a picture	155
Figure 36: sharing a video	155
Figure 37: Shared YouTube video link	156
Figure 38: Knowledge shared in text form	156
Figure 39: A student asked a question and another responded	157
Figure 40: asking and response	158
Figure 41: A student clarifies a medical term	158
Figure 42: Students showed thankful	159
Figure 43: A tutor responded to a student's need	159
Figure 44: A tutor complimenting and advising students	159

Figure 45: Tutors' interaction with students.....	160
Figure 46: A tutor asking students to discuss a topic in a particular time	161
Figure 47: Tricky questions from a student motivated others	161
Figure 48: A student asked for others' participation.....	162
Figure 49: Students thanked their friends for knowledge was shared	162
Figure 50: Tutor as motivator.....	163
Figure 51: Internet issue	164
Figure 52: The Distribution of Knowledge construction activities among the five phases	167
Figure 53: Effect of social presence on knowledge activity	169

Table of tables

Table 1: Curriculum of Qassim Medical School	4
Table 2: Problem-based learning tutorial process (Maastricht Medical School) (Wood, 2003)	6
Table 3: An example of a PBL scenario, including steps that students follow ...	7
Table 4: The main research elements and thier synonyms, using PICO strategy	19
Table 5: Phase of IAM retrieved from (Kanuka and Anderson, 2007)	32
Table 6: Curriculum overview of Qassim Medical School.....	54
Table 7: Research questions, instruments and source of the data	59
Table 8: research questions subject areas and questionnaires items	67
Table 9: Reliability test, their definitions, and tactics adopted in the case study (adopted from (Paré, 2002; Yin, 2009: p 40)	98
Table 10: Variations in student performance during the four weeks	106
Table 11: Number of posts by students	108
Table 12: Number of posts by tutors	108
Table 13: Students' perceptions of the training (males)	115
Table 14: Students' perceptions of the training (females)	115
Table 15: tutors' perceptions of the training session.....	116
Table 16: Students' perceptions of interactivity in the discussion forum (males)	120
Table 17: Students' perceptions of interactivity in the discussion forum (females)	121
Table 18: Tutors' perceptions of the interactivity in the discussion forum.....	122
Table 19: Students' perceptions of e-learning flexibility, feasibility and accessibility.....	125
Table 20: Students' perceptions of e-learning flexibility, feasibility and accessibility (females)	126
Table 21: Tutors' perceptions of e-learning flexibility, feasibility and accessibility.....	126
Table 22: Students' perceptions of integrating online discussion forums with the conventional PBL (males)	128
Table 23: Students' perceptions of integrating online discussion forums with the conventional PBL (females)	129
Table 24: Students' perceptions of using of discussion forums improve different skills (males).....	129
Table 25: Students' perceptions of using of discussion forums improve different skills (females)	130
Table 26: Tutors' perceptions of integrating online discussion forums with the conventional PBL.....	130
Table 27: Tutors' perceptions of whether using discussion forums improves different skills	131
Table 28: Students' satisfaction about using integration discussion forums (males)	137
Table 29: Students' satisfaction about using integration discussion forums (females)	138
Table 30: Tutors' satisfaction about using integration discussion forums	138

List of Abbreviations

DF.....Discussion Forum

PBL.....Problem Based Learning

QMS.....Qassim Medical School

F2F.....Face to Face

SG.....Small Group

VLE.....Virtual Learning Environment

Chapter1: Background/Introduction

This chapter will focus on the background of problem-based learning (PBL) at Qassim Medical School (QMS), Saudi Arabia. It is based on my personal experience as a student at QMS and on an evaluation based on three studies done at the same school, conducted by Qassim faculty. That discussion will be followed by the idea of integration of facilitated asynchronous online discussion forums between PBL sessions and its rationale. The chapter, finally, will be concluded by research questions and explanation of the structure of the thesis.

1.1. Overview

I graduated from QMS in 2007. PBL is a primary teaching and learning methodology that is implemented there in the basic science part of the course of study (preclinical phase). When I was a student, I faced several issues with regards to PBL, in particular, during the PBL session and the self-directed learning (SDL) period. There were problems with students' collaboration during the PBL sessions and the SDL period, as well as issues with tutors' support and feedback during SDL. For instance, during the PBL session, those who can speak English better dominate the discussion; all the discussion was directed to the tutor, not to the student group. For the SDL, the discussion about the PBL is over by the end of the first session, and it was difficult to contact tutors because they were busy when we needed them and we become busy in educational activities during their office hours. Moreover, the university library closed early, and some students suffered from lack of learning resources.

In 2004 and 2009, three studies were published evaluating students' perception toward PBL (Al Robaee et al., 2009; Hamad et al., 2004; Shamsan and Syed, 2009). The studies look at the same issues that I had faced, such as lack of feedback during the SDL period. They reveal issues with regards to a lack of motivation of the PBL, and towards its implementation, resulting from the fact that facilitators are not well trained. As a result, students shirk their responsibility to take an active part in the discussion, which affects the collaborative learning of PBL.

In 2010, in an orientation presentation for pilot study, I discussed PBL issues, and found students complaining of the same issues mentioned in the studies. Then, the idea of integration of the discussion forum into the PBL was initiated and a pilot study was conducted, in which students and their tutors met in the discussion forum, where they can give and receive feedback and share knowledge, immediately after the face-to-face (F2F) PBL session (during the SDL period). This integration attempted to address the participation issues, and showed that tutors and students liked it and wanted to have the same experience in other courses. The above-mentioned personal experience and the three studies have created a research challenge to be met, which is about the impact of integration of facilitated discussion forum with PBL.

To understand the challenge, I will critically discuss: what is PBL? What are its advantages and challenges? What are the expected outcomes of PBL at QMS?

1.2. Background to the Problem-based learning approach

Problem-based learning (PBL) was introduced at McMaster University in the 1960s (Norman and Schmidt, 1992; Wood, 2008). It has become one of the most important educational developments of the past 40 years (Davis and Harden, 1999).

In the literature of medical education, PBL has several definitions; however, medical educationists agree that PBL has common key features. They are that the learner learns by an enquiry process, by a constructivist approach (they construct new knowledge on previous knowledge acquired) that is enhanced by collaborative learning in small groups (Wood, 2003; Davis and Harden, 1999; Barrows, 1985; Dolmans et al., 2005; Dolmans and Schmidt, 2006). Its emphasis on self-directed learning encourages students to be reflective and develop critical and active learning skills (Dodd, 2007; Johnston and Tinning, 2001; Dolmans et al., 2005). To have an effective PBL approach. There should be an efficient group dynamic and a well-skilled facilitator (Barrows, 1985; Maudsley, 1999; Dolmans et al., 2001).

Barrows and Kelson state that PBL has been designed to help students:

- 1) Construct an extensive and flexible knowledge base;
- 2) Develop effective problem-solving skills;
- 3) Develop self-directed, lifelong learning skills;
- 4) Become effective collaborators; and
- 5) Become intrinsically motivated to learn (Hmelo-Silver, 2004 quote (Barrows and Kelson, 1995)).

1.3. Qassim Medical School's expectation of PBL

Qassim Medical School is one of several medical schools in the world to implement either a hybrid or pure PBL curriculum (Des Marchais, 1993), because of the potential advantages to students' learning over the traditional, lecture-based curriculum if applied effectively (Norman and Schmidt, 1992). PBL contributes to the acquisition of the key generic competencies, interpersonal skills and attitudes desirable in future practice, such as communication, team and collaborative work, and problem solving skills (Davis and Harden, 1999; Kilroy, 2004; Sefton, 2005; Wood, 2003). It promotes the constructivist approach, since students make use of existing knowledge when generating learning issues to identify their learning needs (Davis and Harden, 1999; Sefton, 2005; Wood, 2003).

Qassim Medical School implements PBL because it facilitates a deep learning approach, as students interact with the learning materials, actively engaging in leading discussion and solving the problem (Davis and Harden, 1999; Wood, 2003; Finucane et al., 1998). They discuss real cases that might have happened in their life. It is student-centred, inculcating a self-directed learning strategy that prepares students for the adult learning approach needed in later life (Davis and Harden, 1999; Finucane et al., 1998). It helps students to be lifelong learners by encouraging them to be more responsible for their own education, promoting behaviours such as identifying their own learning issues, setting their own learning goals, and reflecting on and self-assessing their own work.

These aforementioned PBL attributes have meant that both students and staff find PBL enjoyable and motivating (Albanese and Mitchell, 1993; Davis and Harden, 1999; Donner and Bickley, 1993; Finucane et al., 1998; Pouyioutas et al., 2011; Wood, 2003).

1.3.1. Qassim Medical School context

Qassim Medical School was established in the academic year of 2000/2001 (Qassim College of medicine, 2011). It is the first medical school in Saudi Arabia that has implemented the hybrid curriculum, in which PBL and lecture-based curricula are integrated (Al-Damegh et al., 2004). Its curriculum is system-based, whereby students study through blocks, particularly in the preclinical phase (Appendix 1), while the rest of the years are mainly spent in a teaching hospital (Table 1).

Table 1: Curriculum of Qassim Medical School

Year 1	Year 2	Year3	Year4	Year5	Year6	Internship
phase I (foundation)	phase II (Basic Sciences)		phase III Clerkship			
Main campus			Main campus and teaching hospital	Teaching hospital		

Qassim Medical School considers PBL as main part of teaching and learning, in which many learning objectives of the course/block are covered. In terms of cognitive skills, students in PBL are expected to develop higher order thinking, in which they understand, apply, analyse, and evaluate the knowledge (Krathwohl, 2002).

Since QMS was established, the medical education committee has allocated ten marks from the total marks (100 marks) of each block/course for PBL. Students are assessed on their discussion and group dynamic. At the end of each week, a formative assessment is given as a quiz that helps them to test their knowledge regarding the weekly problem. According to the QMS curriculum, PBL is mainly implemented in year 2, 3 and 4, while the clinical phase offers only lecture-based and ward-based teaching.

Qassim School students are introduced to the PBL process by attending the medical education course (appendix 1). It is a four-week course, and teaches students how to employ the Maastricht 'seven jump' approach (Table 2), and how to think critically and work and learn collaboratively. Emphasis is often on collaborative learning, as it represents one of the macro-curriculum culminated outcomes, in which the graduates are expected to work collaboratively with other healthcare providers.

Similarly, new staff are provided with a training workshop on how to facilitate a PBL session before the beginning of the academic year. Staff are taught to recognise the rationale of PBL, become aware of the PBL seven jumps and understand how to implement them.

Table 2: Problem-based learning tutorial process (Maastricht Medical School) (Wood, 2003)

First session	
Step 1	Identify and clarify unfamiliar terms presented in the scenario; scribe lists those that remain unexplained after discussion
Step 2	Define the problem or problems to be discussed; students may have different views on the issues, but all should be considered; scribe records a list of agreed problems
Step 3	“Brainstorming” session to discuss the problem(s), suggesting possible explanations on basis of prior knowledge; students draw on each other’s knowledge and identify areas of incomplete knowledge; scribe records all discussion.
Step 4	Review steps 2 and 3 and arrange explanations into tentative solutions; scribe organizes the explanations and restructures if necessary.
Step 5	Formulate learning objectives; group reaches consensus on the learning objectives; tutor ensures learning objectives are focused, achievable, comprehensive, and appropriate
Self-directed learning period (between the two sessions)	
Step 6	Private Study (all students gather information related to each learning objective)
Second session	
Step 7	Group shares results of private (independent) study (students identify their learning resources and share their results); tutor checks learning and may assess the group.

Typically, there are two sessions each week, with 5-10 participants per PBL tutorial and one tutor facilitating the sessions (Barrows, 1996; Sefton, 2005; Wood, 2003). At Qassim School, however, there are three weekly sessions in the first year (1st three blocks), as students are novices to the system, and two weekly PBL tutorials conducted for the rest of the courses. The duration of each session is two hours. In each group, there are 10-13 students who participate in the PBL tutorial; the typical group size is due to space and staff limitations.

At the first session (each week), students elect a group leader to lead the discussion and a scribe to record what has been discussed (Wood, 2003). A written scenario is used as a trigger/stimulator for students’ learning.

At Qassim Medical School, PBL is defined as:

- An approach in which students learn collaboratively in small groups (Dolmans and Schmidt, 2006).
- A small group teaching method that should be mastered by the teacher along with other teaching methods in addition to lectures and students' seminars (Davis and Harden, 1999).
- A learning approach that involves acquisition of knowledge and development of generic skills, e.g., problem-solving skills, teamwork, independent learning and so forth (Wood, 2003; Wood, 2008).

Table 3 is a practical example of a problem given to students during the orientation of conventional (only face to face) PBL at Qassim Medical School:

Table 3: An example of a PBL scenario, including steps that students follow

Samia is a 14-year-old girl who came to her general practitioner. She looks disturbed and complains that acquaintances call her "fat chick." She loves to eat fast food and has not been able to reduce her weight on her own.	
Seven steps that students should follow	
1	Students begin reading the scenario and try to understand it. Students attempt to clarify the meaning of any new word (e.g. GP).
2	They define the problem/s in the scenario. In this scenario, the primary problem could be that Samia's associates are calling her "fat chick" or that she loves to eat fast food.
3	After identification of the problem/s, the students continue to the brainstorming step where students suggest possible explanations for the problem/s. In this step, students use their prior knowledge to reach conclusions and possible solutions. Meanwhile, they identify what additional new information is required to understand the problem/s comprehensively. The new information they require is known as a

	knowledge gap. In this scenario, the students are expected to explain the relationship between eating fast food and being overweight. In addition, they explore why her companions are calling her "fat chick."
4	Students review step 2 and 3 until they understand the problem/s and reach possible solutions to problem.
5	<p>After group members agree on what information they require in order to reach a consensus of the problem/s, the group begins formulating learning issues/objectives. The learning issues are the required knowledge they have identified to understand the problem/s and its solutions in step 3. In the above example, the learning issues are:</p> <ul style="list-style-type: none"> • Definition of obesity, over and under-weight • Causes of obesity • Principles of obesity management • Psycho-social implications of obesity
6	The sixth step is the self-directed learning period (Privet study) where students study individually. During this period, each student gathers information related to every learning objective. In this step there is generally no communication among students, or between students and tutors.
7	In final step, groups meet at the end of the week (second session) to discuss and share the conclusions they found during the Privet study.

1.4. Evaluation of Qassim Medical School Experience

Three articles have been published evaluating the QMS experience (Al Robaee et al., 2009; Shamsan and Syed, 2009; Hamad et al., 2004). The studies reported perceptions of 47 staff in mixed methods study (Hamad et al., 2004); 296 students, with an 86% response rate (Al Robaee et al., 2009); and 384 students, with an 89.84% response rate in Shamsan and Syed's study (2009).

In 2004, Hamad et al. evaluated staff perception from different perspectives in mixed methods study. The researchers reported the PBL students have more clinical skills and more advanced communication skills compared to students following a conventional curriculum. In 2009, two studies were published. In both studies, the curriculum was evaluated by administering a questionnaire to students in different years of the curriculum. More than half of Qassim students agreed that PBL had improved their analytical skills and had increased their confidence in problem solving. The students also found PBL had been an effective stimulus and motivator for their learning, and that it had helped them to use information effectively. They found PBL increased interpersonal relationships, both student-student and student-tutor, which is supported by Finucane et al.(1998).

On the other hand, students had difficulty covering all the learning issues of a problem in one week; they complained of curriculum overload and lack of feedback during the self-directed learning period, and student-student and student-tutor contact ends at the end of the PBL session (Al Robaee et al., 2009; Shamsan and Syed, 2009). Similarly, Haghparast et al. (2007) found a perceived disadvantage of PBL was uncertainty about the information studied, especially regarding what is appropriate to study and to what depth. Qassim staff, similarly, criticised that in PBL, students may feel lost and confused as to what to study (Hamad et al., 2004). Wood (2003 p 330) also argues that “students may be unsure how much self-directed study to do and what information is relevant and useful”.

Shamsan and Syed (2009) report that students indicated that PBL tutorial groups lack motivation. The PBL process tends to become ritualized, with students skipping the stage of elaboration of prior knowledge. Students shirk their responsibility to take an active part in the discussion out of lack of interest, laziness and uncertainty. The main reason for these students' attitudes is the lack of effective facilitation.

By definition, PBL is small group (SG) teaching; and it is, conventionally, implemented in a face to face (F2F) approach. Therefore, the disadvantages of SG and F2F can be considered as the disadvantages of PBL.

Time constraints limit and may affect F2F teaching and learning quality (Adesope et al., 2008). Teachers/tutors may not have enough time to respond to all students' questions in a session (Adesope et al., 2008; Sharpe, 2011). Similarly, in the PBL session, the time allotted might not be enough to discuss the entire problem. Meanwhile, not all students can respond immediately in F2F discussion; some students need time to digest the idea and reflect on it (Meyer, 2003; Malik, 2009).

Ellis (2001), criticizes the F2F approach, highlighting the risk that the students' discussion is directed by the teacher/tutor, because they perceive the teacher as being in control, which affects the collaborative learning. This might be noticeable as the tutor/facilitator is also an assessor in some PBL schools. At Qassim Medical School, for instance, the tutors assess students during the PBL sessions, which might direct students' discussion subconsciously because they might try to be very vocal and proactive to gain higher marks.

Some students are too shy to directly interact with either students or tutors in front of others, which impedes the learning process (DeVries and Lim, 2003; Gould, 2003b). These students avoid the interaction that could enhance the quality of their learning experience. Culture could be a reason; Khoo (2003b) for instance, claims that Asian students have more difficulties in coping with the PBL approach, particularly, as their culture encourages them not to be outspoken in front of any authoritative person (e.g. PBL tutor). They would, therefore, tend to feel uncomfortable with debating issues within their tutorial groups. Those limitations in small group teaching probably affect collaborative learning, which is an essential characteristic of PBL (Dolmans and Schmidt, 2006).

In F2F and/or SG (PBL) teaching, it is not easy for students to listen and comprehend a teacher or a group member who speaks too quickly, particularly if the lesson is not in the student's first language, thus the subject matter is missed. The students would also not be able to review the content discussed again (Adesope et al., 2008; Ellis, 2001)

Finally, Qassim students indicate that the teaching/learning resources, including audio-visual and reference books, need further improvement as there was no designated library for the medical school at the time of the study (Shamsan and Syed, 2009). In one way or another, the abovementioned PBL drawbacks (from the literature or in Qassim School) would appear to affect the educational impact of PBL on students.

1.5. Rationale for integration of facilitated asynchronous online discussion forums between PBL sessions

The discussion forum (DF), also known as a discussion board, is a bulletin discussion or forum. It “allows learners and tutors to engage in an extended, structured dialogue on topics of relevance to their course of study” (Mason and Rennie, 2006 p 39). It is an asynchronous communication tool, in which someone posts a message and others read and post replies at a later time, resulting in building up discussion threads over time (Ellaway and Masters, 2008). A discussion thread is “a series of messages on a particular topic posted in a discussion forum” (Mason and Rennie, 2006 p 112). Discussion boards can be open only to a group of students, or open to everyone on the course (Ellaway and Masters, 2008).

Making use of online DFs may overcome F2F PBL limitations. Primarily adopting the online DFs may induce shy/quieter students to participate, and would give students a potentially equal opportunity to contribute (Ellis, 2001; Blankson and Kyei-Blankson, 2008; DeVries and Lim, 2003). Subsequently, equality within the discussion is enhanced, and regardless of the students’ personalities, they will have the same opportunity for participation. Therefore, the combination of both approaches might lead to effective collaborative learning (Ronteltap and Eurelings, 2002).

In DFs, student-student and tutor-student interaction are enhanced and contact time increases (Pereira et al., 2007; Dzakiria et al., 2006; Adesope et al., 2008; Klimova, 2011). This overcomes the time constraints, and thus students’ queries can be clarified before the last PBL session (Adesope et al., 2008; Sharpe, 2011). Meanwhile, students receive continuous feedback

between the sessions, from both other PBL group members and their tutors (Alamro, 2010).

Since the use of the discussion board is self-paced, students can take time to think before posting. Althaus (1997), finds that students who are involved in online discussions create responses that are more thoughtful, because they have more time to read and think about their responses (Blankson and Kyei-Blankson, 2008; Gould, 2003b). Similarly, it allows teachers to reflect on a question and develop a better and more detailed response (Meyer, 2003).

Implementation of online discussions, Gould (2003b) says, “will allow institutions to maximize their available resources to meet the educational and institutional needs of their students.” Alamro (2010) found students’ posts and their perceptions show that they found the integration helps with finding and sharing resources, which transcends some students’ problems: the fact that the library closes very early, for instance. This also agrees with Dziuban et al.’s (2004) findings, which showed that students constantly report that they find value in the outside resources that become available in blended learning, and that this helps with overcoming the limitations in students’ and tutors’ interactions. Integration of DF would make students learn most effectively when using a variety of information resources (Musal et al., 2004; De Leng et al., 2006).

Ellis (2001) claims that content permanency is one of the key benefits of the online model, allowing students to access content repeatedly and at any time and read at their own speed (Adesope et al., 2008). This addresses the issue that some students might miss the subject matter.

Alamro (2010) argues that, if the discussion forum is visible to the PBL tutors, it helps in standardizing the facilitation of the weekly PBL and helps provide a supportive environment for tutors. Thus, the differences among tutors might make less of a difference. Presumably, it could also alert the tutors to any group difficulties or misunderstandings.

1.6. Challenges of using online Discussion Forums

There are some drawbacks that might contradict the above-mentioned statements. It is important for online discussions' developers and users to bear in mind that online DFs may have the same issues as other online facilities, such as wikis and emails.

Some students, for instance, complained that in addition to the F2F commitment, online participation takes time, as the student needs to read others' postings, think about a response, then check back later to see others' participation in the discussion (Meyer, 2003; Klimova, 2011). Similar complaints have been voiced by teachers, who say creation, preparation and support regarding DFs is time-consuming and demanding (McKimm et al., 2003; Klimova, 2011).

Not all e-learning users are experts in technology, so when a technical problem occurs, some users struggle (Meyer, 2003; Klimova, 2011). For PBL facilitators, two challenges might be faced in their transition from face-to-face to online tutoring: the technical aspects associated with the medium and the skills needed to facilitate in a different environment (Lockyer et al., 2006).

Other educationalists (Alamro, 2010; Lopez et al., 2011; McKimm et al., 2003; Radu et al., 2011) list several disadvantages of using online learning in general and online DFs in particular. For instance, students with poor study habits and those who are unmotivated may fall behind. Instructors may not always be available online, which might affect students' contributions. Slow and/or unreliable Internet connections can be frustrating, too. The use of technology can cost institutions a lot of money, as they need of high-speed internet connections and technical support.

1.7. Research Question

My research question emerged from the desire to investigate several different issues in more depth. Firstly, it has emerged through the research challenges that have been created due to the limitations of PBL at QMS. Secondly, the literature has shown that integration of online discussion

forums can overcome some of the conventional PBL drawbacks. Thirdly, I conducted a pilot study at QMS with the hypothesis: 'Blended problem-based learning improves the educational benefits at QMS compared to conventional problem-based learning.' Finally, there is a lack of literature about the integration of DF with PBL, and this lack impacts evaluation of this integration.

The pilot study was conducted with 130 students and 14 PBL tutors. I had attempted to blend the facilitated online discussion with PBL in a 5-week course/block. During the study, all students received the same treatment (online discussion forums). Perception and satisfaction were the only measured outcomes of the study. A questionnaire was the instrument used for data collection. The study was a single method study, with only quantitative data collected.

Several findings have emerged from the study. I have found that students and tutors liked the blended format, and they would like to have the same experience in other blocks. The idea of blending the two teaching and learning methods was viewed by those participating as something that:

- Increased the contact time between students and their tutors and among students.
- Helped students to get feedback on their self-study during the self-directed learning period.
- Helped students to achieve the learning objectives more than applying the traditional approach alone did.
- Enhanced teamwork and collaborative learning skills.
- Increased the learning resources availability.

There are few existing studies in the literature of medical education focusing on integrating online discussion forums with PBL, and there is no study evaluating the integration in terms of the impact on students' learning. The two studies have been conducted by Ronteltap and Eurelings, and De Leng et al. (2002; 2006). Both studies were conducted in the Netherlands, which differs from the Saudi Arabian context. De Leng and colleagues' (2006)

study aims to understand whether use of VLE (multimedia and DF) supports student-student and student-teacher interactions. The authors implement multimedia in addition to DF, which might affect students' perceptions. The study also does not show the structure of the online facilitation. In the same study, the authors have suggested further in-depth research on the integration of online discussion forums with PBL. Ronteltap and Eurelings' (2002) study aims to investigate the type of learning issues generated in an online discussion. It was a small study (9 students). In both studies, learning impact was not evaluated and different VLEs were applied, both Blackboard and POLARIS (problem-oriented learning and retrieval information system), which might be different from MOODLE. Additionally, in both of these studies, the aims are not similar to what is intended in this research, which is to understand the impact of DFs on learning.

In this research project I intend to study the impact of DFs on learning, and also to analyse the students' participation using mixed methods (quantitative and qualitative) to be more objective and to gain more in-depth insight.

The above-mentioned reasons explain the background and rationale behind the emergence of the following research question:

Does use of an inter-sessional facilitated online discussion forum between PBL sessions improve student learning?

To help find an answer, I devised the following questions:

Q1- What is the impact of using an inter-sessional facilitated online discussion forum between PBL sessions on students' knowledge construction?

In order to develop more understanding of this complex intervention, the following questions are considered:

Q2- What are participants' perceptions of training for an inter-sessional facilitated online discussion forum in PBL?

Q3- How do participants perceive the interaction/collaboration in the inter-sessional facilitated online discussion forum in PBL?

Q4- How do participants perceive the feasibility, accessibility and technical support of the inter-sessional facilitated online discussion forum in PBL model?

Q5- What are participants' perceptions of the learning process in the integrated inter-sessional facilitated online discussion forum in PBL?

Q6- What is participants' level of satisfaction with the integration of an inter-sessional facilitated online discussion forum within PBL?

Q7- What are the advantages and disadvantages of integration of inter-sessional facilitated online discussion forum in PBL?

1.8. Thesis outlines

The thesis will be structured in five chapters. A specific focus is given to literature review in the second chapter. Also in the second chapter, I will outline in detail the research strategy that has been adopted to make sure that all similar studies have been found. In Chapter 3, I will explain my theoretical framework and explore the central theory of the study, and perspectives that might influence the sustainability of the interactivity are discussed. In the same chapter, I will also explain the conceptual model adopted to develop the online model. Chapter Four is about the methodology and methods used, and is structured based on the six steps drawn from the case study design. They are:

1. Determine and define the research question and sub-questions.
2. Select the case or cases, and determine the data gathering and analysis techniques.
3. Prepare to collect the data.
4. Collect data in the field.
5. Evaluate and analyse the data.

6. Prepare the report.

The fifth chapter reveals the data related to the research questions that have been obtained from the research instruments. Chapter Six provides discussion, which includes a synthesis of what was analysed in Chapter Five and explains the meaning of the data analysed. That is followed by a conclusion and recommendations for further research.

Chapter2: Literature review

In the previous chapter, the rationale of the study was explained, including the research problem and the reasons for the integration, which lead to the research questions that need to be addressed. The chapter concluded by outlining the thesis.

In the following paragraphs, I have attempted to show that no previous study has been identified on the same topic: the learning impact of a facilitated inter-sessional online discussion on problem-based learning. Consequently, this literature review indicates that this study would add knowledge to the literature of medical education.

Search of the literature is based on the P.I.C.O. strategy, which has been adopted to analyse the research question

2.1. Search terms

The literature review has commenced by selecting the terms to be used for the search. Before this step, the main dimensions of the study have been determined by analysing the research question, followed by finding the synonyms and other terms, retrieved from the literature, that might refer to the main topic of the paper.

Here, the P, (Patient, Problem, Population); I, (Intervention); C, (Control, Comparison); O, (Outcome) P.I.C.O. strategy has been adopted to analyze the research question, resulting in a list of terms closely related to the main topic. It represents an acronym: for P, (Patient, Problem, Population); I, (Intervention); C, (Control, Comparison); O, (Outcome) (Santos et al., 2007; Leeds University, 2011). These four components are the essential dimensions of the research question in evidence-based practice and of the construction of the research terms for the bibliographic search for evidence (Santos et al., 2007).

Analyzing the research question using PICO shows that the main four elements of the study are: P: undergraduate medical education; I: inter-sessional facilitated online discussion within problem-based learning; C: no

control group; O: learning impact (Table 1). Based on how researchers refer to these elements in the literature, synonyms have been selected.

P: (Patient, Problem, Population)	I: Intervention	C: Comparison	O: Outcome
Undergraduate medical education Including: Medical students, Dental students, Nursing students, Allied medical students	inter-sessional facilitated online discussion with problem based learning Including: online-tutor e-tutor <i>-Inter-sessional, between sessions</i> <i>-Facilitated, tutored</i> <i>-Online discussion, Discussion forum, Bulletin board, Online learning, Computer mediated discussion, Internet forum, Message board</i> <i>-Problem-based learning, problem-based, PBL</i>	N/A	Learning impact Including: Achievement, Knowledge construction

Table 4: The main research elements and thier synonyms, using PICO strategy

Since the aim of the literature review is to prove that this exact method has not been applied before, “sensitivity” in the search is more crucial compared to “specificity”. Haig and Dozier (2003a; 2003b) writes that sensitivity (or recall) “measures what percentage of the total number of known citations on a topic was actually retrieved by the electronic search”, and the more sensitive the search, the higher the possible proportion of relevant database records retrieved. In contrast, they define specificity (or precision) as “measure[ing] what percentage of the search results was actually relevant to the query”; thus, the more specific the search, is the stricter results will match

the query, which may cause the researcher to miss some relevant information.

To conduct a sensitive search, the researcher limited the search to the two essential concepts of the study that should be involved in the review: problem-based learning and online discussion. Consequently, the research result is expected to retrieve all publications that have problem based-learning (and/or its synonyms) and online discussion (and/or its synonyms) in their text.

2.2. Data sources and time limit

All data sources were searched to cover publications from 1980 until the end of July 2014 (current at the time of the review). The time limit has been determined according to Littlejohn and Pegler (2007 p 11), who claim in their book, *Preparing for Blended e-Learning*, that “many of the constituent parts of e-learning, in particular, the move towards students using computers for self-directed study, have been evident in education (particularly in higher and further education) since the early 1980s”. Bates also (2005 p 127) claims that “the first teaching using asynchronous communication technology started in the early 1980s”.

Haig and Dozier (2003a) define a database as “a structured electronic information file, maintained to facilitate the retrieval of information”. In this literature review, fifteen databases have been selected for the search, including bibliographic databases, grey literature, and PhD thesis.

2.3. Bibliographic databases

A bibliographic database (also called white literature) is a database “containing bibliographic information about publications, such as title, author and so on, but not usually the full text of publications”(Haig and Dozier, 2003a; Howard et al., 2011). Out of the fifteen databases, eight are bibliographic databases that are general or subject-specific databases. Eight different databases were used to make sure that the topic has been searched precisely and no result has been missed.

The databases are:

1. Medline,
2. ISI Web of Knowledge,
3. Embase classic and Embase,
4. The Cumulative Index to Nursing and Allied Health Literature (CINAHL),
5. PsycINFO,
6. Communication Abstracts, Applied Social Sciences Index and Abstracts (ASSIA),
7. The Education Resource Information Centre (ERIC) and
8. British Educational Index (BREI).

A search in a bibliographic database often includes keywords and subject headings (appendix 2). Subject headings in the Medline database are known as “MeSH”, while they might have different names in different bibliographic databases, such as controlled thesaurus, descriptors, and controlled vocabulary. It is “a list of standard subject terms from which indexers select subject headings to describe the content of articles or other publications in a consistent manner” (Haig and Dozier, 2003a, p 361). All nine bibliographic databases are indexed except the Communication Abstracts database. Last but not least, non-English articles were considered as long as English abstracts were available.

2.4. Grey literature

Grey literature is that “produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers” (Haig and Dozier, 2003a, p 356, cited (4th International Conference on Grey Literature, 1997)). McAuley et al. (2000) add that it is “unpublished studies, with limited distribution”. In this review, Google, both general search and scholar, has been chosen as the grey literature database (Howard et al., 2011; Lister Hill Library, 2014).

Since the results on Google are arranged according to their relevance to the search terms, the first 200 results have been considered, and the search timeframe was limited to between 1980 and 2014.

2.5. Ph.D. Thesis

PhD theses databases include United Kingdom universities' theses and theses from international institutions. For UK universities, these include Index to thesis and ETHos (Electronic Thesis Online Service), and services for theses from international institutions include: Australian Digital Thesis (ADT), DART-Europe E-theses, and Networked Digital Library of Theses and Dissertations (NDLTD).

2.6. Additional process to enhance comprehensiveness

Distinguished medical education conferences' abstracts have been searched individually, as long as the abstracts are available online. For example, Association for Medical Education in Europe (AMEE) abstracts from 2001 to 2014 have been searched (Association for Medical Education in Europe, 2014) .

Authors/experts in the field of PBL and online learning have been involved in the search, too. An email, for instance, has been sent to Professor Maggi Savin-Baden. She is the author of the books *Problem Based Learning Online* and *A Practical Guide to Problem-Based Learning Online* (Savin-Baden, 2008; Savin-Baden and Wilkie, 2006)

Finally, an additional suggested method was to search by the names of researchers who have had considerably published works involved the two fields: PBL and online learning. I have searched for publications by scholars such as Lyn Brodie, Roisin Donnelly and Tsang-Hsiung Lee, who have published at least three publications that include both fields. The search used Google, bibliographic databases and/or authors' personal webpages.

2.7. Results

Searching in the bibliographic databases leads to more than 2000 results. Some of the results have been discarded due to duplication using a reference manager (Endnote). After reading through the abstracts, most of the results were discarded because they were off topic. Two results/publications have the same concept, which has been discussed in the previous chapter (Ronteltap and Eurelings, 2002; De Leng et al., 2006)

Google and PhD thesis (in UK and international) database results have shown that no similar work with a similar methodology has been conducted before. Searching theses from international institutions search has shown more results; however, they are duplicated and off-topic. Experts have revealed that they are not aware of any similar publications

2.8. Limitation

The researcher has encountered different issues during the search. Using different database providers are a main issue, in which each database provider has its own setup requirements for performing a search.

Some databases produced many results that were off-topic or duplicated in the same search. Issues with technology are sometimes not expected, for instance, technical issues with the reference manager (Endnote), especially during importing the references from the databases. Often, Endnote fails to import a reference with no explicit reason given. The aforementioned issues cost the researcher time and effort.

2.8.1. Summary

In this chapter, I shed light on the search strategy that I have implemented to reach studies related to my research. In this study, P.I.C.O. strategy has been adopted to analyse the research question. A search was implemented in several bibliographic and grey literature databases, in addition to searching PhD theses and asking experts in the field. The search time limit is from 1980 to 2014, and two very relevant studies were picked up..

Chapter3: Theoretical framework

In previous chapter, I explained the search strategy that I have adopted to make sure that all related studies have been discovered and discussed. I illustrated how collaborative learning takes place in PBL and the use of asynchronous online discussion. Finally, I illustrated how the integration of the two might be expected to advance (effect) the concept of collaboration.

The main question of the study is 'What is the impact of inter-sessional facilitated online discussion forum between PBL sessions on students' knowledge construction?' This chapter reviews the central framework of this study and the conceptual model used. I will review how an asynchronous discussion forum helps students construct their personal knowledge (social constructivism), then light will be shed on perspectives that might affect the sustainability of the interaction (the intervention).

3.1. Knowledge construction in the discussion forums

The importance of the discussion forum in online learning is rooted in the social constructivism learning theory and is the central framework of this study. Constructivism can be divided into two parts: cognitive constructivism, developed by Piaget (1952), and social constructivism, by Vygotsky (1978). Constructivists' view of learning is based on the belief that knowledge is not a thing that can be simply given by the teacher to fill students' minds. Rather, knowledge is constructed by learners through an active, mental process of development in which learners build and create meaning and knowledge (Gray, 1997). In short, constructivism emphasizes the idea that knowledge is actively constructed rather than passively received.

Piaget (1952), in cognitive constructivism, asserts that learning does not occur passively, but takes place through an active construction of meaning. He declares that knowledge is built as blocks (schema). He contends that when learners encounter an experience or a situation that conflicts with their current way of thinking, a disequilibrium (imbalanced) state is created. To restore equilibrium, learners first modify their thinking or balance, then make

sense of the new information by associating it with what they already know and assimilate it into the existing knowledge (Figure 1).

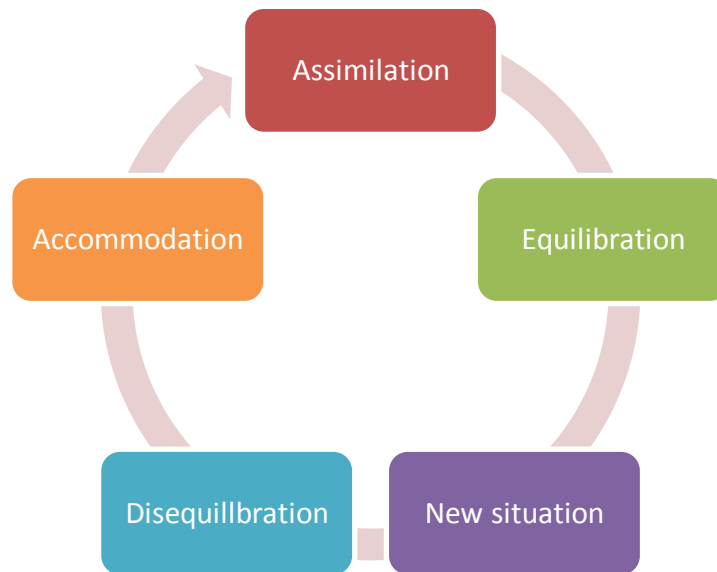


Figure 1: cognitive/mental process of knowledge construction according to Piaget (1952)

3.1.1. Social Constructivism

Vygotsky's (1978) main concept was that learning is mediated through interaction. Thus, he focused on the connections between people and the cultural context in which they interact in collective experiences (Crawford, 1996). Vygotsky's view was that humans use tools, such as verbal and text-based interaction, that develop from a culture to mediate their social environments (Riddle and Dabbagh, 1999).

Vygotsky (1978) agreed with Piaget's cognitive constructivism to a certain extent (Hall, 2011). However, Vygotsky did not accept that learning is specific, happening through invariant stages and that learning/development depends only on individual equilibration (Driscoll, 2005). Cognitive constructivism emphasizes the individual cognitive structuring process, whereas social constructivism concerns the socio-cultural effects of the environment on the cognitive structuring process (Fosnot, 1996).

Vygotsky considered learning as having two types: spontaneous or scientific (Fosnot, 1996). Spontaneous concepts are relevant to Piaget's view (1952) that learning could take place through interaction with the environment leading to equilibration, for example, learning a language (Hall, 2011).

Scientific concepts, under Vygotsky's view, are generated by formal structured activity (e.g., classroom instruction), which convey well-defined abstractions (Fosnot, 1996). With regards to my study, in discussion forums, students are expected to learn through both concepts. For instance, they might learn English writing, computer and teamwork skills spontaneously because they are immersed in the discussion forum's culture (Gould, 2003b; Leasure et al., 2000). Learners use discussion forums as a tool applied through computers using English text-based discussion in a collaborative environment. On the other hand, they formally learn through construction and co-construction of knowledge related to the weekly PBL.

Vygotsky regarded the construction of meaning as a two part, reciprocal process. First, meanings are enacted socially (inter-psychological), which is the part he added to Piaget's cognitive constructivism theory (red boxes in Figure 2). The second part is individually internalized conceptualizations (intra-psychological), which is Piaget's cognitive constructivism (middle black box in Figure 2) (Swan, 2005). In short, knowledge construction is a cycle starting through social interaction (Vygotsky added to Piaget) and processed individually (Piaget) and then again interacted with socially (Vygotsky) (Figure 2).

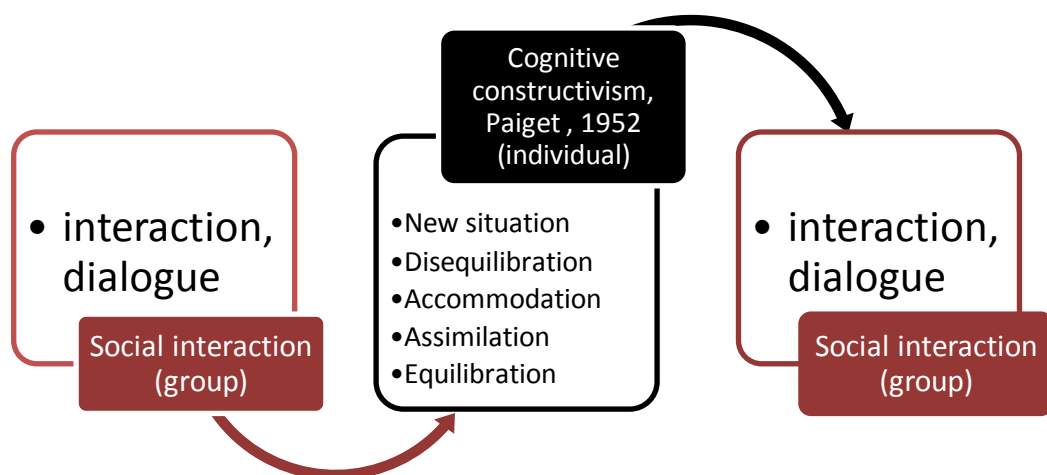


Figure 2: Social Constructivism cycle: Vygotsky's social interaction (red) + Piaget's individual cognitive constructive theory (black)(Swan, 2005)

This theoretical framework of learning has been used to help me examine how students learn in this study. The learning on the discussion forum starts with posting a question or sharing information about a learning issue. If it is new to the students, it leads to disequilibrium (Piaget). Then, during collective discussion, (Vygotsky's social interaction) accommodation will be achieved. According to Vygotsky (1978), this process of social construction of learning takes place in the Zone of Proximal Development (ZPD; see below). Hence, in terms of my study, advocates of either cognitive or social constructivism would both acknowledge the role of the discussion forum in the construction of knowledge.

3.1.1.1. Zone of Proximal Development (ZPD)

Vygotsky (1978) argued that scientific concepts, formal instruction, and cognitive change occur in the Zone of Proximal Development (ZPD). ZPD is the area in which the expert teaches a novice (Crawford, 1996; Anderson, 2008). Vygotsky defines ZPD as: "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p86). The Zone of Proximal Development bridges the gap between what is known and what can be known (Riddle and Dabbagh, 1999). Vygotsky claimed that learning will not occur without guidance in the ZPD.

With regards to my study, Figure 3 shows a diagram of the ZPD that reveals how knowledge is thought to be constructed in the online discussion. The red circle represents a new concept or a learning issue, which is posted as a question (or in any form) in the discussion forum and needs to be understood or covered. The yellow circle represents the concept or learning issue after it has been learned or covered.

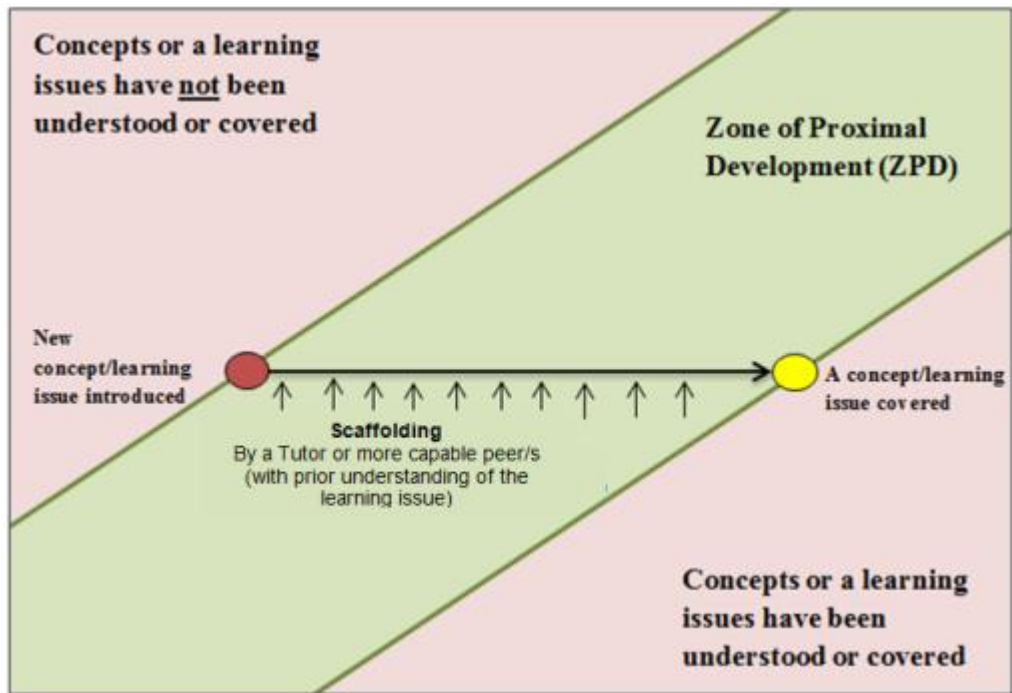


Figure 3: The Zone of Proximal Development

For a learner to move from the red circle (low level) to the yellow one (high level), support is required from tutors and more capable peers in collaboration (Vygotsky, 1978). This process of guidance is known as scaffolding.

3.1.1.2. Scaffolding

Vygotsky (1978) argued that well defined abstractions (scientific concepts) do not come to the learner in a ready-made form. The students require effective teaching and instructional support strategies to access the ZPD through scaffolding (Fosnot, 1996; Riddle and Dabbagh, 1999; Anderson, 2008; Schellens and Valcke, 2006). According to Sawyer (2008, p54) scaffolding is defined as “the help given to a learner that is tailored to that learner’s needs in achieving his or her goals of the moment. The best scaffolding provides this help in a way that contributes to learning.”

In the discussion forums, online instruction is not similar to classroom-based teaching; it is facilitation, rather than content delivery (Anderson, 2008; Romiszowski and Mason, 2008). In my study, the role of the tutor in the discussion forum is to facilitate, which is similar to his/her role in the face-to-face PBL and considered as building continuity with the face-to-face first session (Alamro and Schofield, 2012).

3.2. Evaluation of knowledge co-construction in discussion forums

Reports of statistical metrics from online discussion forums, such as number of posts, are important and have interesting indications. Nevertheless, they do not show how the participants interact, and do not shed light on the process of knowledge construction, and if and how it takes place. The literature reveals the importance of evaluation of the online discussion from different perspectives in addition to simple statistics. The quality of the discussion is considered a powerful tool to understand online learning (Gunawardena et al., 1997).

Spatariu and his colleagues (2004p. 398) reviewed the literature on the methodological approaches utilized in the analysis of online discussions. In the studies they reviewed, the evaluation was classified according to the construct(s) that are supposedly being measured. Four general categories are commonly seen: (a) levels of disagreement, (b) argument structure analysis, (c) levels of interaction, and (d) content analysis. The last is the methodology applied in this study, because the study focuses on knowledge construction, and so content analysis provides important insights. The assumption behind content analysis is that analysis of language in use can reveal meanings, understandings, and ways of seeing the world (Wilkinson and Birmingham, 2003).

The Interaction Analysis Model (IAM) developed by Gunawardena et al. (1997) is one of the most commonly used content analysis models (Stephen Corich, 2004). IAM provided an appropriate model for evaluating students' knowledge construction in this study. This decision was based on two important aspects. Firstly, the theoretical assumptions of this model are based on the social constructivist approach I have adopted as my theoretical framework. Secondly, the model provides a reliable framework for identifying the interactive learning and knowledge construction processes (more details of reliability and validity in the methodology chapter) (Zheng and Spires, 2012).

3.2.1. Development of IAM

In 1995, Gunawardena and her colleagues (1997) developed an asynchronous online discussion forum for a week. The main goal of the discussion forum was to demonstrate and develop effective learning activities that support quality virtual conferences. The first question which arose after the conference was “how to assess the quality of the interaction and the quality of the learning experience in a computer-mediated conferencing environment” (p.398).

Primarily, Gunawardena et al. (1997) reviewed existing literature to adopt an appropriate analysis model. The researchers considered the evaluation models reviewed by Mason (1992), in which Mason notes that most research ends with quantitative analyses based on number of messages sent, numbers of replies, and by whom, or on frequency of logons. Gunawardena and colleagues also noted that many studies used surveys, interviews, and statistical measurements to evaluate online discussion, but these do not consider the quality of learning taking place. These researchers also reviewed a number of models evaluating the quality of an online discussion. They reviewed Hiltz’s work (1990) (cited in Gunawardena et al., 1997), which describes analysis of computer conferences along four dimensions: characteristics inherent to the technology; social and psychological characteristics of users; characteristics of groups adopting the technology; and interaction of the preceding factors. The researchers also examined Levin, Kim, and Riel’s work (1990) (cited in Gunawardena et al., 1997), which analyses the structure and content of interactions by the formation of "message maps" that show the interrelationships among the messages submitted to an online discussion in diagrams. In addition, they reviewed Henri’s model (1992), which evaluated online discussion content related to four broad categories; the social and interactive dimensions and cognitive and metacognitive skills. Gunawardena et al. (1997) also considered the work of Newman, Webb, and Cochrane (1995), who applied Henri’s and Garrison’s models (1992) to develop a content analysis module to evaluate critical thinking in face-to-face and computer-supported group learning. Newman and colleagues suggested that the five stages of Garrison’s critical thinking relate to the cognitive skills dimension of Henri’s model.

Gunawardena et al. (1997), after evaluation of the above mentioned models, concluded that “they are not very specific on how to evaluate the process of knowledge construction that occurs through social negotiation in computer mediated-communication” (P. 402). They criticised that the studies were based on teacher-centred instructional paradigms. During coding, Gunawardena et al. found it difficult to distinguish between the cognitive and the metacognitive dimensions. Finally, In a further study Gunawardena et al (2000) found that the studies focused on the mechanistic relationship between the responses rather than the learning experience as a whole (Gunawardena et al., 2000).

After identifying the shortcomings of the existing interaction analysis models, Gunawardena et al. (1997) applied a grounded theory approach to develop their own model, the IAM. The researchers analysed the entire transcript (of one week of online debate) for four elements: 1) the type of cognitive activity performed (questioning, clarifying, negotiating, synthesizing, etc.), 2) the types of arguments advanced, 3) the resources used in negotiating new meanings, such as reports of personal experience and literature citations, and 4) evidence of changes of personal constructions of knowledge as a result of interactions. Based upon these elements, the researchers outlined the process of negotiation which appears to take place in the co-construction of knowledge. This process comprises five phases: 1) sharing/comparing, 2) dissonance, 3) negotiation/co-construction, 4) testing tentative constructions and 5) statement/application of newly constructed knowledge. Each phase encompasses three, four, or five indicators (operations). Gunawardena et al. theorize that the active construction of knowledge moves through these phases; however, not every instance of socially constructed knowledge progresses linearly through each consecutive phase (Kanuka and Anderson, 2007). Table (1) shows the description of each phase, retrieved from Kanuka and Anderson (2007) ; the whole model, including the indicators/operations, is included at the end of the document.

Table 5: Phase of IAM retrieved from (Kanuka and Anderson, 2007)

Phase	Explanation
Phase I: Sharing/comparing of information	In everyday transactions, this might take the form of ordinary observations, statements of problems, or questions.
Phase II: Discovery/exploration of dissonance/inconsistency among the ideas	This is defined as an inconsistency between a new observation and the learner's existing framework of knowledge and thinking skills.
Phase III: Negotiation of meaning and/or co-construction of knowledge.	This phase includes negotiation or clarification of the meaning of terms, identification of areas of agreement, and proposal of a compromise or co-construction.
Phase IV: Testing tentative constructions.	Events that occur in this phase include testing against an existing cognitive schema, personal experience, formal data experimentation or contradictory information from the literature
Phase V: Agreement statement(s)/ applications of newly constructed meaning	This phase encompasses summarizing agreement(s) and metacognitive statements that illustrate new knowledge construction and application

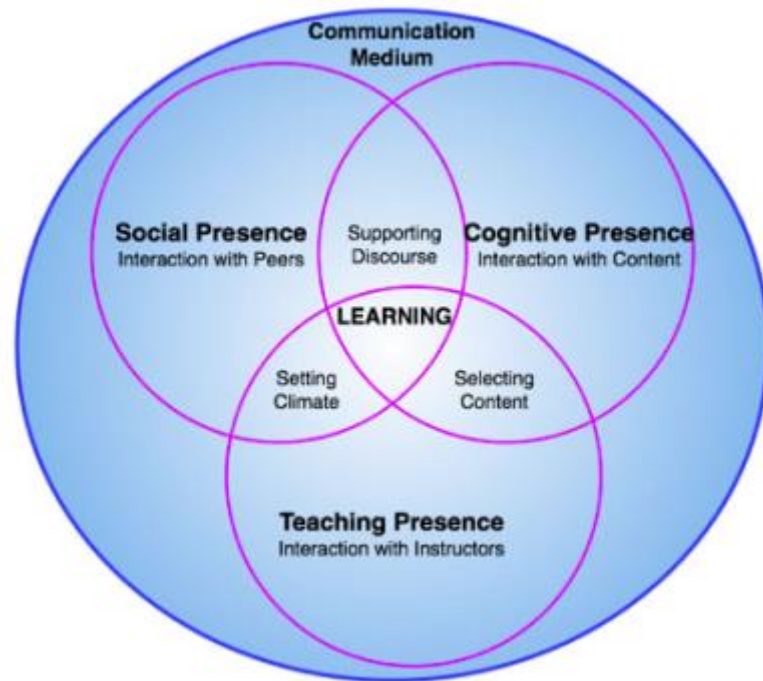
In summary, social constructivism is used as the framework for this study. According to this theory, the learning process occurs both individually and collaboratively, mediated by group interaction/discussion. Group co-construction of knowledge is evaluated through content analysis of the students' online interaction (posts) by using IAM, which was developed based on social constructivist theory. Individual learning (construction of knowledge) is investigated by looking at the students' marks, which is not used in this study because of validity and reliability issues that will be explained later. Another aspect of the theory is the types of learning concepts, spontaneous and scientific: the spontaneous is explored through participants' perceptions, while scientific learning will be investigated through objective evaluation of the discussion forums. After an understanding of the theoretical framework for the study is reached, and particularly of how this framework supports the online discussion forums as the focus of the study, attention can be turned toward factors that could affect the sustainability of the interaction/educational experience.

3.3. Sustainability of educational experience in the online discussion

The aforementioned sections show that social constructivism is based on the assumption that learning is mediated by social interaction. In an online discussion, a communication/interaction medium is required for the educational experience to occur. The medium helps maintain the learning to take place and sustain, and is based on the interactivity of online learning elements, students, tutors, content and interface (technology). This medium requires participants to prepare for and offer support to maintain the technology.

3.3.1. Medium of interactivity/Community of Inquiry

Interactivity refers to reciprocal events that require at least two actors or/and objects and at least two actions, and in which the actors, objects, and events mutually influence each other (Swan, 2003, cited Wagner, 1994). According to Moore (1989), there are three forms of interactions: learner-content, learner-instructor and learner-learner. Hillman et al. (1994), added a fourth form of interaction: learner-interface interaction. All three of Moore's modes of interaction function dependently in practice (Swan, 2003). Interaction among students, for example, is supported by instructor/tutor facilitation and support, which centres on content. A useful way of thinking about the three forms of interaction is provided by Garrison et al.'s (1999) "community of inquiry" model of online learning (Figure 4). In this model, cognitive presence equates with students' interaction with content, teaching presence with students interaction with instructors, and social presence with interaction among students; this model yields a good representation of how all three work together to support online learning (Swan, 2003).



**Figure 4: Interactivity and Learning Online (community of inquiry)
(Swan, 2003 adapted from (Garrison et al.1999))**

3.3.1.1. Learner-Content Interaction

Learner-content interaction refers to the learners' interaction with the knowledge, skills and attitudes being studied (Swan, 2003). Moore (1989) claims that it is a key characteristic of education. It is the base of education, since it is the learner's intellectual interaction with content that leads to changes in the learner's understanding, perspective, and/or the cognitive structures of the learner's mind. Moore believes that learner-content interaction is partly involved in what Holmberg (1986) calls the "internal didactic conversation" in which learners "talk to themselves" about the information and ideas they encounter in a text, lecture, website or elsewhere. With regards to this study, it would be interaction with the content of posts resulting from interaction of participants. According to social constructivism, this individual (intra-psychological) learning is where disequilibrium and equilibration take place, which represents Piaget's (1952) cognitive constructivism (middle black box in Figure 2).

Learner-content interaction is considered a cognitive presence in the community of inquiry model. It has been defined as "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al.,

2001, p89). Communication occurs through the content generated by participants' interaction. In my study, cognitive presence is based on social constructivist theory, which has been explained above.

3.3.1.2. Learner-Learner Interaction

Learner-learner interaction occurs between two learners or in group settings with or without the presence of the instructor (Moore, 1989). Moore (1989) asserts that learner-learner interaction can be "an extremely valuable resource for learning, and is sometimes even essential". First, without learners' interaction, content will not be generated (ibid). Second, Garrison (1990) indicates the importance of interaction: students who interact regularly with their instructor and other students are more motivated and have better learning experiences.

Garrison et al. (1999) look at the learners' interaction from different perspectives in the Community of Inquiry model and focus on social presence. The importance of social presence is that it helps sustain the interaction, which leads to knowledge construction and establishing cognitive presence (Gunawardena, 1995; Garrison, 1997; Garrison, 1990). Social presence can be tracked back to the concept of "immediacy" articulated by Mehrabian in 1968, who defined immediacy as "communication behaviours [that] enhance closeness to and nonverbal interaction with another" (Mehrabian, 1968, p 203). In the online community, Garrison et al. define social presence "as the ability of participants in a community of inquiry to project themselves socially and emotionally, as real people (i.e., their full personality), through the medium of communication being used" (1999, p 94). This socio-emotional interaction and support is important and sometimes crucial in realizing meaningful and valuable educational outcomes (Garrison et al., 1999).

In the Community of Inquiry model, three categories of social presence are identified: expression of emotion, open communication, and group cohesion (Garrison, 2011; Rourke et al., 2001). Emotional expression involves humour and self-disclosure (Cobb, 2009). Open communication comprises reciprocal and respectful exchanges, such as mutual awareness and recognition of

each other's contributions. Group cohesion refers to activities that foster a sense of group commitment and a sense of belonging (ibid). Gunawardena (1995) claims social presence is essential when participants do not know each other. However, in my study, it is blended with face to face PBL; hence students know each other before engaging with the online discussion forums. However, this does not negate the importance of social presence for the interaction to be sustained (Gunawardena, 1995).

3.3.1.3. Learner-Instructor Interaction

Learner-instructor interaction refers to the interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor. In this interaction, Moore explains online instructors' attempts to achieve certain goals. Moore and other researchers assert that instructors are concerned with stimulating and maintaining the learner's interest in what is to be taught, motivating the learner to learn, and leading to self-direction and self-motivation (Hacker and Niederhauser, 2000; Wong and Looi, 2010; Laurillard, 2012). Instructors make presentations or guide their creation. Presentations might be in the form of information giving, demonstrations of skill, or modelling of certain attitudes. Other instructors might try to organize students' application of what has been learned, such as manipulation of information and ideas that have been presented. In addition, instructors also evaluate whether learners are making progress and decide whether to change strategies. Finally, instructors can provide counsel, support, and encouragement to each learner (Moore, 1989).

In the Community of Inquiry model, Learner-Instructor interaction is known as teaching presence (Garrison et al., 1999). Anderson et al. (2001, p 5) define teaching presence as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes". The role of the facilitator is instructional design and organization, facilitating discourse (social) and direct instruction (intellectual) (Anderson et al., 2001, cited (Mason 1991)). With regards to my study, as it is integrated with face-to-face learning, the role of the tutor is only to facilitate the discussion (scaffolding).

3.3.1.4. Learner-Interface Interaction

Hillman et al. (1994) added a fourth type of interaction: learner-interface interaction. This is the interaction that takes place between a student and the technology used to mediate a particular online education process (Swan, 2004).

According to Swan (2004), “interface” refers to the specific technologies and applications that students must use to interact with course content, tutors, and classmates (Swan, 2004). Hillman and colleagues (1994) found that learner-interface interactions were critical, as failure in interaction might significantly inhibit learning. For example, a student who has difficulty engaging with the asynchronous online discussion may totally miss vital instructions or learning materials. Interactions with an interface hence provide or constrain the quality and quantity of the other three interactions (Swan, 2003). In other words, productive interactions with well-designed interfaces can enhance learning by explicating knowledge structures.

Researchers assert the importance of usability (or ease of use) of the technology in an elearning activity (Davids et al., 2014; Ardito et al., 2004; Sandars, 2010; Stinson et al., 2010; Ballard, 2010; Childs et al., 2005). When discussing e-learning usability (interaction of participants with content and the technology), the technological aspect is an important consideration (Davids et al., 2013; Sandars and Lafferty, 2010). Sandars and Lafferty (2010) argued that motivation is necessary for effective learning and for e-learning usability. They declare that a visually unappealing or boring interface will affect participants’ motivation (ibid). Ardito et al. (2006) assert that if students get frustrated navigating through the interface or find it slow, learning could be affected. If students spend a larger proportion of time understanding poorly usable interfaces than understanding learning content, this distracts them from the aim of the discussion forums and the construction of new knowledge (Ardito et al., 2004). Previous research showed that Moodle has a high usability level (Graf and List, 2005; Al-Ajlan and Zedan, 2008; Kakasevski et al., 2008) However, in this study, it was necessary to investigate the accessibility and feasibility of the discussion forums, which are the focus of the study.

3.3.2. Student orientation and tutor training

Hillman and colleagues (1994) argued that both well-designed course interfaces and prerequisite orientations to their use are necessary. The latter allows users to become comfortable with the interface before they commit to its use (Swan, 2003).

In addition to orientation, Gold (2001) asserted that orientation is not enough and that there must be pedagogical training, particularly for tutors. He claimed that without such training tutors will continue to replicate their best existing practices in the online medium. Tutor training includes facilitating, in addition to maintaining awareness of the fact that what works in the traditional PBL room, with learners communicating synchronously face-to-face, is qualitatively different from online asynchronous communication (ibid). Deficiency in professional training could be the reason for failure of learning to take place (Gold, 2001, cited (Russell, 1997)). Salmon (2012) also commented on the importance of training and how it affects moderator performance.

The need for training for online facilitation becomes more apparent in Saudi Arabia. Alebaikan and Troudi (2010) claimed that Saudi university instructors have limited pedagogical and technical experience in teaching online. They recommended that orientation sessions be provided for both instructors and students to outline online teaching and learning to achieve maximum education benefits. Hence, it is mandatory to orientate and train both students and tutors.

3.3.3. Technical support

Technical support has the same importance as training of the participants. It is a pre-condition for educational experience to accrue successfully (Alebaikan and Troudi, 2010). Technical support is appreciated by users, as it helps them to overcome technical issues and contributes to the success of the online discussion experience (Alebaikan and Troudi, 2010; Zhang et al., 2013, cited (Bregman 2000); Romiszowski and Mason, 1996). Moreover, low technical support may leads to poor user satisfaction (Yang et al., 2007;

Martins and Kellermanns, 2004). Childs et al. (Childs et al., 2005) concluded that technical support is crucial for participants in elearning.

In summary, all factors that affect the sustainability of the interaction in one way or another affect the satisfaction of the participants as they work toward the main goals of the intervention (Figure 5).



Figure 5: Participants' satisfaction

3.4. Conceptual model of the proposed integrated, facilitated online discussion model

After exploring the conceptual framework that this study is based on, it is necessary to explain the conceptual model. I will show how the conceptual model (Figure 6) was developed and why the asynchronous, facilitated and not graded (no designated marks) online discussion forums using MOODLE as a virtual learning environment (VLE) package was chosen.

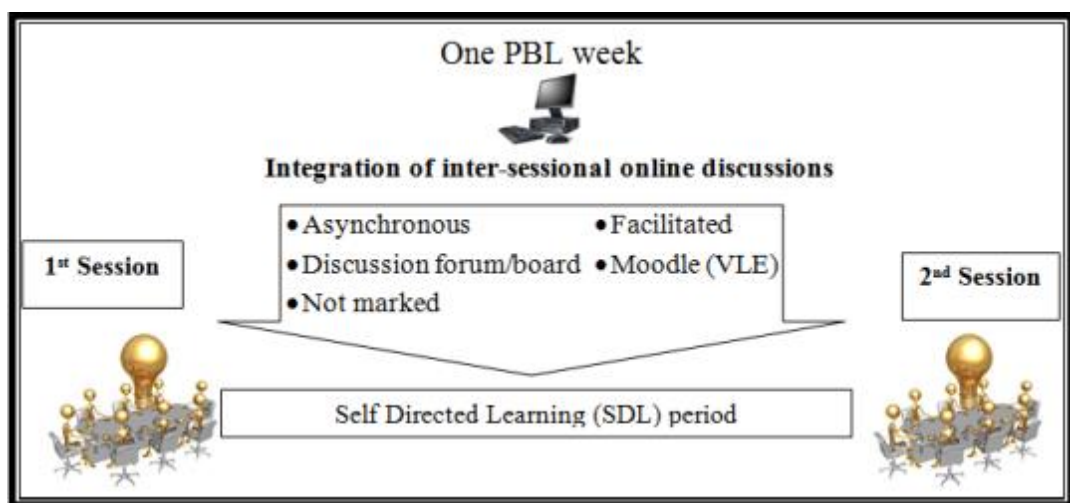


Figure 6: Conceptual model of the inter-sessional facilitated online discussion in PBL

3.4.1. Asynchronous vs. synchronous communication

Asynchronous communication (AC) means the discussion does not take place at the same time, and users are not necessarily online simultaneously, such as the interactions that occur on discussion forums/boards and via email (Cole and Foster, 2007; Simpson, 2002). Synchronous communication (SC) means the discussion happens at the same time, such as in chat rooms or via audio and video conferencing (ibid). Both ways of communicating take place over the internet (Simpson, 2002).

Synchronous communication has limitations and benefits for online communicators. Hrastinski (2008) states that when using synchronous communication, students are more committed and motivated compared to

when using asynchronous communication, as they have an immediate response. On the other hand, Schwier and Balbar (2008) state that e-students felt isolated by the difficulty of performing different skills simultaneously: processing the ideas presented by others, thinking about a response, composing a response, and typing a response. In SC, a difficulty encountered in any of these steps will be a potential barrier. Therefore, Schwier and Balbar (2008) found that students commented that they felt they often ran out of time to respond, and that the conversation moved more quickly than their typing skills. This will be even worse for students communicating in a second language, such as those at Qassim Medical School, where English is the language used formally.

The limitations of SC seem to be the same as those for face-to-face PBL sessions. For instance, in both there are time constraints, and the facilitator may not have enough time to respond to all students' questions in a session (Adesope et al., 2008; Sharpe, 2011). In addition, not all students can reflect upon a synchronous discussion immediately, and some students need time to do so (Meyer, 2003). In face-to-face and/or SC teaching, it is not easy for students to follow a member who is typing too fast. This could affect the equality of students' participations. It is also difficult to have all group members online simultaneously outside of school hours. Finally, therefore, implementing SC will not address the issues of face-to-face PBL.

To address the face-to-face PBL issues, the communication should be characterized by being self-paced and flexible, to give participants time to reflect on others' posts (Schwier and Balbar, 2008). Those are some of the attributes of AC, as mentioned in the rationale section.

3.4.2. Facilitated vs. Student-led discussion

In my study, the online discussion forum is facilitated by the same face-to-face tutors. Whether to make the discussion tutor-led or student-led is a debatable point. Fuks et al. (2002) mention that in an asynchronous online discussion, there are times when interaction declines, and this requires intervention by the tutor, such as by posting motivational posts. This

suggests that the presence of the tutor is crucial for a productive interaction. There is a positive correlation between students' satisfaction and learning and their instructor's interaction (Richardson and Swan, 2003).

In addition to students' satisfaction, studies show there is a positive correlation between tutors' interaction and student's perceived interaction and learning. Swan et al. (2000) found there is a positive correlation between students' interaction with the instructor and the percentage of the course grade that was based on discussion. In a study to determine whether and how students are learning within an asynchronous learning environment, Shea et al. (2002) found significant differences in perceived learning and satisfaction among students interacting with their instructors. Students who reported the highest levels of learning and satisfaction also reported the highest levels and quality of interaction with the instructor. Similarly, students who reported low levels of interaction with their instructors reported the lowest levels of learning. Jiang and Ting (2000) also found positive correlations between perceived interactions with instructors and perceived learning.

In the pilot study at QMS, I have found that there was a positive correlation between students' motivation toward using the online discussion and the tutor's activity in the discussion forums. Finally, the evaluation by two studies of experiences at Qassim School showed a need for a feedback and guidance during the SDL period, as an enhancement of collaborative learning and a way to encourage all students to participate (Al Robaee et al., 2009; Shamsan and Syed, 2009). Taken together, as a result of the above mentioned advantages and needs, it was decided that online discussion should be facilitated, and as working with a person already known from face-to-face interaction is key to the success of online discussion, the same tutor will facilitate the face-to-face sessions and the online PBL (Joutsenvirta and Myyry, 2010). However, the facilitation should be focused on developing student self-reliance and enhancing student-student interaction (Paloff & Pratt 2001 cited in Mazzolini and Maddison, 2003).

3.4.3. Discussion forum vs. blog

A discussion board is used to give and receive feedback from participants and is a tool for generating dialogue between users in a group, in which anyone can post a message and users have a platform in which to respond to each other in a constraint-free environment (Lewis, 2011). In contrast, a blog is intended for a person to post ideas, thoughts, and articles; visitors can comment on the author's posts, and the blog is organized chronologically (Divitini et al., 2005; Mason and Rennie, 2006). A blog's purpose isn't to initiate a discussion, but to deliver a message (Lewis, 2011).

Lewis (2011) states: "If you want to have communication between users about a topic, utilize a discussion board. If you have a topic that you want one user to communicate to users, utilize a blog". Since the aim of the project is to enhance collaboration and communication between the students, discussion forums are the ideal option.

3.4.4. Marked vs. not marked

In the current study, marks were not allocated for students' online contribution based on the medical education committee decision. Garrison (2011) claims that marking the online contribution might affect the quality, because students will participate only because of marking, not to learn. However, he mentions that marking will help in shaping the learning. In this project, online tutors will be the same as the face-to-face tutors, and this could influence students to think that their online participation might contribute to the tutor's decision in the end-of-PBL summative assessment. This could offset the disadvantage of the board's not being marked.

3.5. Summary

In this chapter I have discussed social constructivism learning theory and its central framework, used to help shape the understanding of discussion forums in this study. Students in the discussion forums learn individually and with others. Learning with others is through asynchronous discussion in the forums, where students pass through ZPD to move from unknown to known

concepts. This movement is advanced by scaffolding by tutors and more capable students.

For this interactivity to be sustained and for a valuable educational experience to take place, several factors play an important role: interactivity of the learners with their peers, tutors, the content and the interface. In addition to interactivity, training and understanding of the role and technology, as well as technical support, can affect the participant's opinion of the educational experience.

Finally, for practicality, a model was developed after discussion of how and why the inter-sessional facilitated online discussion forums in PBL were implemented. This was an asynchronous, facilitated, unmarked discussion forum, using Moodle as the VLE system.

Chapter4: Methods and Methodology

In this chapter, the research design and its rationale are explained, in addition to the exploratory and mixed-method purposes. A case study framework (six steps) has been adopted, which helps organize the structure of the chapter. It is followed by a discussion of quality issues of my case study, and tactics that were used to address these issues. Finally, ethical concerns of the case study and how they were considered are discussed.

The pilot study has informed my current study methods in diverse ways. Firstly, I realised the importance of the training evaluation step that has been incorporated for the participants. Thus, the training evaluation has been included in the current study, and it has been evaluated quantitatively and qualitatively. Secondly, some of the questionnaires items, also, have been edited, making them easier to understand. Thirdly, an Internet connection issue, in which students experienced difficulty connecting to the university's Wi-Fi, was taken into consideration and the issue has been discussed with the information technology (IT) deanship at Qassim University. After the discussion, the IT team has made Wi-Fi available everywhere in the medical school; thereby, making the connection easier than before.

Finally, the participants' perception of the pilot study showed that the integration of online discussion with PBL enhanced the students' learning. However, this was based on self-administered questionnaires, which produced superficial data. Thus, in this study I have proposed further in-depth investigations. They include an objective analysis of the discussion forums, and qualitative methods (focus group and individual interviews), which have been adopted, in addition to the questionnaires.

4.1. Research design

The purpose of this research is to explore the impact of integration of inter-sessional facilitated online discussion forum (DF) with face-to-face PBL. The research design is mixed-method exploratory single-case study. I will explain what is this, and why a case study and mixed methods were chosen.

- **Design rationale**

Exploratory single case study design was the design adopted in this research, using a mixed methods approach. The design has been chosen due to circumstances related to Qassim Medical School and its purpose.

Firstly, the circumstances of the research context make case study design an effective choice. The research will be conducted at Qassim Medical School, where the implementation will be in a complex real-life situation (as the school decided the integration should be part of the block teaching and learning). The uniqueness of the research at Qassim Medical School supports the claim of adopting a case study in my research. I, as a researcher, do not have control over the intervention. Qassim Medical School does not allow changing the groups' structure or selecting the tutors. Moreover, the boundaries between phenomenon and context are not clearly evident, hence it is difficult to identify the main variables, so one needs to have multiple sources of evidence. Therefore, data will be collected from different resources (mixed-method approach) to reach a comprehensive understanding.

Case study design has been recommended in the literature in certain situations similar to my research context. Yin (Yin, 2009, p 18) asserts that case-study research method is suitable when:

- The case is an empirical inquiry that investigates a contemporary phenomenon within its real-life context,
- The boundaries between phenomenon and context are not clearly evident; and
- In which multiple sources of evidence are used.

Fitzpatrick and Wallace (2012) conclude that case study is applied to expand the understanding of a little known phenomena. Hitchcock and Hughes (1995) add that it is favoured when the researcher does not have control over the case, which similar to my situation. Simons (2009) offers a definition of the case study as “an in-depth exploration from multiple perspectives of the

complexity and uniqueness” (Simons, 2009, p 21). Stake and Chmiliar (1995, p 2; 2010, p 285) add that the case is a “bounded system” (e.g., a university or school).

Secondly, the purpose of the study supports the claim of using a case study design. In the literature, there are few studies integrating online DF with face-to-face PBL and evaluation participants’ perception (Alamro and Schofield, 2012). Integrating facilitated online DF alongside face-to-face PBL sessions at Qassim Medical School has shown positive responses from participants (pilot study) (Alamro, 2010). Participants, both tutors and students, claimed that the intervention enhanced students’ learning, as they shared knowledge and discussed the problem throughout the week. However, the impact of the integration has not been investigated objectively, and the literature does not portray a study showing so.

The research is a single case study design due to the following reasons. Yin (2009) suggests rationales for choosing single case study design. Firstly, uniqueness of the case studied, and the case I am researching is limited to Qassim Medical School, where similar research has not been done before (Yin, 2009; Stake, 1995). Qassim Medical School’s circumstances are similar to any school with the same status (having same PBL problems of QMS),, so it would be an effective representative for others. Representation or typicality of the case is another rationale, according to Yin (2009). An additional reason for applying a single case study is if it is a revelatory case, in which the researcher is able to observe and analyse the phenomena beforehand (ibid). I graduated from Qassim Medical School in 2007, and I am aware of the current issues at the school, which were the starting point for conducting this intervention.

- **Exploratory purpose**

My research will be an exploratory case study. Exploratory case study is applied to “inductively generate, rather than deductively confirm, insights regarding the phenomenon of interest” (Ogawa and Malen, 1991, p 271). It is seen as a bottom-up theory generation approach (Johnson and Christensen, 2011; Hodkinson and Hodkinson, 2001). Streb (2010, p 372) elucidates that

the role of an exploratory case study method is to investigate “distinct phenomena characterized by a lack of detailed preliminary research, especially formulated hypotheses that can be tested, and/or by a specific research environment that limits the choice of methodology”. Exploratory case study can lead to further research (Chmiliar, 2010). It is also argued that exploratory researches are directed mainly by a general research question (e.g., ‘Does inter-sessional facilitated online discussion forum between PBL sessions improve student learning?’) rather than by a particular tested hypothesis (Thomas, 1998). Finally, at the start, I accepted that this intervention might work or might not. If it fails, the role of the research will be exploring the reasons why students do not participate online. Thomas claims that outcomes of an exploratory study cannot be expected (*ibid*). Thus, the researcher must be prepared for any change as a result of new data or new insight (Saunders et al., 2009).

There are three purposes of a case study approach: explanatory, exploratory and descriptive (Yin, 2009; Fitzpatrick and Wallace, 2012). Their application depends on the research purpose and circumstances (Bishop, 2010). Explanatory case study is employed when the aim of the research is to discover causality when the information of a case is related to a theoretical position (Chmiliar, 2010). In my research, the goal is to explore and to understand a phenomenon that has not been investigated and whose variables are not understood (Yin, 2011). Descriptive case study is mainly used to follow a descriptive theory through the study, which I have not in this research (Chmiliar, 2010).

The research adopted a mixed-method approach, in which different types/resources evidences have been collected to obtain richness in data from multiple perspectives to fully understand the case. The mixed methods approach is defined as “the use of quantitative and qualitative approaches in combination” (Creswell and Clark, 2007, p. 5). Quantitative research is when the researchers use statistical analyses to achieve their results and data is represented numerically, (Marczyk et al., 2010; Thompson and Walker, 1998). Under a qualitative approach, researchers do not quantify the findings

through statistical summary or analysis and data is represented in words. (Marczyk et al., 2010; Thompson and Walker, 1998).

- **Mixed methods purpose**

A mixed methods approach is applicable to case studies (Creswell and Clark, 2011; Yin, 2009). Adopting a mixed methods approach has several advantages for the researcher and the research quality. Mixing gains the best of both methods, which provides more understanding of the research problem than either approach alone (Creswell and Clark, 2011). It helps compensate for the drawbacks of both methods applied in this research (ibid). For instance, regarding quantitative methods, I will measure the impact of the intervention on students objectively; however, it is mandatory to understand the context and listen to participants' views about the idea of integration. Vice versa, applying qualitative tools only will not result in a valid instrument for measuring the impact on student learning.

The qualitative approach has been criticized that it is subject to researcher bias (e.g., in individual interviews and focus groups), as the researcher has influence on interpretation, and s/he is part of the research (Cohen et al., 2007). On the other hand, in quantitative approaches the researcher is not involved and his/her influence is minimal (Creswell and Clark, 2011). Using a quantitative approach will enhance the quality of the research findings, as it adjusts for the bias of the qualitative approach. Lastly, although qualitative approaches provide rich and in-depth descriptions of the sample, it does not represent the whole group, such as in focus group interviewees, as only small number out the whole cohort participate (VanderStoep and Johnston, 2008). In contrast, in quantitative approaches (e.g., surveys) there is no limited number of participants to be studied (Creswell and Clark, 2011). Therefore, implementing both approaches in my study advances the quality of the study by allowing the strengths of one approach to offset the weaknesses of the other.

In short, I have selected mixed methods exploratory single case study because of the lack of literature in the area I am exploring (purpose) and due to the circumstances at Qassim Medical School, that is, a unique, bounded

system involving empirical work in a real-life and complex situation. Mixed methods allow me to explore the area from different facets and to enhance the quality.

Based on Soy and Yin's work (2009; 1997), the case study research framework follows six steps:

1. Determine and define the research questions.
2. Select the case or cases and determine the data gathering and analysis techniques.
3. Prepare to collect the data.
4. Collect data in the field.
5. Evaluate and analyze the data.
6. Prepare the report.

The following section will be organized based on this framework. I will explain each step with relation to the overall case study design and with relation to the instrument.

4.1.1. Determine and define the research questions.

In general, there is very little research into integration of inter-sessional facilitated online discussion forum with conventional PBL. Moreover, there is a lack in the literature of deep and objective evaluation of the integration, which contributes to the importance of investigating this area. The theoretical framework (in previous chapter) helped determine the research questions, and has informed the meaning and importance of the data collected throughout the research. The main research question is:

- Does use of an inter-sessional facilitated online discussion forum between PBL sessions improve student learning?

To address this question the following questions will be explored:	
Q1- What is the impact of using an inter-sessional facilitated online discussion forum between PBL sessions on students' knowledge construction?	
In order to develop more understanding of the complex intervention, the following questions are considered:	
Q2- What is participants' perception of training for an inter-sessional facilitated online discussion forum in PBL?	Q3- How do participants perceive the interaction/collaboration in the inter-sessional facilitated online discussion forum in PBL?
Q4- How do participants perceive the feasibility, accessibility and technical support of the inter-sessional facilitated online discussion forum in PBL model?	Q5- What are participants' perceptions of the learning process in the integrated inter-sessional facilitated online discussion forum in PBL?
Q6- What is participants' level of satisfaction with the integration of an inter-sessional facilitated online discussion forum within PBL?	Q7- What are the advantages and disadvantages of integration of inter-sessional facilitated online discussion forum in PBL?

4.1.2. Select the case/s and determine the data gathering and analysis techniques

4.1.2.1. Case selection

In this study, the case is integration of inter-sessional facilitated online discussion forums between PBL sessions in the Growth and Development block at Qassim Medical School, Saudi Arabia. This block was the only one that has yet incorporated the facilitated inter-sessional online discussion forum, hence it merely showed the phenomenon of interest.

The growth and development block, which is a 1st year block, was an ideal choice for curriculum development for the following reason:

1. First year students need more support compared to senior students. Davis and Harden (1999) reveal that the less experience students have, the more external support they need.

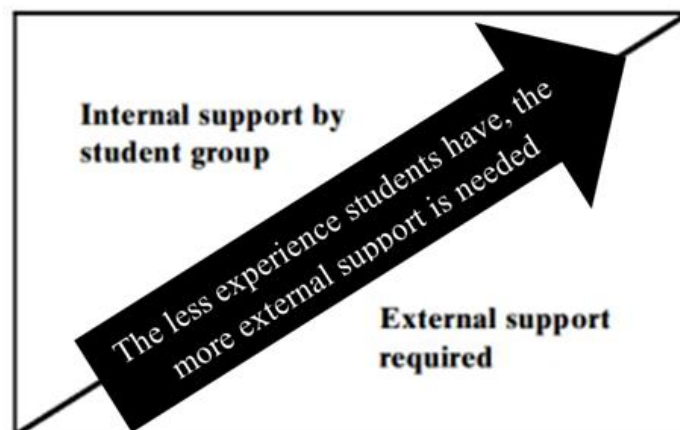


Figure 7: Students support needs in PBL (adopted from Davis and Harden, 1999)

2. The growth and development block is the same block that was investigated during the pilot study (Alamro, 2010), so replication would help to address the reliability of the study.
3. All students are at the same stage of their learning, and have similar previous experience with PBL. In this block, there are 159 students (103=males, 56=females) attending the course. There are 15 tutors assigned to facilitate learning in the PBL groups (10=males, 5=females)

4. All tutors will be available throughout the block, while during other blocks they travel to other medical schools because of teaching commitments.

4.1.2.2. Case description

The following sections describe the case in terms of (1) the context, (2) the course content, (3) the tutors, (4) the students, (5) groups, and (6) the adopted virtual learning environment.

- **The host institution, Qassim Medical School (context)**

This study is conducted in the Kingdom of Saudi Arabia (KSA) at Qassim University, which is located in Qassim (Gasim) province. Arabic is the main language of the country; however, some schools teach students in English and it is an official language. At Qassim Medical School, English is the official language, in which students are taught and examined. Staff are recruited from different countries, therefore some do not speak Arabic.

Saudi Arabia is a conservative Islamic country, thus it adopts a segregation system between male and female students in all educational sectors, including medical schools. At Qassim Medical School, students of the same gender study together, and they are often taught by teachers of same gender. In the clinical phase they study in the same teaching hospital, but are separate in terms of groups and teachers, and both sexes have equal hours of teaching. Male and female patients are examined by students of both genders. Both staff and students accept segregation as reality (KASSIMI, 1983).

Qassim Medical School started operating in 2000, and was the first medical school in KSA to implement the system-based hybrid curriculum, using PBL and traditional learning in the basic science areas (phase 2) (Table 6). Its curriculum is system-based, and students study through blocks (For details of pre-clinical phase blocks, see appendix 1).

Table 6: Curriculum overview of Qassim Medical School

Year 1	Year 2	Year3	Year4	Year5	Year6	Internship
phase I (foundation)	phase II (Basic Sciences)		phase III Clerkship			
Main campus			Main campus and Teaching hospital	Teaching hospital		

Qassim Medical School considers PBL as a principal aspect of teaching and learning methods, in which many learning objectives are covered. From the start, the medical education committee allocated ten points from the total marks of each block (100 marks) for PBL. Students are assessed on their discussion and the group dynamic. PBL is implemented in year 2, 3 and 4, while the teaching in the clinical phase is lecture- and ward-based.

- **Growth and Development block**

The study was conducted in the Growth and Development block. It is a first-year block (see appendix 1). It is a four-week block, involving four PBL scenarios given over four weeks (appendix 3). Each week, students attended two sessions for every scenario (problem), Saturday and Wednesday, respectively; each session lasts 2 hours.

In the Growth and Development block, students are taught basic science (including anatomy, physiology, pathology, embryology, etc.). Several teaching methods are applied in this block, such as lectures, PBL, lab sessions, clinical skills and student seminars (an example of a weekly timetable is in appendix 4).

The school decided to consider the integration of facilitated online discussion between PBL sessions as part of the curriculum development in this block. Therefore, students and tutors were asked to participate in the online discussion. However, no marks are allocated for the contribution (details given in the conceptual model in the previous chapter).

- **The tutors**

Fifteen tutors participated in the study. There was no change in the tutors assigned by the block organizer to facilitate face-to-face PBL. Tutors' ages ranged from 25-63 years old with variation in technology interest, and all of them use the computer regularly. Tutors are from different countries, including Sudan, Pakistan, Saudi Arabia, and Egypt. All tutors attended staff development sessions on face-to-face PBL tutoring practice.

- **The students**

According to the block records, 159 students (103=males, 56=females) were attending the course. The age of the students ranged between 19 and 21. **All students had a minimum level of language proficiency. Students are required to achieve a certain level of competency in the English language before they can join the medical school. Students are required to pass a course with a mark not less than 60/100, which is equivalent to 5.5 on the IELTS test. The English language is the official language at the school and students are expected to write, read, speak and listen proficiently.** Finally, all students are Saudis.

- **PBL groups**

Students were assigned to groups according to their grade point average (GPA) so that each group includes students with different GPA levels, which enhances similarity among groups. Thus, in each group, there were students with high and low GPAs. For each group, a tutor was assigned to facilitate the discussion.

All students and tutors have a username and password that give them access to the virtual learning environment (VLE). All students are expected to know how to access the VLE and use all facilities provided.

- **The virtual learning environment**

Qassim Medical School had already adopted Modular Object-Oriented Dynamic Learning Environment (MOODLE) as a Virtual learning environment (VLE). It was used for content delivery, announcements, and grade distribution, but not commonly for online discussion.

Two weeks before the beginning of any block, the online interface of the block and its tools are developed and organized by the information technologist to be easily navigated. If students are frustrated when navigating through the interface or find it slow, this makes it difficult to use (Ardito et al., 2006).

Participants' motivation is crucial for online learning sustainability. Sandars and Lafferty (2010) argue that motivation is necessary for effective learning and for e-learning usability (interaction of participants with content and technology). They declare that a visually unappealing or boring interface will affect participants' motivation (ibid). Qassim Medical School takes that into consideration, and so the interface of the block was developed to be motivating and well organized. Course members, for instance, were welcomed and course materials were uploaded, such as the block's booklet, timetables etc. (

Figure 8).



Figure 8: Introduction of the block on e-learning

In the course interface, the weekly dates and theme were analysed, and a discussion forum for PBL of each week was created prior to the beginning of the week (e.g., Figure 9 shows the one for week 4).



Figure 9: Weekly theme and PBL forum

4.1.2.3. Data gathering and research instruments

In the case study, before data can be gathered, unit of analysis should be determined (Darke et al., 1998). This might be individuals, groups, organization or event (Babbie, 2013; Yin, 2009). In the coming section, I will explain the unit of analysis in this case study and the instruments that were used to collect data from the unit, in addition to the instruments that were applied to understand the whole picture comprehensively.

- **Unit of analysis**

The case is the integration of inter-sessional facilitated online discussion forums with a PBL-based growth and development course at Qassim Medical School, Saudi Arabia. Within this case, there are embedded units of analysis. These are the 15 study groups. Within these embedded units, there are units of data analysis, which are students' and tutors' posts evaluated by validated tools (Figure 10) (Yin, 2009; Babbie, 2013).

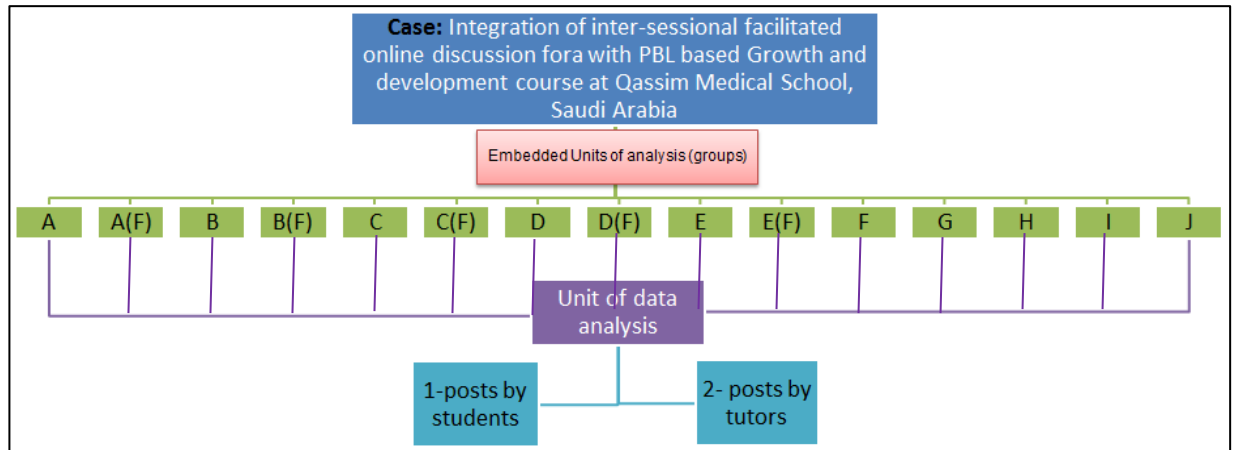


Figure 10: The case to be studied and the embedded units of analysis.

However, this does not give the whole picture; hence it was necessary to supplement this data with information from the entire cohort by:

1. Administering self-completed questionnaires (students and tutors)
2. Conducting individual interviews (tutors) and focus groups (students).

Multiple methods allowed me to gather a rich data set in order to develop an understanding of a complex intervention.

- **Instruments and source of the data with relation to research questions**

The data were collected from different perspectives to understand this complex phenomenon. It included quantitative and qualitative data (Table 7). Data gathered to answer the first research question included quantitative content analysis of the discussion forums using a validated tool to evaluate knowledge construction in the online discussion. For questions 2, 3, 4, 5, 6 and 7, the collected information included participants' perception of their experience, measured by three instruments: self-administered questionnaire, individual interviews (tutors) and focus group (students).

Table 7: Research questions, instruments and source of the data

Research question	Content analysis (group interaction)	Questionnaires (student & tutors)	Individual interviews (tutors)	Focus group interviews (students)
R Q 1	■			
R Q 2		■	■	■
R Q 3		■	■	■
R Q 4		■	■	■
R Q 5		■	■	■
R Q 6		■		
R Q 7			■	■

In the following sections I will discuss the rationale for the selection and design of each instrument applied to collect data related to the research questions.

A. R Q 1: Knowledge construction in the online discussion forums

Based on the theoretical framework (previous chapter), knowledge construction in online discussion forums was explored through quantitative content analysis using a validated evaluation tool, the interaction analysis model (IAM) (Gunawardena et al., 1997) (appendix 5). The model is based on quantitative content analysis, which is “based on the assumption that an analysis of language in use can reveal meanings, priorities and understandings, and ways of organising and seeing the world”. (Wilkinson and Birmingham, 2003: p, 68).

- **Research instrument: Content analysis**

Statistical reporting of an online discussion forum, such as number of posts, is important and has indications, such as how active participants were online (Gunawardena et al., 1997). Nevertheless, it does not show how the participants interact, and does not shed light on the process of knowledge construction, if it takes place. Therefore, literature reveals the importance of evaluation of the online discussion from different perspectives, both statistics and quality. The quality of discussion is considered a powerful tool to understand online learning. Quality of discussion, in this case study, was evaluated through using quantitative content analysis methodology. Bryman (2008: p 275) defines quantitative content analysis as “an approach to the analysis of documents and texts that seeks to quantify content in terms of predetermined categories and in a systematic and replicable manner”. It is a

way to extract meaning and understanding of language in use (Wilkinson and Birmingham, 2003).

- **Evaluation of knowledge construction**

Based upon the notion that statistics is not enough, and the importance of analysis of the quality of the discussion, Gunawardena et al. (1997) outline the process of negotiation that appears to take place in the co-construction of knowledge. This process comprises five phases: 1) sharing/comparing, 2) dissonance, 3) negotiation/co-construction, 4) testing tentative constructions and 5) statement/application of newly constructed knowledge. Each phase encompasses three, four, or five indicators (operations). Gunawardena et al. theorize that the active construction of knowledge moves through these phases; however, not every instance of socially constructed knowledge progresses linearly through each consecutive phase (appendix 5) (Kanuka and Anderson, 2007).

Several reasons support the application of IAM in this study. First, the interaction analysis model has been implemented frequently in the literature, which enhances its validity. Hall (2011) reviewed the literature through searching 8 databases. She found that from 1997-2010, IAM was the most-used online evaluation model. Rourke and Anderson (2004) claim that using existing evaluating models, rather than creating new ones, contributes to the growing normative data and overall validity of the existing models. The popularity IAM has gained therefore leads to validity accumulation.

Another element of support for the IAM comes from the high levels of inter-rater reliability (Hall, 2011). Inter-rater reliability is a critical concern in relation to content analysis, and is considered the “primary test of objectivity in content studies” (De Wever et al., 2006, P. 8). Hall (2011) among the 22 studies, she reviewed, show the inter-rater reliability, and it was considered high. Gunawardena et al. (1997), in the original study, state that the transcript was coded by two researchers independently; however, they do not report the inter-rater reliability.

In this study, it is assumed that using online discussion forums between PBL sessions enhances collaborative knowledge construction. Another assumption is that inter-sessional facilitated online discussion forums are considered as continuous with the face-to-face PBL sessions, in which the latter is based on constructivist and social constructivist theory and a student-centred approach (Schmidt et al., 1989; Greeno, Collins, & Resnick, 1996 cited in Cindy et al., 2011). Gunawardena and her colleagues' model contains several important features, as Lally (2001, p. 402): states: "a) it focuses on the overall pattern of knowledge construction emerging from a conference; b) it is most appropriate in social constructivist and collaborative (student-centred) learning contexts." Relating the study assumptions to what is mentioned by Lally supports applying IAM in this study. Lally also asserts that the model "a) is a relatively straightforward schema; b) it is adaptable to a range of teaching and learning contexts (p. 402)." The first feature is crucial for the usability of IAM by new researchers, and the second is important for adaptability of the model for the study context.

In contrast to the above positive features of IAM, there are few a drawbacks to the model. First, it does not evaluate the social presence, which has an important influence on students' participation (Gunawardena et al., 1997). Based on the community of inquiry model (theoretical framework) social presence evaluation is valuable. Moreover, after the analysis using IAM, there was variation between groups' knowledge construction results. Accordingly, it was necessary to explore the reason for the variation by using the social presence evaluation model (appendix 6) (Garrison, 2011).

Another weakness is that learning of "passive learner is not measured" (Hew and Cheung, 2003). While the literature reveals that vicarious learners (students who observe others' interactions but do not participate) learn as much as active students who contributed to the online discussions (Sutton, 2001). This was taken in consideration, as MOODLE shows whether a student viewed the forum or not. However, the system does not show how long students spend in the discussion forum.

After the development of IAM, the unit of analysis was determined by Gunawardena et al. (1997, p 416) to be a participant's entire, single post since the message "embodied a participant's cognitive activity and contribution to the construction of knowledge".

Finally, to enhance the reliability (inter-rater reliability), posts were coded by second coder and percent agreement is calculated (De Wever et al., 2006). Percent agreement reveals the ratio between the number of codes which is agreed upon and the total number (agree + disagree) of codes (ibid).

- **Evaluation of social presence**

The social presence assessment model has been developed by Rourke et al. (2001) The model contains three categories: Affective (A), Interactive (I) and Cohesive (C). Each category has several indicators (appendix 6). The unit of analysis in social presence assessment model has been decided to be thematic unit (Rourke et al., 2001).

B. R Q 2, 3, 4, 5, 6 and 7: questionnaires and interviews

It was necessary to assess the intervention from different perspectives to gain a holistic understanding of the phenomenon. In this study, I explored participants' perception of the learning and training provided, the flexibility, accessibility, technical support, interaction/collaboration, and satisfaction towards the intervention, in addition to exploring the interventions' pros and cons. In the literature of social science, there are some instruments commonly applied to evaluate participants' perception and attitude toward a phenomenon. For instance, questionnaires, individual interviews and focus groups are employed regularly, and their purposes are to ascertain respondents' experiences, attitudes, feelings and beliefs (Gibbs, 1997; Cohen et al., 2007; Kothari, 2004; Aldridge and Levine, 2001; Blaxter et al., 2006). Each tool has advantages and drawbacks, and applying the three tools together allows them to complement each other and to offset other instruments' pitfalls. Another rationale for using different instruments is the research circumstances that will be explained later under each tool. In the

following sections, I will elaborate on these instruments and why they have been chosen.

- **Instrument: Questionnaire**

A questionnaire was one of the research tools applied to evaluate the participants' perception and satisfaction. A questionnaire is a list of questions that are prepared beforehand, and respondents can answer these questions either in their own words or by choosing from a set of responses (Rugg and Petre, 2007). It is a perfect "sensible way of collecting information about the subjective features in a standardized format" (Rugg and Petre, 2007, p 144). In the following, I will show its pros and cons, the way it was designed, and how the data analysed and presented.

- **Advantages and disadvantages**

Similar to any research instrument, a questionnaire has advantages that led me to employ it in my research and drawbacks that have been taken in consideration, some of which were overcome by implementing other tools.

Self-administered questionnaires are effective in terms of time, effort, and cost, as they can be applied to collect a lot of data from a large number of people over a relatively short period of time (Dörnyei and Taguchi, 2010; Bryman, 2008). There were 145 students and 15 tutors participating at Qassim Medical School, and the only way to gain as much information as possible from the whole group to evaluate the intervention from different aspects, was to use questionnaires. Another advantage is that respondents to questionnaires are not subjected to the effect of the presence of a person (anonymity is ensured), as in the interview that presence of interviewer might lead to social desirability bias (Bryman, 2008; Gray, 2004).

However, questionnaires have limitations because of the data generated from questionnaires and others related to their administration. It is claimed that the data generated from questionnaires are not deep because the questions in questionnaire are developed in a simple way so they produce superficial data (Dörnyei and Taguchi, 2010). Moreover, in questionnaires,

respondents cannot ask for clarification (Gray, 2004). Having considered the ambiguity issue, I sat with students before the administration of the questionnaire and made the questions clear. A common issue with questionnaires is that the researcher does not have the opportunity for or clarification of respondents' answers (Bryman, 2008). Interviewing the participants will make up for this limitation, and details about the interview will be provided later.

Generally, questionnaires tend to have a low response rate (Gray, 2004); however, a reminder message/email could help to enhance the response rate. Bryman (2008) claims that in self-administered questionnaires, it is not easy to know who exactly completed the questionnaire, particularly for online questionnaires. Nevertheless, it is not an issue in this research, because the students' questionnaires are administered through the VLE system and cannot be accessed without username and password, and students can only complete it once. Tutors' questionnaires were sent to their personal email.

- **Questionnaire design**

The questionnaires were designed to be descriptive, self-administered questionnaires. Their purpose is to obtain the participants' opinion about the intervention, which is answers the first sub-research question: 'How do participants perceive the use of inter-sessional facilitated online discussion forums between PBL sessions?' Oppenheim (2000) classifies questionnaires into analytic and descriptive, according to their purposes. It is an analytic questionnaire when the purpose is to explore causality or association between two variables. A descriptive questionnaire's purpose is to count, for instance, the number of students who liked the intervention. The main aim of descriptive questionnaires is finding facts and descriptive data (ibid). This goes side by side with the purpose of my case study.

With regards to the language adopted for the data collection, both questionnaires (tutors and students) were administered in English. The students' questionnaire was in English because the VLE (Moodle) does not accept Arabic language, and using VLE for administering the questionnaire will ensure that the students complete it themselves. In addition, students'

results were announced in the block page, and students are expected to visit the page regularly after the course ends (Figure 11). It will be in the block page, and students will face it whenever they access the course (so it will remind them). For tutor questionnaires, the 15 tutors were of different nationalities, and English is the only language that they can all read and understand in addition to their primary languages. Administering the questionnaire in English ensures that they understood it similarly.



Figure 11: The block page shows students' questionnaire

The questionnaires applied were Likert-type 5-point scale forms. Questionnaires can be designed in different forms. They can be fill-in-the-blank, multiple choice, comment-on, list, Likert scales and rank or others (Anderson and Arsenault, 1998; Blaxter et al., 2006; Cohen et al., 2007). The Likert-type 5-point scale was adopted due to the following reasons. The Likert scale is commonly used in social science to evaluate attitude (e.g. from favourable/agree to unfavourable/disagree) towards an object by reacting to statements (Kothari, 2004). Anderson and Arsenault (1998: P, 184) state that five-point scale is " the most practical, most common, easy to respond to, straightforward to analyse and sufficient for most needs". In this study, the students' questionnaire used a 5-point Likert scale (5-Strongly agree, 4-Agree, 3-Neither agree nor disagree, 2-Disagree, 1-Strongly disagree). The response (0-not observed) was added to the tutors' questionnaire, as some items might not be observed by them. Finally, a space was provided for comments that participants wanted to add (Boynton and Greenhalgh, 2004).

Generally, in a questionnaire, items can be developed by the researcher or adopted from the literature. Items in the questionnaires used have been adopted from instruments used in previous studies (Huang, 2002; Walker and Fraser, 2005; Shehab, 2007; Chen and Jones, 2007; Picciano, 2002). I used and modified some items employed in these instruments, which were mainly used to measure participants' perception of online and web-based learning contexts. Items have been modified to gain the needed information.

- **Questionnaire item development**

The instrument for this research was developed through the following steps:

1. The lack of questionnaires that have the same evaluating purpose as my study was overcome by developing an instrument using items from previous studies. Review instruments used in previous relevant studies (Chen and Jones, 2007; Huang, 2002; Picciano, 2002; Walker and Fraser, 2005).
2. Select items indicating participant's perception over the dimensions mentioned below.
3. Rewrite items to suit the project context.

In this research, both questionnaires (for tutors and students) include 5 dimensions that contain 40 items (students' questionnaire see appendix 7 and tutors' questionnaire see appendix 8). These items explore the perception of participants toward the intervention from different perspectives. Table 4 reveals the research question subject areas and the number of items developed to gather data.

Table 8: research questions subject areas and questionnaires items

Research question subject area	Group of items (themes)
What are participants' perceptions of training for an inter-sessional facilitated online discussion forum in PBL?	<ul style="list-style-type: none"> ○ Training (6 items)
How do participants perceive the interaction/collaboration in the inter-sessional facilitated online discussion forum in PBL?	<ul style="list-style-type: none"> ○ Interaction/collaboration, student-student and student-tutor interactions (14 items)
How do participants perceive the feasibility, accessibility and technical support of the inter-sessional facilitated online discussion forum in PBL model?	<ul style="list-style-type: none"> ○ feasibility accessibility, and technical support and (6 items)
What are participants' perceptions of the learning in an integrated inter-sessional facilitated online discussion forum in PBL?	<ul style="list-style-type: none"> ○ The idea of integration of facilitated online discussion forums with face-to-face sessions, understanding the problem and learning objectives (6 items) ○ Improve different skills, computer, writing and teamwork skills (3 items)
What are the advantages and disadvantages of integration of inter-sessional facilitated online discussion forum in PBL?	<ul style="list-style-type: none"> ○ Satisfaction (5 items).

- **Piloting the questionnaire**

Piloting was essential since "questionnaires do not emerge fully-fledged; they have to be created and adapted, fashioned and developed to maturity after many abortive test flights. In fact, every aspect of a survey has to be tried out beforehand to make sure that it works as intended" (Oppenheim, 2000). Piloting enhances reliability, validity and practicability of the questionnaire (ibid). Questionnaires are piloted for two purposes; first, to check the coverage and format; second, to be sure appropriate data is collected (Cohen et al., 2007). Both types were considered in this research.

From the first draft to the final version, the questionnaires went through three stages to produce a reliable and valid instrument: pre-piloting, piloting and finalizing stages.

Pre-pilot stage: The first version of the developed questionnaire was sent to two experts in medical and online-based education and one of the participating tutors, in order to verify each item in relation to its language, validity and format. The results helped in developing version two, which was used in the pilot stage.

Pilot stage: The second version was piloted with 26 second year Qassim Dental students at Qassim University, Saudi Arabia. They have a similar English language level to the target population, and they applied the discussion forum in their curriculum. The results helped in developing the third version, which was used in the main project.

Final stage: In the last version, the researcher explained each item to all students, focusing on ensuring the clarity of each item for the reader.

As a result of the above stages, items have been changed because of ambiguity, fluency, language issues and clarity of the statements. Following, that, the questionnaires were administered.

- **Instrument: interviews**

Gray defines interviews (of any type) as “a conversation between people in which one person has the roles of the researcher” (2004, P 213). Interviews are the next instruments I have used, both individual and focus groups. The literature reveals that interviews are an important source of information in a case study design (Yin, 2009). Results attained from questionnaires explore, generally and superficially, the opinion of the participants without detail, and do not reveal how and why they responded as they did. Mixing questionnaires with a tool such as interviews will yield more depth of understanding of participants’ experiences, perceptions, opinions (Creswell and Clark, 2011; Patton, 1990). The deeper evaluation was obtained through several interviews: individual interviews with the 6 tutors and 2 focus groups with students.

In the coming sections, first, I will shed light on how the question schedule was developed for both interviews (individual and focus group), as they were

similar, followed by elaboration on each instrument (separately), its definition, cons and pros, design, sampling and language applied, piloting, conducting the interviews and interview data analysis and presentation.

- **Designing of both interviews (individual and focus group) questions schedule**

In this case study, the questions developed based on the research questions and the questionnaire results. Results of the questionnaires emphasise the importance of exploring participants' perception deeply through interview questions, which is a common reason for conducting interviews (Wilkinson and Birmingham, 2003). The interview questions were also designed based on the research purpose (Kvale, 1996; Gray, 2004; Bryman, 2008). This research is an exploratory case study and its purpose is to explore, 'How do participants perceive the use of inter-sessional facilitated online discussion forums between PBL sessions?', and the purpose of using interviews is to explore this research question in depth (see individual interview question appendix 9 and focus group questions appendix 10), especially regarding:

- 1- Expectations of participants towards the integrations;
- 2- The training conducted and how it was effective or not;
- 3- Cons and pros of the intervention;
- 4- Collaborative learning and
- 5- Learning impact of the intervention on students.

In both interviews, the questions have been designed in an open-ended format. In the literature, there are three types of questions used in interviews: close-ended questions in which interviewees are forced to choose among options; scale questions in which interviewees respond to a scale (e.g., level of agreement); and open, where there is no restriction on how the interviewee replies (Robson, 2011). The questions in both interviews (individual and focus group) include open and closed questions. However, these questions might be criticized in that they could be more general and open-ended questions. I made the questions closer (more specific) than expected because of the culture and the language of the interviewees, who do not respond or speak freely. This was confirmed during piloting the

interview questions. Having recognized these issues, I considered the use of probes and prompts which helped to reach the information and the depth intended.

For individual interview: Semi-structured interviews were used in this study. There are three types of interviews, according to the degree of structure, namely: unstructured interviews that are very flexible and in which the discussion is mainly guided by the interviewee; semi-structured, which is less flexible, with questions prepared by the interviewer; and structured interviews which lack flexibility and are considered face-to-face questionnaires (quantitative) (Wilkinson and Birmingham, 2003).

Semi-structured interviews are considered the most common type and have several advantages over the other types. Flexibility is the main advantage (Gray, 2004). Using semi-structured interviews gives the researcher the opportunity to shape the flow of information. Although interview questions were predetermined, in semi-structured interviews other questions can be raised during the interview. In such interviews, the interviewee is able to clarify questions and the interviewer is able to probe. It is not fully uncontrolled, like unstructured interviews, so the interviewer controls the dialogue. However, it is not very strict, like a structured interview, so the interviewee can express him/herself, which improves the interview.

1- Individual interviews, Tutors

Individual interviews are two-person conversations. One participant is the researcher and has prepared a set of questions beforehand to ask the interviewee (Wilkinson and Birmingham, 2003; Cohen et al., 2007). In the following section, I will reveal the reason for using it and the limitations that were considered, in addition to how the interview was implemented and analysed.

○ Advantages and disadvantages of individual interviews

In any instrument, the advantages are the rationales that underpin its usage, but drawbacks should also be considered by the researcher. Most of the

advantages of interviews support applying them in my research, and some of these advantages are disadvantages of the questionnaires.

Firstly, there is a consensus on that interviews are the most effective instruments to reach deep information from participants (Anderson and Arsenault, 1998; Blaxter et al., 2006; Bryman, 2008; Cohen et al., 2007; Creswell and Clark, 2011; Patton, 1990), particularly, in case studies to obtain different information from different perspectives to thoroughly understand the phenomenon (Yin, 2009). I used questionnaires to look at the surface elements of what was happening in the integration, while interviews focused on the deep meaning of what happened, such as why they liked the integration or not.

In interviews, participants had time to express their views without constraints of time or being limited to five options (as in the questionnaire). Therefore, interviews are tools that are characterized by generating rich data about the subject (Wilkinson and Birmingham, 2003). In interviews, I am exploring the participants' views, and applying interviews offered high flexibility to any additional questions to ask or to any direction that the dialogue would take us in, while questionnaires are rigid (Bryman, 2008). By applying interviews, I would have the opportunity to go deeply as required through probing, and interviews allow researchers to prompt the respondents to give more information about the experience (Gray, 2004; Cohen et al., 2007).

However, interviews have several limitations that must be considered. Some limitations are not avoidable, such as time-consuming during preparation and interview, and analysis (Robson, 2011). Nevertheless, money was not an issue in my research, as all participants were at the same campus. PBL rooms were used for the focus groups, while tutors' offices were used for individual interviews. Secondly, interviews lack anonymity compared to questionnaires, which might restrict responses. In addition, interviews are subjected to the risk of interviewer bias (e.g. social desirability bias), or the researcher might lead the responses, consciously or sub-consciously (Frankfort-Nachmias and Nachmias, 2000; Bryman, 2008). All of those risks

have been recognized beforehand, and I have considered them before data collection started to minimize their influence on the data collected.

- **Sampling and language**

Data were gathered from tutors through individual interviews. There were reasons why I interviewed tutors individually, not in a focus group, though focus groups are more effective compared to individual interviews. Firstly, it was not possible to have 6 (the minimum ideal number of interviewees in a focus group) tutors together because when some were free, others were teaching. Secondly, females are segregated from males; thus, it is impossible to have females and males in a group. Finally, even if it was possible to have male tutors in a group, not all of them participated and they would give false opinion as they did not live the experience. Therefore, individual interviews and participants (sample) were selected following a purposive sampling strategy. Purposive sampling, also, known as judgment sampling, is the deliberate choice of participants due to the characteristics they possess (Tongco, 2007).

The selection criteria for the interview were: 1) availability at Qassim University at the time of the interview and 2) participation in the online discussion. Bryman (2008) remarks that most writers of qualitative studies recommend purposive/judgmental sampling in which the researcher selects who is most relevant to the research questions. Thus, selecting a tutor that had little engagement in the discussion forum would not be a valid selection.

Interviews were conducted in English. All interviewees speak and understand English effectively. Although some were native speakers of Arabic, interviews were conducted in English to ensure uniformity in which all participants understand the questions similarly.

- **Piloting individual interview**

No research instrument is perfect, and piloting the interview questions will help to establish clarity and eliminate ambiguous questions or words (Wilkinson and Birmingham, 2003; Blaxter et al., 2006). I invited a young

Saudi tutor, who participated in the pilot study, to the pilot interview. His English was not perfect, so he was an effective sample to ensure understanding of the questions at a low language level. The interview was conducted in a room at Qassim Medical School, and took 20 minutes.

I piloted the interview question for several reasons. Firstly, it was an opportunity to test out the questions. I could ensure that the questions were understandable and clear. Secondly, it was necessary to practice interviewing beforehand to evaluate my interview skills and an interviewee's responses to the questions. In addition, feedback was given on my interview skills. The interviewee's responses were limited; consequently, I realized that it was necessary to utilize probes and prompts during interviews. Finally, a recorder was tested, and recorded sound was reliable.

2- Focus group interview, Students

A focus group is a commonly used instrument to explore perception, experiences and understanding (Kitzinger, 2005). Marczyk, DeMatteo and Festinger (2010, P 154) define focus groups as "formally organized, structured groups of individuals brought together to discuss a topic or series of topics during a specific period of time." Kitzinger (1995) adds that focus group is based on the interaction of the group. In subsequent sections, I will show why I have chosen a focus group (advantages), limitations that I considered, designing, sampling and language, followed by analysis and presentation of the data.

○ Advantages and disadvantages of a focus group

A focus group is considered an interview method and, thus, it shares the same advantages of individual interviews mentioned before (see section: Advantages and disadvantages of individual interviews, P 25). (Anderson and Arsenault, 1998; Baxter and Jack, 2008; Cohen et al., 2007; Rabiee, 2004; Morgan, 2008). However, a focus group has more benefits to the research, in terms of depth and effective data, over the individual interviews, which supported the intention to use them, particularly with students

(Robson, 2011). Bryman (2008, p 475) notes that a focus group interview is an efficient tool to explore “why people feel the way they do”.

The characteristics of the interaction in focus group indicate its effectiveness with students in particular. Discussion in focus group interview is described as synergism, snowballing, stimulation, security and spontaneity (Wilkinson and Birmingham, 2003, quoted (Hess 1968, p 149)).

1. Synergism is “a cumulative process in which individual participants react to, and build upon, the responses of other group members” (Wilkinson and Birmingham, 2003, P 92). In other words, focus group interviews are socially constructed. This enhances generation of a wider range of combined ideas and deeper insight accumulating from students’ interactions.
2. Snowballing is “a situation in which a comment by one participant triggers a chain of responses from others” (ibid).
3. Stimulation: is “a situation in which the group setting works to spur members on to express their own ideas” (Wilkinson and Birmingham, 2003, P 92). It encourages participants to talk as others do (Kitzinger, 1995). Simulation and snowballing make focus groups a crucial instrument to gather data from students compared to individual interviews, due to the cultural effect that encourages them not to be outspoken in front of any authoritative person (Khoo, 2003a).
4. Security: focus group interview security reassures group members to express their opinions more freely, particularly if they hear others share similar opinions (Wilkinson and Birmingham, 2003).
5. Spontaneity refers to the fact that, when a participant chooses to speak in a focus-group interview, it is likely due to that s/he holds a strong opinion about a subject wanting to share it with others, not because s/he is obliged (Wilkinson and Birmingham, 2003). In contrast, if individual interviews were conducted with students, in

particular, there would be a certain pressure that could lead them to answer all questions, regardless of the honesty of the responses.

In terms of management, a focus group provides access to several students at the same time, while in an individual interview it is only one person (Morgan, 2008). It was a useful advantage when students were busy attending lectures and PBL, and preparing for exams. It was not easy to find an hour that was suitable for all students who agreed to participate, but eventually we reached a consensus. Bryman (Bryman, 2008) considers this difficulty in setting up a focus group a limitation.

In addition to the limitations of any other interview type, such as costs of time and money, a focus group has its own limitations. Its critical drawbacks have to do with the facilitation/moderation of the interview, that is, if the interviewer is not well trained, that will lead to several issues (Robson, 2011). Unskilled facilitators may lead to bias, as 2 or 3 students dominate the interview, while others with contrasting views are silent (Bryman, 2008). Students also might deviate from the main subject, so an untrained interviewer will collect not relevant data. Lastly, transcribing data from focus groups is time-consuming and more complicated compared to individual interviews. I have considered this limitation from the start, and have attended several focus group workshops and practiced facilitating. A focus group is, to some degree, similar to any small group teaching, and I have been facilitating several PBL sessions which have enhanced my moderating skills.

Last but not least, it could be criticised that one of the main rationales for this research (integration of online discussion forum with PBL) is that some students are quiet or shy and do not speak in a group. This might, subsequently, argue against the use of a focus group, which takes place in a similar setting. In fact, the two situations are completely different, due to:

1. A form is sent through email for participants to return if they want to participate in the focus group (Figure 12). Thus, registered students expected that they would speak and give their opinions.

2. The focus group was conducted in Arabic, which is the first language of the students, while the PBL is in English and some students struggle.
3. Students are marked by a tutor in PBL session, which puts some pressure on them to not to participate unless they are sure their input is accurate. The focus group was not marked, and there was no particular pressure on students.

- **Sampling and language**

It was not an option to conduct the focus group in English for several reasons. All students were Saudi, and Arabic is their first language, which is also true for me (interviewer). This made it enjoyable and efficient. Students were first-year students and their English language was not expected to be effective enough to allow them to express their opinion as they wanted. Accordingly, it was necessary to conduct the group in Arabic.

Two focus groups were conducted, one for male and another for female students. Selection of the focus group participants was random, through an email seeking their participation, purposive selection and snowballing sampling. In the focus group, it was crucial to know who was appropriate to be selected to participate in the focus group. Morgan (2008, p 353) claims that “group composition is one of the most important aspects of research design for focus groups”. He notes that selecting individuals that share the same views is the most common; however, in my research, this will hide the others’ views (either agreement or disagreement). On the other hand, other researchers mention that diversity in group members brings the two views together, which enriches the interaction (Kitzinger, 1995; Kitzinger, 2005). Diversity helps to stimulate the discussion, and homogeneity facilitate groups’ opinion differences (Barbour, 2005). However, with a diverse group, the interviewer is required to pay special attention to moderate the interaction effectively.

An email was sent after the end of the block/course to all students (males and females), using a Google form, asking them to participate in the focus

interview (Figure 12). For the male group, the second step was that I selected two students purposively whom I knew they were interested in the integration. The third step was snowballing sampling, in which I asked the two male students to invite others with negative perceptions about the intervention. For the female students' focus group, I asked one of those who was willing to participate to invite her colleagues who were not motivated about the intervention.



The image shows a web form titled "online discussion with PBL--Group interview". The form includes a message "Your participation is appreciated" and a red asterisk indicating required fields. There are two input fields: "Name *" and "Email *". Below the input fields is a "Submit" button. At the bottom, it says "Powered by Google Docs" and provides links for "Report Abuse", "Terms of Service", and "Additional Terms".

Figure 12: Student form for focus group participation

4.1.3. Preparing to collect the data

Preparing for data collection in my case study has been done prior to data collection. The first step was contacting Qassim Medical School to gain their cooperation (Soy, 1997) Acceptance of Qassim Medical School to integrate an inter-sessional facilitated online discussion forum with conventional PBL in the growth and development course was obtained in advance. That enabled me to access the VLE system beforehand. Both acceptance of the school and access to the VLE allowed me to develop the online model based on the conceptual model, and to train the participants before the intervention began. Details of online model development and the training are provided in the next sections.

Preparation for collecting the large data set generated from the case study was planned prior to commencement of fieldwork. All qualitative data (groups' posts, interviews transcripts), was brought together using Computer Assisted/Aided Qualitative Data Analysis Software (CAQDAS), such as NVIVO. NVIVO is a specialized qualitative data analysis software (QSR International, 2014). Using such software programs has potential advantages, particularly in my case study (multi-methods case study). They provide an organized storage system in a single location and offer quick and easy coding and access to large amounts of data (Robson, 2011; Weitzman, 2000).

4.1.4. Collect data in the field

Data were collected in a convergent manner (Yin, 2009). A multi-method approach was used to reach a deeper understanding of the complex case study phenomenon (Figure 13).

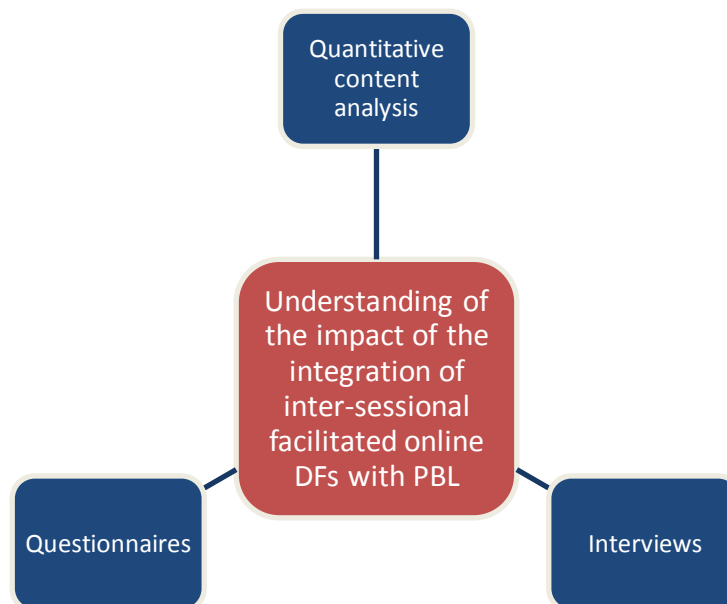


Figure 13: Convergence of evidence

In the following section I will explain how the field was made ready for the data collection, starting from developing the online model, training participants and conducting the data collection using the instruments explained above.

4.1.4.1. Development of the online model based on the conceptual framework

Part of the preparation was development of the online model which was to be integrated between the PBL sessions. In the following sections I will explain how I developed the online context based on the conceptual model.

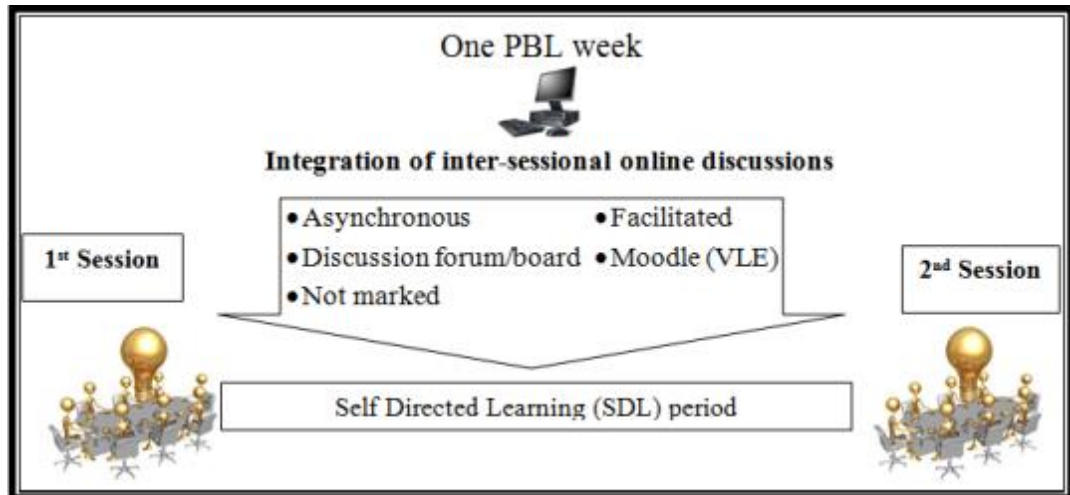


Figure 14: Conceptual model of the inter-sessional facilitated online discussion in PBL

- **Group setting**

In Moodle, the system allows the course administrator to select the group's name and divide students into groups. It also allows including a staff member in the group. Students in the online model were grouped according to their face-to-face PBL groups. In this block, there were 15 PBL groups (10 male and 5 female). Male groups were assigned identifiers A-J and female groups A (F)-E (F) (Figure 15). The tutor for each group was also added to the existing group. This created a virtual PBL room with exactly the same group name, students, and tutor as the conventional face-to-face PBL (Figure 15).

Home → My courses → Growth and Development 33 → Users → Groups

Groups Groupings Overview

Growth and Development 33 Groups

Groups:

- A (12)
- A(F) (11)
- B (13)
- B(F) (12)
- C (13)
- C(F) (12)
- D (11)
- D(F) (12)
- E (11)
- E(F) (12)
- F (11)
- G (11)
- H (11)
- I (11)
- J (11)

[Edit group settings](#)

[Delete selected group](#)

[Create group](#)

[Auto-create groups](#)

[Import groups](#)

Members of: J (11)

Staff

Dr

Student

[Add/remove users](#)

Figure 15: Grouping students and their tutor in the online model

Discussion topics of the groups can be visible to all groups or be exclusive to the specific group's members (Figure 16). It has been set exclusively to the group members, because in the pilot intervention it was visible in the first week and a few students copied others' work and posted it on their own forums (Alamro, 2010). At the end of the second PBL session (end of the week), visibility was set to be available to all to make the content sharable.

Groups

Group mode ?

Force group mode ?

Default grouping

Figure 16: Control of topic visibility

- **Discussion forums and topic development**

Each week, a PBL forum was created bearing the number of the week. For instance, the 2nd week forum was named 'PBL-2' (Figure 17). Forums could only be created by people who were authorized, such as the administrator and tutors, but not students. The forum could include an unlimited number of topics/threads.



Figure 17: PBL forum created per week

Topics/threads of a forum can be created by any registered user in the course, including students and tutors. The students were requested to create only one topic for each PBL, i.e., one topic/thread per week, to make participants focus on one discussion forum rather than moving from one thread to another. Using only one thread will also simulate the face-to-face class session and subsequently form a virtual PBL room (Figure 18).

 A screenshot of a discussion forum interface. At the top, there is a breadcrumb trail: "Home → My courses → Growth and Development 33 → Topic 4 → PBL-4". Below this, there is a dropdown menu for "Separate groups" set to "All participants" and a red text instruction: "Please keep it all in one discussion forum". Below that is a button labeled "Add a new discussion topic". The main part of the screenshot is a table with the following data:

Discussion	Started by	Group	Replies	Last post
Delayed Puberty	[User Icon]	D(F)	87	
Let's discuss this	[User Icon]	A(F)	83	
Learning Issues.	[User Icon]	B(F)	41	
adolescence(A shy boy)	[User Icon]	E	70	
PBL4:A shy boy	[User Icon]	E(F)	29	

 There are two large blue rectangular boxes overlaid on the table, one covering the 'Started by' column and another covering the 'Last post' column.

Figure 18: A topic for each group for the weekly problem

- **Training of the course members**

Different aspects should be considered during training for utilizing online discussion forums for educational purposes. They include, first, the role of the participants (students and tutors) in the online community; second, what

is expected from the participants (Rovai, 2007; Palloff and Pratt, 2002). I had considered all the aforementioned aspects while the two workshops were conducted. I conducted one for the students and another for the tutors.

- **Tutor training**

A few days before the course began, a workshop was conducted for staff assigned as tutors for the conventional PBL. Tutors were invited by an email from the vice dean for academic affairs, who advocated the project process (see appendix 11).

The workshop was conducted in one hour, divided into theoretical and practical parts. First, I delivered a presentation, followed by a practical explanation of steps needed for the intervention. The PowerPoint presentation was to introduce the tutors to the concept of integration of online learning with face-to-face activities (see appendix 12). I illustrated the definition and rationale of the integration, and how it would help students and tutors. It also showed the participants' roles (students and tutors), to ensure that the idea had been clearly grasped and maximize effective practice during the intervention. I illuminated the criteria of how the content would be evaluated, so the tutors became oriented to knowledge construction levels (showing Gunawardena et al.'s model (1997)). In addition to explaining how their effective facilitation will enhance knowledge construction. I also shared the pilot study results and what has been concluded from the study.

In the practical part, the tutors were trained in the skills important to the project, such as how to navigate in the e-learning website, log-in and engage in the virtual PBL virtual room (the discussion forum and the group's topic). Tutors were also shown how to reply to, add, and delete a post. I showed how to upload learning material for students and how to refer students to a reference, such as a website. They were told about the 10-minute questionnaire, which would be administered at the end of the block, assessing their perceived satisfaction of integration of online discussion between PBL sessions, in addition to the individual interviews.

Finally, my and the information technologist's contact details were provided for the audience for any inquiries or technical support.

- **Student Training**

In the first day of the block, students were introduced to the project by receiving a presentation (See appendix 13). It began with a question: "What are the problems you encounter with the PBL?" Following a brainstorming session, they were asked: "what is/are the expected solution/s?" This was to make the students recognize the problems and find the solution/s themselves, which made them excited to start the experience. They were then shown the aims and objectives of the project and how it would help them to overcome their current issues, and in addition, that it might advance their learning and enhance assessment reliability in the PBL. Students were informed of their colleagues' perception of the pilot study, and how they found it useful. I informed them that a 10-minute questionnaire would be administered at the end of the block assessing their perceived satisfaction of integration of online discussion between PBL sessions, in addition to a group interview.

This was followed by showing students the steps they needed to access their virtual PBL room, and how to create a topic, reply, post, and upload a resource, e.g., reading materials and pictures. I emphasized the importance of creating only one discussion topic for each problem/scenario, preventing student and tutor confusion and keeping the discussion focused. A scribe/note-taker role was clarified, in which s/he should create and post the learning issues by the end of the first session. The group members could also do this. All discussion topics had to be posted by 6pm (on the day of the 1st session) to have the virtual PBL ready for discussion. Students were asked to cite the sources they used. Finally, my and the information technologist's contact details were provided for the students for inquiries and/or technical support, if needed.

For students who were absent or who arrived late, the researcher created a Word file illustrating how to engage with their virtual PBL room, post and reply (see appendix 14).

Finally, at this early stage, it was verified that:

- Tutors and students have their own valid usernames and passwords
- Tutors have their own PCs at the University and they can access the forums from home.
- Most students have their own computers or tablets (e.g. iPad), and
- Internet access is available on and off campus.

If a student does not have a PC, laptop, or a tablet, there are computers on the university campus, which has access to the internet.

- **Implementation**

After the training, the class was divided into their PBL groups to start the first session of the first week. Later in the same day, students started posting on the discussion forum.

Weekly, before the first session, the PBL forum was created and the virtual PBL rooms made visible of the existing week, in which the student can only access and see his/her group. After the second session, the discussion forums were made accessible to all students, i.e., they could view others' discussions. Forums were made accessible for two reasons. First, students might benefit from others' discussion and knowledge. Secondly, looking at other groups' threads might encourage students to participate.

From day one, crucial points were followed up: 1) time of the discussion topic creation; 2) involvement of all group members (including the tutor), and making sure that no student or staff had a technical problem; 3) maintaining the discussion in one topic; 4) deleting of unacceptable (e.g. off-topic, offensive, etc.) posts. Finally, throughout the four weeks, emails were sent to the tutor if s/he did not participate, providing technical support if needed and encouraging her/him to participate. As part of the follow-up, another booster email was sent to ensure that all tutors participated (see appendix 15).

4.1.4.2. Field data collection: R Q 1: content to be analysed (posts)

All participants' posts and activities on the VLE system (MOODEL) were recorded and saved. All posts have been retrieved to be uploaded to NVIVO and then coded.

4.1.4.3. Field data collection: R Q 2, 3, 4, 5, 6 and 7: questionnaires and interviews

- **Field data collection: Questionnaires**

As noted before, both tutors' and students' questionnaires were administered online because of the advantages that online completion offers. It reduces the time needed to distribute, gather and process data, and gathered data can be processed automatically (Cohen et al., 2007). It also allows the researcher to reach anybody easily at any place, for instance, tutors assigned to teach in a different city. Thus, email was a suitable way to reach them easily.

The students' questionnaire was distributed by utilising one of the services provided by Moodle system, where the questionnaire was uploaded and administered through the system (

Figure 19 and Figure 20).

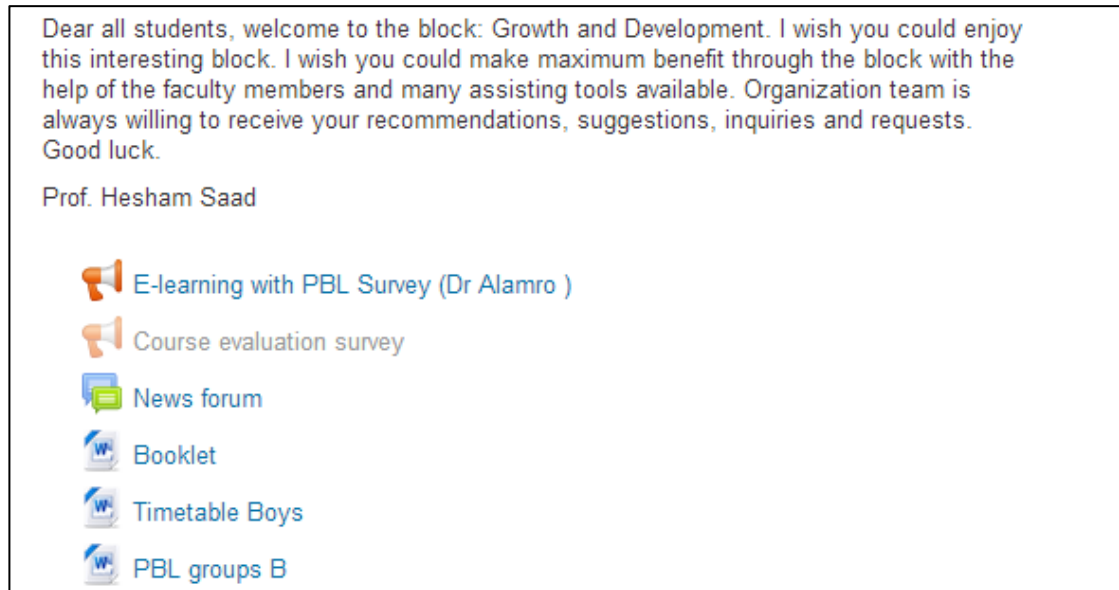


Figure 19: Appearance of the questionnaire on the online interface

COMPLETION OF THE QUESTIONNAIRE AND RETURN THE Q WILL BE REGARD AS AGREEMENT TO TAKE PART IN THE STUDY

Contact details for further information:

The researcher: Dr Ahmad Alamro

Email: asalamro@gmail.com

Mobile No.: 0555133800

+

1() The presentation (done by dr. Ahmad Alamro) was useful*

- Not selected
- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Figure 20: Students' questionnaire appearance in Moodle

The tutors' questionnaire was distributed and the data collected using a Google form (Figure 21), and it was distributed through an email. A reminder email was sent a few days later. The email contained the form in the body of the email, as well as a link in case the recipient encounters a problem in submitting the form.

COMPLETION OF THE QUESTIONNAIRE AND RETURN OF THE QUESTIONANIRE WILL BE REGARDED AS AGREEMENT TO TAKE PART IN THE STUDY.

Contact details for further information:
 The researcher: Dr Ahmad Alamro
 Email: asalamro@gmail.com
 Mobile No.: 0555133800
 *Required

My group is:
 for example: A, A(F), H, C(F)...etc

The presentation (done by dr. Ahmad Alamro) was useful *

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

not observed

Figure 21: Tutor's questionnaire

• **Field data collection: Individual interviews**

Six tutors have been interviewed, 3 males and 3 females. The selected male tutors have been invited personally, while female tutors have been invited through the phone. Male tutors' interviews were conducted in their offices at Qassim Medical School, Qassim University, Saudi Arabia, whereas female tutors' interviews were conducted over the phone (telephone interview) due to the gender segregation. Telephone interview was the only way to interview female tutors. The main disadvantage of a telephone interview is the lack of observation of non-verbal responses; however, that could help reduce bias because of interviewer influences on responses (Robson, 2011; Bryman, 2008). The length of the interviews averaged between 15-30 minutes.

Before starting, I reassured the interviewees about anonymity and confidentiality, and that though the interview will be recorded, the recorded files will be destroyed immediately after transcription. I used a digital recorder because it was crucial to focus on the conversation and give appropriate eye contact and non-verbal communication to the interviewee (Marczyk et al., 2010). Moreover, Patton asserts that it poor technique "if the interviewer fails to capture the actual words of the person being interviewed" (1990, P 347). Thus, recording the interviews was mandatory.

In all interviews, I started by introducing the coming questions and then continued with a general question about what they expected from the intervention. It was necessary to start this way to "break the ice", which encouraged tutors to show their views more explicitly. I took notes, which helped me to go back to some questions and ask for further details (Gray, 2004).

There are several skills that researchers agree are important that I considered during interviews. The basic interview skills that an interviewer should consider are active listening, good attentive behaviour, appearing physically relaxed, making eye contact and responding verbally (Anderson and Arsenault, 1998; Cohen et al., 2007; Gray, 2004; Robson, 2011). These skills will maintain a healthy interview and indicate to the interviewee that the interviewer understands what is being communicated.

- **Field data collection: Focus group interviews**

Eleven female students participated in the focus group, while nine male students appeared for the focus group. In the literature, there is no ideal number of participants for a focus group interview. Some researchers suggested it is 6-9, while others opt for 8-12 participants (Stewart et al., 1990; Robson, 2011).

Both interviews were conducted in Qassim Medical School, in the students' free time. The male focus group was conducted in the male campus, in one of the PBL rooms. The female focus group was conducted in a PBL room through teleconferencing (using only the sound option) as the segregation of the genders is obligatory. Conducting focus groups through teleconferencing using sounds only has the same limitation as those reported for the telephone interview (see section "Conducting individual interviews", page 39) However, it could be even worse, as the interviewer will not recognise who speaks and who does not. Taking that in consideration, I have asked a colleague (not related to the research) to join the session, and she encouraged students to contribute in the focus group.

In both focus groups, I started with a general question (about their expectation of the intervention), which can be considered a brainstorming question. I followed with the subsequent questions, intervening when necessary. Bryman (2008) claims that it is crucial in a focus group to start with a general question to stimulate interviewees. In some of the questions, I needed to probe to enhance students' interaction and to encourage them to elaborate more on some responses, and that helped reach deeper insight. Each interview took one hour and was conducted with no issues.

4.1.5. Evaluate and analyse the data.

In this section I will elaborate on what strategy has been used to analyse the case study and details of how data from each instrument have been analysed and presented.

According to Yin (2009; p 132) analytic strategies, in my research "Developing a case description", has been adopted. In my case study there were no research propositions, as it is not yet clear what effect the intervention might have. Tellis (1997) states that "if theoretical propositions are not present, then the researcher could consider developing a descriptive framework around which the case study is organized". The analysis and presentation of my case study will start with the main outcome of the case study (knowledge construction) to be explained in related to the unit of analysis (quantitative content analysis).

This is followed by analysis of data gathered from mixed quantitative and qualitative research (questionnaires and interviews) central to the entire case study, to show the whole picture(R Q 3-9) (Figure 22). According to (Creswell and Clark, 2011) mixed methods can be implemented concurrently (at the same time) or sequentially (different phases). In my case study, all data were collected after the end of the Growth and Development block exam, by when participants' opinions were well formalized, particularly after attending the exam.

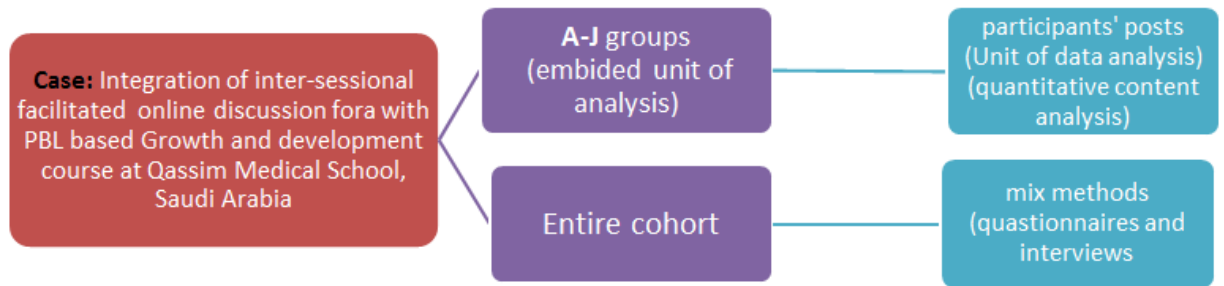


Figure 22: Embedded units and entire cohort data analysis

4.1.5.1. Instruments data analysis and presentation

In this section, I will explain how raw data from each instrument have been analysed, and the process of analysis, and how results will be presented.

- **R Q 1: Content analysis of the posts (knowledge construction and social presence) process and presentation**

Posts on the online discussion forums have been saved in PDF files and then used in NVIVO for coding of the two purposes, knowledge construction and social presence.

First, indicators and categories have been created as nodes in NVIVO system (Figure 23, and Figure 24).The posts were coded based on the evaluation model. For instance, in the knowledge construction model, the whole post is the unit of coding (Gunawardena et al., 1997), while in the social presence evaluation, model coding is based on the sentence (Rourke et al., 2001).

Nodes			
Name	Sources	References	
Phase 0	0	0	
PhA	1	2	
Phase I	0	0	
PhA	1	1	
PhB	1	1	
PhC	4	47	
PhD	2	2	
PhE	2	2	
Phase II	0	0	
PhA	0	0	
PhB	0	0	

Figure 23: Example of knowledge construction model's phases

Nodes			
Name	Sources	References	
Affective	0	0	
Expression of emotio	4	6	
Self-disclosure	0	0	
Use of humor	0	0	
Cohesive	0	0	
Addresses or refers t	0	0	
Phatics, salutations	3	7	
Vocatives	3	9	
Interactive	0	0	
Asking questions	2	2	
Complimenting, expr	3	5	
Continuing a thread	0	0	
Expressing agreeme	0	0	
Quoting from others'	1	1	
Referring explicitly to	1	1	

Figure 24: Categories and indicators of social presence model

The quantity of codes of the two evaluation models were represented in bar charts, with numerical representations based on each evaluation model's coded unit. For instance, in the knowledge construction evaluation model, numbers represent how many posts have been coded out of the total posts (Gunawardena et al., 1997). Whereas in the social presence evaluation model, the number represents how many sentences have been coded under the model categories (Rourke et al., 2001).

- **R Q 2, 3, 4, 5, 6, and 7: Questionnaire and interview data analysis and presentation**

A. Questionnaire data analysis and data presentation

Data collected through questionnaires was first stored in the place they were administered. For instance, students' questionnaire responses were saved in the VLE (Moodle) system. At the time of analysis, data were exported to Excel (Microsoft office software). The exported spreadsheet showed responses in words (i.e., strongly agree). I have replaced them with numbers (e.g., strongly agree=5) to be readable by SPSS, which is a quantitative analysis software program. The tutors' questionnaire was distributed using a Google form. Data was stored similar to tutors' responses (in words) in the VLE, therefore, words transferred to numbers before analysis using SPSS.

The data has been analysed at the level of exploratory data analysis, applying descriptive statistics (Rugg and Petre, 2007; Cohen et al., 2007). Since the objective is to identify participants' perception, the questionnaires were designed to collect their opinions. In other words, the objective was to gather participants' opinions of the intervention, so questionnaires were descriptively designed and afterward descriptively analysed.

I have calculated the mean/average of participants' responses to each item. In addition, I considered frequencies, representing, for instance, the number of students who found the integration helped them to understand the weekly problem. Finally, data were presented in tables, and striking results were further interpreted in text. Each dimension was represented separately, and in each dimension there are two tables. One shows female students' responses and another table shows male students' responses for comparison; in a separate section, tutors' perception was presented.

B. Individual interviews data analysis and data presentation

The interviews were conducted in the tutors' offices at Qassim Medical School. They were conducted in English, as all speak English fluently. Immediately after the interview the recorded interview file was uploaded to

the Leeds University server, in 'N drive', in a folder that required a password and could only be accessed by the researcher.

The first step after conducting the interview was transcription (transferring data from audio recording to written text). Audio recordings were transcribed by a professional who is not related to Qassim Medical School or to any one of the tutors. I have listened to all interviews and read all transcripts before analysis commenced to ensure a reliable transcribed text. Listening to the recording and reading the transcript of the whole interview is highly recommended (Wolcott, 1994; Cohen et al., 2007; Robson, 2011). It is necessary to familiarize oneself with data and note down ideas and data will "speak for themselves" (Wolcott, 1994, P 13)

Since it is an exploratory case study, the data of the interviews has been analysed adopting thematic analysis, which is one of the most common approaches in qualitative data analysis (Bryman, 2008). It is used as a realistic methods to report meanings, experiences and reality of participants (Robson, 2011). Researchers perform thematic analysis in one of two ways: either they start analysis without predetermined themes (inductive thematic analysis) (for example in grounded theory), or the themes are determined beforehand, from the literature or based on the research question (deductive thematic analysis) (Robson, 2011; Wilkinson and Birmingham, 2003).

Based on the research questions and theoretical framework it was necessary to explore these areas that may affect the quality of the intervention and then affect the interaction of a participant. These areas are the themes that need to be explored. After the themes were determined, an opinion of two researchers (my supervisors) was considered to maximise the trustworthiness of the interviews analysis. The areas/themes were participants' perceived satisfaction and learning and training towards the intervention. Thus, the present general and broad themes were expectations, training, advantages, limitations, motivation, interaction/collaboration and impact. Braun and Clarke (2006: p 12) remark that inductive thematic analysis "would tend to be driven by the researcher's theoretical or analytic interest in the area, and is thus more explicitly analyst-

driven”. Additionally, subcategories were developed during the analysis. Despite the plan to determine the themes in advance, analysis was flexible so as not to neglect new information from the participants. Robson (2011) notices that predetermined themes might bias the researchers toward one aspect of the data and cause them to ignore others. This limitation has been considered in my interviewing process by increasing flexibility. **To ensure flexibility and enhance reliability, an independent person (who re-coded the discussion forums) reviewed the transcript and the codes.**

After transcription, all interviews were brought together in one NVIVO file. This helped in handling the data and retrieving quotes from different interviews under one theme quickly. Using NVIVO made the management and interpretation of data more efficient (Weitzman, 2000).

In NVIVO, a node is a theme (e.g., training in Figure 25), a group of quotes/data in one subcategory is a code (e.g., clarity in Figure 25), and whatever was presented in the transcript as having the same meaning was coded under such subcategory (Rubin and Rubin, 2012). This helped focus on the details. Figure 25 shows an example of the hierarchy of coding regarding part of a quote from a tutor.

Name	Sources	References	Created On
Training	0	0	10/02/2013 12
clarity	0	0	19/03/2013 10:
clarification	2	2	05/02/2013 03:
clearer training	1	2	12/02/2013 12:
Need for the training	0	0	19/03/2013 10:
importance of training	1	1	05/02/2013 03:
it was useful, it was helpful because it was ori	1	1	11/02/2013 16:
Of course this presentation is a must as It sh	1	1	12/02/2013 12:
Well it was good, it was useful. It gives a gen	1	1	11/02/2013 17:
Well it was helpful to elaborate on the concep	1	1	11/02/2013 17:

clarification [x]

<Internals\AMANY-M> - \$ 1 reference coded [2.44% Coverage]

Reference 1 - 2.44% Coverage

I remember that I asked you some questions when something was unclear to me: you answered

Figure 25: Themes, codes and quotes in NVIVO

Finally, themes, subthemes/subcategories and quotes from the interviews were presented with their interpretations in a descriptive manner, including

comparisons between tutors' responses if they were found. Overall, the development of the question and handling of the data from interviews in this study was led by the primary aim of using interviews to provide in-depth understanding of the tutors' perception of the intervention. The analysis of interviews was mostly guided by the aim proposed by Rubin and Rubin (Rubin and Rubin, 2012), that the goal of interview analysis is "to find themes that both explain the research arena and fit together in a way that a reader can understand "

- **Focus group data analysis and data presentation**

I have analysed the focus groups using a similar approach to that which I have applied in analysis of the individual interviews: thematic analysis. Morgan (2008, p 354) states that focus groups "show many similarities with individual interviews". However, the process of analysis was different.

Interview audio recordings were transcribed in Arabic. Male students' interviews were transcribed without issues. However, it was necessary to have support from one of the interviewees in the female interview to indicate the speaker of each response, as she could recognize names and voices.

Firstly, it was not possible to use NVIVO to handle the transcription of focus groups, as NVIVO does not recognize Arabic. Therefore, Microsoft Word was adopted. I read and listened to the interviews several times before starting the real analysis/coding, to familiarize myself with the material. The general themes have been determined beforehand: expectations, training; advantages, limitations, motivation and impact of the intervention. Microsoft Word has been adopted for coding (comment tool). First, it was coded before translation (appendix 16). All quotes coded were then organized in a table (appendix 17). Finally, they were translated in English. A translation of a text, according to (Esposito, 2001), cannot possibly reflect the exact meaning in cross-language research. **Having realized this issue, and to enhance reliability, I asked an Arabic-speaking professional, who is an English teacher, to review the translated quotes. To ensure flexibility and enhance reliability, an independent person (who re-coded the discussion forums) reviewed the transcript and the codes.**

Finally, themes, subthemes/subcategories and quotes from the interviews were presented in descriptive interpretations, including comparisons between students' responses. Generally, the development of the question and handling of the data of focus groups in this study were led by the main aim of using interviews to provide deep understanding of the students' perception towards the intervention.

4.1.6. Prepare the report.

The whole thesis (case study report) was written adopting Linear-Analytic Structure (Yin, 2009). Runeson and Höst (Runeson and Höst, 2009) claim that linear–analytic structure is the most accepted structure. The structure is the sequence of chapters, starting with the issue or problem being studied, followed by methods applied, and then presenting results and analysis, And finally conclusions and recommendations for further research (Yin, 2009; Runeson and Höst, 2009).

4.2. Quality issues of the case study

Based on Paré and Yin (2009; 2002), there are four tests that are commonly applied to establish the quality of case study research. They are:

- 1- Construct validity
- 2- Internal validity
- 3- External validity
- 4- Reliability

Construct validity requires the researcher to apply the correct measures to evaluate the concept being studied (Yin, 2009). This test was addressed in two ways in this case study, in order to enhance the study construct validity. First, multiple resources of evidence were used, aiming to study the phenomenon from different perspectives. Secondly, contentious feedback was received from my supervisors on the report, which ensured the construct's validity by suggestions and advices (Ramanathan, 2009).

Internal validity is concerned with establishment of causal relationships, and Yin (2009, p 40) states that the test is for “ explanatory or causal studies only and not for descriptive exploratory studies”. This case is an exploratory case

study aiming to understand an ambiguous and complex phenomenon that has not been explained. However, based on the theoretical framework, (Chapter three) that there are factors might affect participants' interaction in an asynchronous online discussion. They are: interaction of participants, satisfaction, flexibility, accessibility and technical support of the online model and training provided (Research questions 2-5). These factors need to be explored to provide evidence whether they have an effect or not. Hence, internal validity needed to be established, and it was addressed by providing a chain of evidence through using sufficient citations and quotes from interviews and questionnaires results to allow the reader to track the conclusion (Paré, 2002; Yin, 2009; Ramanathan, 2009). This is in addition to data and methodological triangulation, as different types of data were collected through different methods from different resources to address the research questions (Ramanathan, 2009).

External validity refers to the generalizability of the study finding (Yin, 2009). Although the appropriate ensuring of generalizability can be achieved through conducting multiple-case design (replication), there are other tactics used to ensure external validity. I frequently discussed the data and how it was interpreted with my supervisors (Paré, 2002). In addition to the analytical generalizability, a theoretical framework and conceptual model have been developed and provide details of how the case study was approached (*ibid*). This will help other researchers to implement the same methodology in other situations. More details of the generalizability of the case study will be illustrated in the coming section (Research methodology limitations).

Reliability refers to the repeatability of the findings, so if other researchers conduct the same case study they will have similar results (Yin, 2009). Two ways were proposed by Yin and Paré (2009; 2002) to enhance reliability in a case study. The first is to use a case study protocol, which is essential in a multiple case study (Yin, 2009). In my case, study reliability was established through the 6 steps (mentioned earlier in this chapter) (Soy, 1997). The six steps were guidelines to ensure that the data can be collected, presented and analysed in a repeatable and reliable manner. Secondly, documentation was recommended to enhance reliability. All data were stored in a personal

file in the Leeds University N drive. In addition, NVIVO was applied to organize and store the analysed data (Ramanathan, 2009).

Table 9: Reliability test, their definitions, and tactics adopted in the case study
(adopted from (Paré, 2002; Yin, 2009: p 40))

Test		Case Study Tactic	Tactics implemented in this study
Construct Validity	Establishing correct operational measures for the concepts being studied	Use multiple sources of evidence	Content analysis, questionnaires and interviews
		Establish a chain of evidence	Use sufficient citations and quotes
		Have key informants review case study report	Supervisors' feedback
Internal Validity	Establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from creating spurious relationships	Establish a chain of evidence	Provide citations, quotes and questionnaire results
		Triangulate evidence	Data and methodological triangulation were used in a convergent manner
External Validity	Establishing the domain within which a study's findings can be generalized	Review the findings	By my supervisors
		Analytical generalizability	Clear comprehensive description
Reliability	Demonstrating that the operations of a study can be repeated, with the same results	Use case study protocol	Use case study framework (Soy, 1997)
		Develop a case study database	Appropriately sorting, coding and storing the data by using NVIVO software and all are electrical documents in one file

4.2.1. Research methodology limitation

Despite the fact that a case study is an appropriate research design for my research purpose and its circumstances, it has been criticized that it lacks rigor in addressing the issue of generalizability (Noor, 2008, cited (Johnson 1994); Yin, 2009; Savenye and Robinson, 2004; Flyvbjerg, 2006). Moreover,

Savenye and Robinson (2004) claim results of a case study are not generalizable, they may be applied to generate questions to be investigated in an experiment. On the other hand, researchers assert that generalizability in case study research comes from analytical generalization, rather than statistical generalization (Robson, 2011; Yin, 2009).

Generalizability is “how much, how well, how closely the findings from the current sample apply to the entire population” (VanderStoep and Johnston, 2008. p 26). Schwandt (2007, p 5) defines analytic generalization as the state in which “the inquirer attempts to link findings from a particular case to a theory.” Theory means, for instance, a set of theoretical tools, models, or concepts rather than a formalized set of propositions (ibid). A case study’s generalizability depends on applying the study’s theoretical framework to establish a logic that might be suitable to other circumstances (Yin, 2011). Thomas (2010, p 23) states that the case study is especially effective for “getting a rich picture and gaining analytical insights from it”. Similarly, in my research, I am expecting that the methods that have been used and the logic that has been followed would be generalizable to similar situations. The situations/schools that encounter the same issues faced at Qassim Medical School (e.g., language, separation between the two sessions without follow up, quietness of shy students and/or dominance of outspoken students, and poor tutoring skills); or at a school that wants to enhance collaborative learning and sharing of knowledge and evaluate its impact.

Finally, the high ecological validity of my research nature ensured its generalizability. Ecological validity is demonstrated when the researcher does not manipulate the variables or conditions and the research represent the reality. As previously described, as a researcher, I had no control over the variables.

4.2.2. Role of the researcher (insider-researcher)

I am a staff member of Qassim Medical School, where the case study has been conducted. Under these circumstances, I was considered an insider-researcher. Insider-researchers, according to Coghlan (2003: p 456), are

those who “undertake research in and on their own organization while a complete permanent member”.

Being an insider-researcher has advantages and disadvantages. Based on their literature review, Unluer and Rooney (Unluer, 2012; Rooney, 2005) report that being an insider helps in several aspects which facilitate the research process. Advantages include speaking the same language of the organization, understanding the local values and knowing the formal and informal power structure. These advantages eased conducting my case study, in which I obtained permission to conduct the research, to interview, and to get access to the VLE and students' marks easily.

Another value of being an insider, Coghlan and Costley et al. (2003; 2010) assert, is that the researcher has a comprehensive understanding of the research circumstances in advance. An outsider-researcher must exert effort to have an insight into the research context and develop understanding of the host institution. I have graduated from Qassim Medical School, where I lived the experience in the school as a student as well. This adds weight to my insight on the research setting in addition to being an insider-researcher (staff member).

However, to be an insider-researcher has disadvantages which may impact the researchers' bias, which threaten validity or honesty (Rooney, 2005). According to Rooney (2005: p. 6) researcher bias might take place if :

- the researcher's relationships with subjects may have a negative impact on the subject's behaviour, such that they behave in a way that they would not normally,
- The researcher's tacit knowledge may lead them to misinterpret data or make false assumptions,
- The researcher's insider knowledge could lead them to make assumptions and miss potentially important information,
- The researcher's moral/political/cultural standpoints may lead them to subconsciously distort data, or

- The researcher's politics, loyalties, or hidden agendas lead to misrepresentations.

To be an insider-researcher could affect the depth of the knowledge provided, as participants may tend to assume you already know what they know (Unluer, 2012).

All these situations were taken into consideration and did not take place during the conduction and analysis of my research. **Tutors and students have been reassured several times that there will not be any consequences for the information given. The vice dean, also, asked the tutors to provide confidentiality to assist the school in improvement. The interview data has been reviewed by an independent body, who asked to review the 1st interview data to assure the depth and comprehensiveness of the data before continuing with the others. Piloting an interview made me aware of these issues and overcome them.**

4.2.3. Ethical consideration

Protecting participants is an essential consideration in any research, and includes providing participants with enough information about the study to enable them to make an informed decision about participation (Thompson and Walker, 1998). The following ethical principles were related to my study and were considered throughout the research. The research has been reviewed and ethically approved by:

1. The Research ethics committee at Qassim Medical School, Qassim University (appendix 18), and
2. The Medicine and Dentistry Educational Research Ethics Committee (EdREC) of the University of Leeds, UK (appendix 19)

4.2.3.1. Access and acceptance

Access to and the acceptance of the institution or organization where the research is to be conducted is important to obtain at an early stage of the research (Cohen et al., 2007). Acceptance is achieved by permission from a gatekeeper before commencing (Homan, 2001). In my case study, Qassim

Medical School is the institute that granted permission. Details of the research have been explained to the dean of the medical school. Qassim Medical School did not allow research without ethical approval from the ethical approval committee (appendix 18).

4.2.3.2. Informed consent

The next principle is Informed consent, which refers to giving the right to participants not to participate in the study after they learn about the study details (Cohen et al., 2007). A participant's information sheet for each instrument was developed before the instruments were used. The purpose of the participant information sheet was: to highlight the aim of the research, to explain to respondents its importance, to give details about the study and what will happen to the data; to assure confidentiality, and to encourage students' replies by explaining the value of their responses, and explain the study's voluntary basis (Cohen et al., 2007).

1. Content analysis participant information sheet and consent form (appendix 20 and 21),
2. End of block marks analysis participant information sheet and consent form (appendix 22 and 23),
3. Questionnaire participant information sheet (appendix 24),
4. Individual interview participant information sheet and consent form (appendix 25 and 26) and
5. Focus group participant information sheet and consent form (appendix 27 and 28).

4.2.3.3. Anonymity of participants

The third ethics principle is anonymity of participants, in which data was analysed and presented with no reference to participants' identities (Cohen et al., 2007; Frankfort-Nachmias and Nachmias, 2000). This was clearly communicated to Qassim Medical School and participants.

4.2.3.4. Confidentiality

To ensure privacy, the confidentiality issue was addressed in addition to anonymity. Confidentiality is an ethical principle to be addressed in my study (Cohen et al., 2007). All participants (tutors and students) were advised that any information given was treated in strict confidence and that the raw data including transcripts were not made available for any other persons or purposes. The questionnaire did not request names of participants. Interview participants were again assured confidentiality, thus, for the individual interview, interviewees (with a given a character), interview transcripts and audio files will be saved with the assigned characters. Each focus group will be given a number, and each participant was given a random character that ensured confidentiality. The transcripts and audio files will be saved with the assigned number. Audio files were destroyed immediately after they were transcribed. The online discussion will be presented only after the names are replaced by characters.

For privacy and data storage, data were stored on the secure N Drive on the Leeds University system under one file (under the name "PhD data"), which is secured and protected with a password and accessible only by the researcher. All questionnaires, interviews (focus group and individual), transcripts, and content of online discussions (after names are replaced by characters) were stored in the above mentioned file. Only I, the researcher, was able to access the N drive from anywhere in the world through 'Connect to Desktop Anywhere' provided by Leeds University system.

4.3. Summary

This chapter shows the research design and methods applied to collect the data relevant to my study. I include the rationale for each tool and consideration of the tools' issues.

The research design is an exploratory mixed-method case study. The study's effective context is a complex real-life situation; I do not have control over the intervention and the boundaries between phenomenon and context are not clearly evident. A mixed-method approach has been implemented to gather as much evidence as possible to explore the phenomena. They include

qualitative (individual and focus group interviews) and quantitative methods (self-administered questionnaires and quantitative content analysis).

The chapter also includes a description of the case and identification of the units of analysis. Each PBL group was defined as a unit of analysis, and the whole picture is understood through investigation of participants' perceptions. In addition, quality issues of the case study are assured and discussed. Finally, ethical issues that could arise in my study were elaborated, as well as my role and how it could affect the study's outcomes.

The following chapter reveals the results that have been obtained by implementing the above-mentioned methods.

Chapter5: Results

5.1. Introduction

In the previous chapter, the research design and instruments applied have been discussed, in addition to justifications for their adoption. The chapter shows the limitations of the study and my role as a researcher. There were tactics that I have adopted to ensure quality. The chapter is concluded by explanation of ethical considerations.

In this chapter, I will present data that have been obtained through the methods explained before. The chapter will be presented according to the research questions, starting with results obtained from the content analysis. In addition, pictures (print screen) of the online discussion forums are used to show participants' interaction in the discussion forums. This is followed by the rest of the questions, for which data were collected by questionnaires, followed by the interviews. In some research questions (sections), quotes have been used as evidence. Due to the huge amount of data, synthesis of the findings will be reported in the next chapter (discussion). **End of block exam results were proposed to be additional data that is crucial to know if integration of discussion forums with PBL improve students' learning. However, analysis of the exam results (Growth and Development end of block results) showed that they are not reliable because the exam is comprehensive and included all the course objectives and there is no blue print for the exam. Another reason is that, the learning objectives/issues of the PBL were covered by other teaching and learning method which was a confounding factor.**

5.2. Demographic data

In the course records, 159 students are attending the Growth and Development block. 14 students dropped out by the end of the course.

Participants	Gender		Total
	Male	Female	
Tutors	10	5	15
Students	103	56	159

Regarding discussion forum participation, there were variations in the number of students who posted on the online discussion forums during the intervention. There were variations in performance among individuals, groups and variations in performance from one week to another (table 10 and 11). In the first week, 110 students posted on the discussion forums. A similar amount of students (109) posted during the second week. In the third week, an additional 14 students posted during the week (123). In the last week, 120 students contributed in the online discussion.

As for weekly performance, table 10 and 11 reveal that there were variations in weekly participation. In almost all groups, there were a lower number of posts in the first and the fourth weeks in comparison to the second and third week. The average number of posts per week was 35, 37, 63 and 31, respectively.

Student participation was unequal. Some students posted more than 10 posts, while other students only posted one or two posts per week. Some students did not post every week and only viewed/read the posts.

Table 10: Variations in student performance during the four weeks

	1 st week	2 nd week	3 rd week	4 th week
Number of students posted in DFs	110	109	123	102
Total number of posts every week	519	554	940	474

With regards to groups variations, Table 11 shows variations in terms of gender and in terms of groups of the same gender. The average number of posts by female users (total: 1002, mean: 200) was considerably greater than the male groups' average (total: 1489, mean: 149). Group A (females) reported the highest number of posts during the 4 weeks (W1-W4). On the other side, J (males) posted 298 posts/replies during the block, which was the highest among the male groups (Table 11). There was variation in number of posts throughout the block, excluding group A (females). Group J (males), for instance, in the 1st and 4th weeks posted/replied 38 and 27 posts, respectively. However, in the 2nd and 3rd weeks the posted 100 and 123

posts, respectively. The lowest number of posts by males was by group G, while for females it was group C (in the 2nd week they had only one post, which could be due to a technical issue). Group E was atypical, as most posts by students were by one student, and mainly in one week.

For tutors, as can be seen from Table 12, the number of posts by female tutors (5 groups) (total: 121, mean: 24) was significantly higher than the male tutors' posts (10 groups) (total: 64, mean: 6). This means that five female tutor posted double what was posted by ten male tutors. Tutors' contributions range from 51 posts/replies (group A female tutor) to zero/no posts (E male tutor) during the block. Three male tutors contributed only by one post through the four weeks (Table 12).

Table 11: Number of posts by students

No. of week	Students' Groups name /Number of posts														
	A	A(Female)	B	B(Female)	C	C(Female)	D	D(Female)	E	E(Female)	F	G	H	I	J
W1	10	84	15	80	22	37	48	29	19	67	17	5	41	7	38
W2	32	66	23	41	20	1	47	71	14	28	29	14	48	10	110
W3	22	67	26	44	88	48	52	63	170	43	55	31	63	45	123
W4	8	75	6	27	29	21	14	86	70	20	6	6	61	18	27
Total	72	292	70	196	159	107	161	249	273	158	107	56	213	80	298

Table 12: Number of posts by tutors

No. of week	Tutors' Groups name /Number of posts														
	A	A(Female)	B	B(Female)	C	C(Female)	D	D(Female)	E	E(Female)	F	G	H	I	J
W1	2	12	1	15	3	9	3	3	0	1	2	1	2	0	9
W2	2	11	0	12	8	0	0	2	0	0	2	0	0	0	1
W3	3	5	0	10	7	5	0	2	0	0	2	0	2	1	4
W4	0	8	0	14	6	2	0	1	0	9	1	0	2	0	0
Total	7	36	1	51	24	16	3	8	0	10	7	1	6	1	14

Regarding questionnaires, among 145 students, 80 (39 females and 41 males) completed the questionnaire (Response rate =55%). Fifteen tutors were involved in the study (10 males and 5 females). Eleven tutors responded to the questionnaire (RR= 73%).

Finally, ten female students attended the focus group, while nine male students appeared for the focus group. Six tutors participated (3 males and 3 females).

The following sections show the data/evidence obtained addressing the research question subject area.

5.3. R Q 1: Knowledge construction in the online discussion forums

I started analysing the students' posts using the coding schema of the interaction analysis model (IAM) (as discussed in methodology chapter), which was developed by Gunawardena and her colleagues (1997). After I completed the analysis, I noticed that almost all female and four male groups are different from others that they were higher in number of post and knowledge construction and social presence activities.. That led me to use another evaluation model, developed by Rourke et al. (2001), which evaluates the social presence of an online discussion participant. According to Rourke et al., social presence is a crucial factor for interaction to be maintained and for learning to take place online. In this study, results show that social presence has a positive impact on sustainability of the interaction and subsequent knowledge construction.

In the following sections, I will discuss the results obtained, starting with coding results. I commence with evaluation of knowledge construction and present results. After that, analyses of three consecutive end-of-block results which were not valid and reliable will be explained.

5.3.1. Evaluation of knowledge sharing and construction on DFs (content analysis)

Discussion forums were coded using the interaction analysis model (Gunawardena et al., 1997). The model includes five phases, and each phase comprises several indicators (appendix 5). Each phase is a level of knowledge construction. The first phase (sharing of knowledge) is the lowest, while the fifth phase is the highest level (application of new acquired knowledge) (Gunawardena et al., 1997). Results obtained by using interaction analysis model (IAM) are represented with a number of codes out of the total posts (all groups see appendix 29).

Almost all codes were in phase 1 (sharing of knowledge). There was no post coded in either phase 4 to 5. **Students begin using discussion forums after completing the first 5 steps of the seven-jumps face-to-face in the first session. During the 6th step (privet study), in which students are acquiring more knowledge, they commence using the discussion forums. Appendix 30 is a sample transcript from a discussion forum of one of the groups during one week. In most of the posts, students shared knowledge with their group members that related to the learning objectives of the weekly problem. They shared information through diagrams or text-based responses. The transcript, also, shows students asking for clarification of particular meanings. All of the abovementioned activities in the discussion forum are considered to be at the level of phase 1.**

Group J (male) is the highest coded group, followed by the female groups, which were characterized by high numbers of codes among the 15 groups (appendix 29). Comparatively, among the male groups, C, D and H groups have higher codes than other male groups. Compared to the number of posts, the groups mentioned above, which were coded higher in the IAM model, showed a high number of posts in the discussion forums (see Table 11 above). Finally, only group J (males) has shown five posts/replies that were coded in phase 3. Four groups' posts/replies were coded in phase two (AF (6 posts), D (1), EF (3) and J (6)).

The bar chart in Figure 26 reveals the results of the 3 highest (J, AF and BF) and 3 lowest (F, A, G) coded groups compared to the others. In all the groups, the ratio of coded posts to the posts and replies are nearly same. However, the total number of posts was different. Group J (191 coded posts) is the highest and G (36 posts) the lowest coded DF. In group J, out of 298 posts, 191 have been coded, while G group posted/replied 56 times, and 36 have been coded.

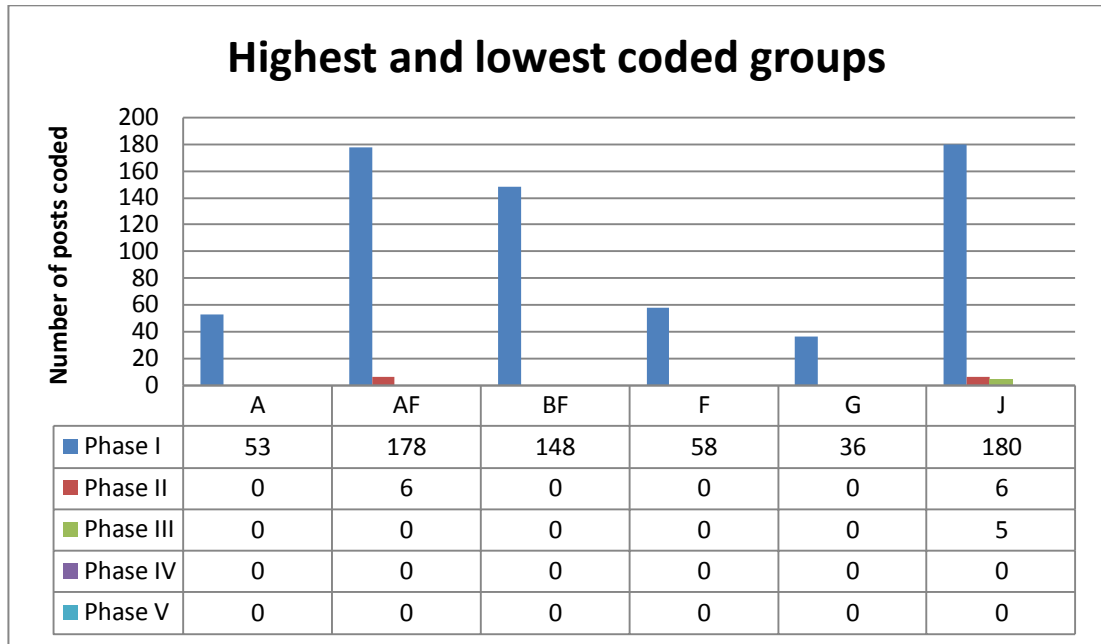


Figure 26: The three highest and lowest coded groups.

To understand what could be the cause of the variation and what made students sustain a high level of participation in some groups, I used a social presence evaluation coding model. It was implemented to explore whether social presence is the reason behind this difference (Rourke et al., 2001). Rourke et al (2001), claim that it correlates with online interaction.

5.3.2. Evaluation of social presence (content analysis)

Social presence has been analysed using Rourke and colleagues' model (2001) (appendix 6) by using the bar charts in appendix 30 and 31, showing the number times contributions of male and females students were coded, respectively.

Both charts (appendix 30 and 31 show the total codes under each category (e.g., Affective). There are variations in social presence among groups. With comparison to number of posts (see Table 11), groups with high social presence posted more than the others. Among male groups with a high number of posts, for instance groups J, C, H and D, coded higher in most of the categories, and group J is an outlier that was evaluated much higher (appendix 30).

On the other hand, most of female groups were evaluated high. Predominantly, group AF and BF are coded highly (appendix 31). In contrast, group EF's social presence was not very high compared with others. Groups AF and BF posted more than others in the discussion forums.

Figure 27 is a bar chart that visualizes comparison of the mean of number of codes of each category for both genders. Interestingly, females were highly socially present on the online discussion forums in all categories.

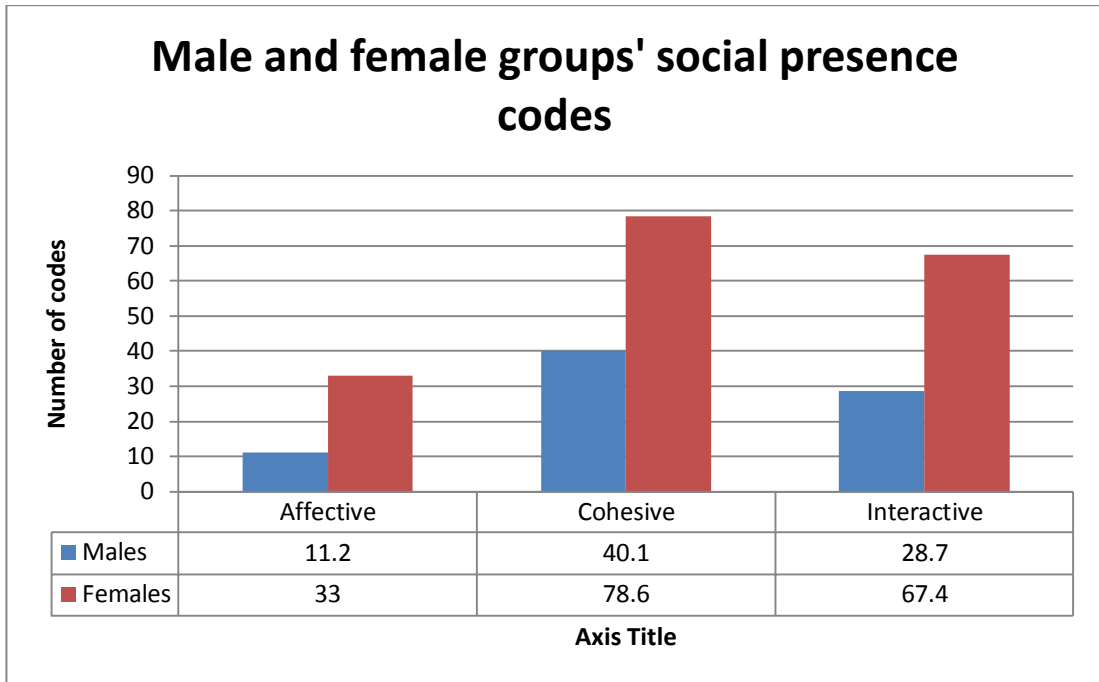


Figure 27: Comparison of means of social presence evaluation

Figure 28 shows the three highly and poorly coded groups in the knowledge construction evaluation model (IAM). It is clearly seen that the highest three groups (J, AF, BF) coded very high. In contrast, the lowest coded groups (F, A, G) were weakly socially present on the online forums.

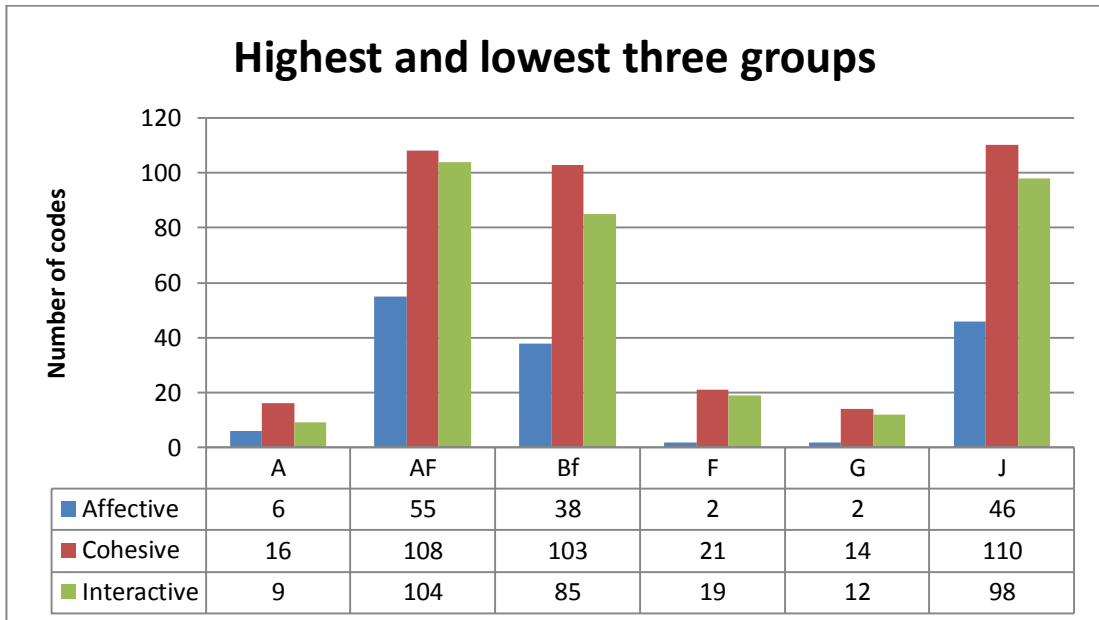


Figure 28: Social presence evaluation results of groups with highest and lowest number of posts of the 15 groups

5.4. R Q 2: participants' perception towards the training

The following section will represent the research questions (2-8). Under each question, the questionnaire's outcomes will be represented followed by interview results.

The tables below highlight the findings from these questionnaires, displaying the mean (average) as well. They are followed by quotes from interviews used to answer the research question and as evidence.

5.4.1. Questionnaires results

5.4.1.1. Students' perception

Responses from both male and female students on training were analysed. The majority of students were satisfied with the training session. The greatest satisfaction was observed in the question related to usefulness of the training (males (95%) and females (92%)). The second highest satisfaction of males was on the ability of development of the online discussion forum (89%), while for females it was the effective utilization of discussion forums (87%). There were 11 female students neutral about answering of their questions by the presenter, and six students from both groups disagreed (Table 13, Table 14).

Table 13: Students' perceptions of the training (males)

Training Evaluation				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
The presentation (done by Dr. Ahmad Alamro) was useful	0	2	39	4.44
In the presentation, the information was presented effectively	2	5	34	4.12
After attending the presentation, I am able to use MOODLE (discussion forum) effectively	3	6	32	4.20
After attending the presentation, I am able to develop effective online discussions	2	3	36	4.34
After attending the presentation, I know what my role is.	3	4	34	4.17
My question/s that I wanted to ask was/were answered by the presenter (Dr. Alamro).	4	5	32	4.17

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

Table 14: Students' perceptions of the training (females)

Training Evaluation				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
The presentation (done by Dr. Ahmad Alamro) was useful	1	2	36	4.33
In the presentation, the information was presented effectively	0	6	33	4.21
After attending the presentation, I am able to use MOODLE (discussion forum) effectively	1	4	34	4.26
After attending the presentation, I am able to develop effective online discussions	3	4	32	4.03
After attending the presentation, I know what my role is.	2	3	34	4.18
My question/s that I wanted to ask was/were answered by the presenter (Dr. Alamro).	2	11	26	3.85

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

5.4.1.2. Tutors' perception

The overall response of the tutors to the training domain was positive (Table 15). There was no tutor who disagreed that the training was helpful, or that the material was not presented effectively; however, two tutors were not sure.

Table 15: tutors' perceptions of the training session
Training Evaluation

Items	Disagree 1 and 2	N 3	Agree 4 and 5	NO 0	Mean
The presentation (by Dr. Ahmad Alamro) was useful	0	0	10	1	4.64
In the presentation, the information was presented effectively	0	0	10	1	4.64
After attending the presentation, I am able to use MOODLE (discussion forum) effectively	0	0	10	1	4.73
After attending the training workshop, I am able to develop effective online discussions	0	2	9	0	4.18
After attending the presentation, I know what my role is.	0	1	9	1	4.36
My question/s that I wanted to ask was/were answered by the presenter	0	1	10	0	4.45

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree; **NO:** not observed.

5.4.2. Interview results

5.4.2.1. Focus group (students)

Most of the responses to the training question were about the clarity of different aspects of the training. From both genders, a group of students stated that it was totally clear, while others found some aspect needed more clarification.

- **Clarity:**

Most of those who found it clear are females, while only one male student digested it well. However, a student stated that the role of the tutor was explained well.

"The time was short but you have used it well." (SM4)

"For me it was very clear what to do and how to do it."(SF8)

"It was very clear for me, but I was not sure if the tutor will be available daily" (SF6)

"The presentation was more than enough and I left the room with a clear picture." (SF1)

"Presentation was clear, in which you used pictures and showed us how to do it." (SF7)

On the other hand, a cohort of students indicated that it was not clear. Some students criticised the practical/application part, and one student commented that the advantages of the integration were not explicit.

"As an idea it was clear but you were fast and thus some points were not clear, especially my group" (SM1)

"The general idea was clear; however my friend was asking how to apply it, which is because you were very quick." (SM4)

"I only remembered that there will be discussions online, but the practical part was not clear because of the workshop's short time. However, one of my friends explained the process." (SM6)

"I did understand the details, too. Because you were very quick" (SM7)

"The idea was clear on discussion forum usefulness but implementation was not clear enough."(SF2)

"There were some students who were not contributing because they do not know how." (SF3)

"Some students did not realize the importance of the online discussion; they might understand the idea but did not see how it would help in exam." (SF2)

5.4.2.2. Individual interviews (tutors)

- **The importance of the training:**

Tutors claimed that training is very important from different perspectives, and it is a must for every participant. It was useful that it gave an orientation to the rationale of the intervention and showed them what was expected from them:

"It is a must for you to put this presentation to everyone participating....presentation was very useful. You gave us a proper orientation for the whole subject, for the whole idea, and you gave us the rationale about this experiment." (Fem 2)

“It was useful, it was helpful because it was orientation, it tells you what to expect and what to do, so yes.” (Tm1)

“The presentation is very useful, it was very useful, it made some useful points about our role as a tutor, and the student’s roles.” (TF3)

“Of course this presentation is a must as it showed the tutors and the students how to use it and to understand the rationale behind it. So it was very useful.” (Tm2)

“Well it was helpful to elaborate on the concepts behind the idea and to give the rationale – why we use this, because of this and this – and also practical guidance, how to implement it.” (Tm3)

- **Facilitation of online discussion**

Tutors, also, found the training important to train them how to facilitate an online discussion:

“It was useful to guide us how to communicate with the students, how to get contact with the students through the e-learning and also how to improve the performance of our students, how to introduce them and let them more share in this e-learning.” (TF1)

“How to conduct this online forum effectively, and also you answered some enquiries” (Fem 2)

- **Clarity:**

Tutors also commented on the clarity of the training, that it was clear. However, one tutor claimed that more time was needed for the introduction and more examples to clarify:

“It clarified a lot of issues for me.” (TF3)

“It was ok but I think that the introduction before starting should be clearer.” (Tm2)

“I got some more ideas like more examples. They don’t understand what the idea is.” (Tm2)

5.5. R Q 3: participants' perception towards the Interaction/Collaboration

5.5.1. Questionnaire results

5.5.1.1. Students' perception

The results in Table 16 and Table 15 were obtained from analysis of students' collaboration and students' interaction with their tutors online. Most students perceived it highly positive that the use of DF enhanced collaboration and knowledge sharing. Most male and female students found the online discussion increased the time of communication (93%, 92%) respectively. However, some were not satisfied with tutors' responses, and nearly 50% of both male and female students were not happy with tutors' feedback on students' contribution. Similarly, more than half of the students did not agree that the tutor was answering their questions (males 59% and females 51%). Finally, the majority of students perceived the idea of integration as if the PBL session continued throughout the week.

Table 16: Students' perceptions of interactivity in the discussion forum (males)

Interaction/Collaboration Student-student (Items)	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Using the Online discussion forum increased the contact time between me and my friends in the PBL group.	2	1	38	4.56
In the Online discussion forum, I shared my knowledge (information +resource) with my group members	3	2	36	4.37
In the Online discussion forum, I work together (collaborate) with other students in the PBL group.	6	3	32	4.05
In the Online discussion forum, most of my questions in the discussion board were answered by my colleagues.	2	7	32	4.02
Collaboration/cooperation with other group members on the Online discussion forum helped me to learn more	4	3	34	4.24
I consider the Virtual PBL room as a continuity of the face-to-face PBL room.	3	9	29	3.95
Student-tutor (Items)	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Using the Online discussion forum increased the contact time between me and my tutor in the PBL group	5	4	32	4.02
In the Online discussion forum, the contact with my tutor became easier than using the face-to-face only	6	4	31	3.83
The tutor gave me feedback on my contribution in the discussion board.	12	9	20	3.34
My tutor motivated me to participate.	5	11	25	3.76
Contribution of my tutor in online discussion was one of the reasons for my participation	8	8	25	3.71
In the Online discussion forum, the tutor redirected the discussion when it is needed	6	8	27	3.73
The tutor stimulated the discussion between the group members	8	8	25	3.66
My questions, in the discussion forum were answered by the tutor, if not answered by my colleagues	14	10	17	3.15

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

Table 17: Students' perceptions of interactivity in the discussion forum (females)

Interaction/Collaboration Student-student (Items)	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Using the Online discussion forum increased the contact time between me and my friends in the PBL group.	1	2	36	4.51
In the Online discussion forum, I shared my knowledge (information +resource) with my group members	3	2	34	4.28
In the Online discussion forum, I work together (collaborate) with other students in the PBL group.	1	8	30	4.13
In the Online discussion forum, most of my questions in the discussion board were answered by my colleagues.	0	7	32	4.05
Collaboration/cooperation with other group members on the Online discussion forum helped me to learn more	2	3	34	4.13
I consider the Virtual PBL room as a continuity of the face-to-face PBL room.	4	3	32	3.92
Student-tutor (Items)	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Using the Online discussion forum increased the contact time between me and my tutor in the PBL group	10	5	24	3.62
In the Online discussion forum, the contact with my tutor became easier than using the face-to-face only	8	6	25	3.67
The tutor gave me feedback on my contribution in the discussion board. Strongly disagree	11	9	19	3.23
My tutor motivated me to participate.	8	7	24	3.64
Contribution of my tutor in online discussion was one of the reasons for my participation	9	8	22	3.38
In the Online discussion forum, the tutor redirected the discussion when it is needed	10	5	24	3.49
The tutor stimulated the discussion between the group members	8	6	22	3.51
My questions, in the discussion forum were answered by the tutor, if not answered by my colleagues	14	6	19	3.10

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

5.5.1.2. Tutors' perception

In response to the interactivity Items, most of the tutors surveyed indicated that the integration helps improve contact between students, enhance sharing of knowledge, encourage students to respond to each other's queries, and enable students to collaborate more (Table 16). Despite the fact that most tutors indicated that using the DF increased contact between them and their students, three did not consider their contribution a motivating factor for student's contribution. In addition, three did not want to have the same experience in the future blocks and two were not sure (Table 16). Lastly,

most tutors perceived the intervention as continuing the conversational PBL sessions, and just one strongly disagreed with the statement.

Table 18: Tutors' perceptions of the interactivity in the discussion forum

Interaction/Collaboration					
Student-student (Items)	Disagree 1 and 2	N 3	Agree 4 and 5	NO 0	Mean
Using the Online discussion forum increased the contact time between the students in the PBL group.	0	1	10	0	4.55
In the Online discussion forum, the students shared their knowledge (information +resource) with their group members	0	1	10	0	4.45
In the Online discussion forum, the students collaborated with other students in the PBL group.	1	1	9	0	4.27
In the Online discussion forum, most of the students' questions in the discussion board are answered by their colleagues.	0	1	9	1	4.27
Collaboration/cooperation with other group members on the online discussion forum helped the students to learn more	1	1	9	0	4
I consider the online discussion forum as a continuation of the face-to-face PBL tutorial.	1	0	10	0	4
Student-tutor (Items)	Disagree 1 and 2	N 3	Agree 4 and 5	NO 0	Mean
Use of Online discussion forum increased the contact time between the student and his tutor in the PBL group	1	1	9	0	4.09
In the Online discussion forum, the contact with the students became easier than using the face-to-face only	3	2	6	0	3.55
I gave feedback on the student's contribution in the discussion board.	3	0	8	0	3.45
I motivated the students to participate.	1	1	9	0	3.82
My contribution in online discussion was one of the reasons for the student's participation	2	4	5	0	3.55
In the Online discussion forum, I redirected the discussion when it was needed	1	1	8	1	4.18
I stimulated discussion between the group members	0	2	9	0	4.09
I answered the students' questions in the discussion forum, if not answered by his colleagues	3	2	6	0	3.36

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree; **NO:** not observed.

5.5.2. Interview results

5.5.2.1. Focus group (students)

- **Students' interaction and collaboration**

Collaboration between students was improved as a result of interaction, e.g. responding to queries and sharing knowledge, which they considered it as

an assistance of other students. Additionally, they met face-to-face to discuss the problem.

“For me, helping others was one of the main motivating factors; it is good that everybody gets the benefit out of it” (SF2)

“I learn a lot from some of my friends apposite to what happens in face to face, because sometimes you miss the discussion while in online you do not and if you ask you will get an answer”(SM9)

“My group sat every Monday to discuss the problem and what has been discussed in the forum” (SM1)

• **Tutors’ interaction and collaboration**

While interviewees responded to the questions, they occasionally mentioned the tutor and his/her roles. A group of students were not satisfied due to poor contribution from some of the tutors.

A student claimed that the tutor is not a very important influence to maintain discussion. On the other hand, a student explained how presence of the tutor might affect trustfulness of students on what was been shared, and activity on DF depends on tutor’s activity.

“In my opinion, not responsibility of responses from the tutor, our group worked well without obvious intervention of the tutor.” (SF2)

“Not all students responded to my question when I asked, only the tutor. (SF3)

“Our tutor was always motivating us, she was responsive all the time and asking those not participating. That enhanced our contribution.” (SF10)

I want to comment on tutor selection, for my group we had a very active tutor and I found her posts at 8 pm, 11 pm, and 3.30 am. She was active all the time and followed up the discussion and redirected the discussion, so tutor selection is very important.”(SF7)

“In my group, the tutor was not leading us; that affects the trustworthiness of the post, so I did not trust my friend’s posts” (SF5)

“In my opinion, the discussion forum makes the face to face session continue throughout the week, however, that depends on how active the tutor is” (SM3)

5.5.2.2. Individual interviews (tutors)

Tutors noticed that using discussion forums enhanced the collaborative learning in different way; all students cover the learning objectives collaboratively, respond to each other's' queries, and discuss topics as a team:

"They can all be exposed to all of the objectives of the weekly problem, in a collaborative way." (TF2)

"Enhancing collaborative learning" (TF2)

"Some tutors ask students to upload some material. So I want some students to bring topics which deficient. And they say to mention it as deficient. So they give them more materials." (Tm2)

Also there is improvement in their active participation and interaction between the students and with the students" (TF1)

"When you go to the forum you will find they are passing the learning objectives and they discuss with each other "we are going to discuss this first and discuss this second" so they collaborate with each other in discussing their learning objectives." (Tm3)

"Students also will work as a team to get the target of the team, not the individual target, and this is the aim of the teamwork and the philosophy of the PBL system and our college" (TF1)

"Also, and this teamwork is very good for them for how to deal with the problems and how to reach a solution or get a solution for this" (TF1)

5.6. R Q 4: participants' perception towards the flexibility, feasibility and accessibility

5.6.1. Questionnaire results

5.6.1.1. Students' perception

The tables (Table 17 and Table 18) below illustrate the students' perception toward the flexibility, feasibility and accessibility of MOODLE and support. In general, female students did not perceive the flexibility, feasibility and accessibility as high as the male students. Most respondents of either gender agreed that the online discussion was easy to access (males (90%), females (87%). However, a few students had technical issues which were not resolved very quickly (males (5 students), females (8 students)).

Table 19: Students' perceptions of e-learning flexibility, feasibility and accessibility

E-learning flexibility, feasibility and accessibility				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
It was easy to access my virtual PBL room	1	3	37	4.39
I could access my virtual PBL room at any time	2	4	35	4.32
The Online discussion forum interface was enjoyable and easy to use	1	4	36	4.46
The Online discussion forum interface and tools were well organized	1	7	33	4.12
If I have problems with the tools I know where to get help	5	8	28	3.80
If I have problems with the tools I could get help quickly	5	13	23	3.59

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

Table 20: Students' perceptions of e-learning flexibility, feasibility and accessibility (females)

E-learning flexibility, feasibility and accessibility				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
It was easy to access my virtual PBL room	3	2	34	4.15
I could access my virtual PBL room at any time	5	4	30	3.97
The Online discussion forum interface was enjoyable and easy to use	4	5	30	4.10
The Online discussion forum interface and tools were well organized	4	4	31	3.95
If I have problems with the tools I know where to get help	8	9	22	3.54
If I have problems with the tools I could get help quickly	8	13	18	3.38

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

5.6.1.2. Tutors' perception

The majority of tutors who responded felt that the discussion forum was easy to access and at any time. Similarly, they found it enjoyable. ON the other hand, two tutors found the tools in the VLE not to be well organized (Table 21).

Table 21: Tutors' perceptions of e-learning flexibility, feasibility and accessibility

E-learning flexibility, feasibility and accessibility					
Items	Disagree 1 and 2	N 3	Agree 4 and 5	NO 0	Mean
It was easy to access my virtual PBL room	1	0	10	0	4.18
I could access my virtual PBL room at any time	0	0	11	0	4.73
The Online discussion forum interface was enjoyable and easy to use	1	2	8	0	3.91
The Online discussion forum interface and tools were well organized	2	0	9	0	3.91
If I have problems with the interface / tools I know where to get help	1	0	10	1	4.36
If I have problems with the interface / tools I could get help quickly	1	2	7	1	4

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree; **NO:** not observed

Although flexibility, feasibility and accessibility were not explored by the interviews, students had their point of view on the VLE (MOODLE) system adopted. Quotes from the focus groups are presented below as evidence of students' opinions.

5.6.1.3. MOODLE

Students criticized the virtual learning environment applied (MOODLE). A female student mentioned a technical issue, while male students criticized that the forum page was not updated spontaneously and did not show who is online.

“There was a problem with font colours that the browser closed once I selected one then I needed to start again, I hope I could write main points in colours...we could colour the test but it was complicated.” (SF1)

“It is not updating like Facebook, so if you refresh the browser many posts will appear” (SM2)

“The web does not show who is online, and that makes users lose their motivation as they expect nobody will contribute. It would be better if the user can see who is online from the group.” (SM3)

5.7. R Q 5: participants' perception towards the learning

5.7.1. Questionnaire results

5.7.1.1. Students' perception

As Table 22 and Table 23 show, for almost all items, a majority of male students found the intervention enhanced their understanding of the PBL. Similarly, they perceived that the idea of integration helped them understand the weekly problem and their study became more focused on what was needed.

Table 22: Students' perceptions of integrating online discussion forums with the conventional PBL (males)

Integration of discussion forums with the conventional PBL				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Use of online discussion forum helped me to understand the weekly problem.	4	1	36	4.27
Use of online discussion forum helped me to achieve the learning objectives effectively	1	5	35	4.22
Use of online discussion forum helped me to focus on the knowledge related to the learning objectives	2	3	36	4.20
Use of online discussion forum helped me to find the helpful resources	2	4	35	4.32
Use of online discussion forum provided an effective learning environment	1	3	37	4.34
Use of the discussion board/forum gave me the chance to express my opinion	2	5	34	4.32

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

Table 23: Students' perceptions of integrating online discussion forums with the conventional PBL (females)

Integration of discussion forums with the conventional PBL				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Use of online discussion forum helped me to understand the weekly problem.	4	1	34	4.26
Use of online discussion forum helped me to achieve the learning objectives effectively	4	0	35	4.23
Use of online discussion forum helped me to focus on the knowledge related to the learning objectives	5	1	33	4.10
Use of online discussion forum helped me to find the helpful resources	5	6	28	4.00
Use of online discussion forum provided an effective learning environment	3	1	35	4.08
Use of the discussion board/forum gave me the chance to express my opinion	2	2	35	4.23

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

Three items on the questionnaire measured students' perception of whether using DFs can improve certain skills (Table 22 and Table 23). The vast majority of students found it enhancing their writing skills (males (88%), females (92%)).

Table 24: Students' perceptions of using of discussion forums improve different skills (males)

Using of DF improve different skills				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Using the Online discussion forum helped me to improve my computer skills	5	7	29	3.93
Using the online discussion forum helped me to improve my English writing	1	4	36	4.37
Use of online discussion forum enhanced my team work skills	1	5	35	4.29

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

Table 25: Students' perceptions of using of discussion forums improve different skills (females)

Using of DF improve different skills				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
Using the Online discussion forum helped me to improve my computer skills	6	5	28	3.87
Using the online discussion forum helped me to improve my English writing	3	0	36	4.31
Use of online discussion forum enhanced my team work skills	3	3	33	4.15

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

5.7.1.2. Tutors' perception

Most of the tutors (73%) reported that it helped students understanding of the weekly PBL. Almost all tutors found the DF to be a space where students can write and express their opinion without stress.

Table 26: Tutors' perceptions of integrating online discussion forums with the conventional PBL

Integration of discussion forums with the conventional PBL					
Items	Disagree 1 and 2	N 3	Agree 4 and 5	NO 0	Mean
Use of the online discussion forum helped students to understand the weekly problem.	2	2	7	0	3.82
Use of the online discussion forum helped students to achieve the learning objectives effectively	1	2	9	0	4
Use of online discussion forum helped the students to focus on the knowledge related to the learning objectives	0	3	8	0	3.91
Use of online discussion forum helps students to find the helpful resources	0	1	10	0	4.18
Use online discussion forum provided an effective learning environment	1	2	8	0	3.91
Use of the discussion forum gave the students the chance to express their opinion	0	1	10	0	4.27

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree; **NO:** not observed

Table 27 illustrates tutors' opinion on whether using the discussion forum helps in enhancing computer, writing and team work skills. Most of them agreed that it boosted the three skills; however, three tutors strongly disagreed that it improved students' team work skills.

Table 27: Tutors' perceptions of whether using discussion forums improves different skills

Using of DF improve different skills					
Items	Disagree 1 and 2	N 3	Agree 4 and 5	NO 0	Mean
In my opinion, using the E-learning helped the students to improve their computer skills	2	0	9	0	3.91
Using the discussion board/forum helped the students to improve their English writing	1	2	8	0	4.09
Use of the virtual PBL room enhances students' team work skills	3	1	7	0	3.82

Not: **SA:** strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree; **NO:** not observed

5.7.2. Interview results

5.7.2.1. Focus group (students)

The impact of the use of DFs on students was interesting. Some were expected and others were not. It was expected to enhance collaboration, English writing skills and knowledge sharing and construction. However, surprisingly, students claimed it enhanced their confidence and interrelationship, and the following quotes show that.

- **Understanding of the weekly PBL**

There was a general consensus among interviewees that the integration led to effective understanding of the weekly problem. This was due to sharing of knowledge, repetition of knowledge, and verity in knowledge presentation.

“It gave an opportunity for more understanding of the PBL, someone shared and I put more which let me understand more.” (SF10)

“It helps us to understand the concept, while before I attended but did not understand” (SF5)

“We visit the information two times or more in the online discussion; that made information stay longer, which made the study for the exam easier than face to face only.” (SM2)

“It gave each student more than one chance to repeat the information.” (SM5)

“We were avoiding questions during the second session because tutor can stop you at any time and he asks you, but in this block, reading the post improves my understanding, so I was not afraid because I know and understand what I said.” (SM2)

“In the second session, sometimes the 2 hours were not enough but it is ok because we understood everything by using videos.” (SF6)

- **Information selection and retention**

Students also became aware of trustworthy websites as they read through them before posting. Since students summarize their posts, they found that supports knowledge retention.

“By using online discussion we became aware of trusted websites that help students.” (SM5)

“One thing that encouraged me is that using online discussion let me find information and summarize it and write it in a good way, which makes the information stick in my head” (SF4)

“In one of the groups, they post a lot of videos, I listen to them which helped me memorize well.” (SM5)

- **Students’ Self-confidence**

By interaction in the DF, students understood the weekly problem properly. That assured students about what they would say at the last session and its legitimacy.

“We used animations and other media that help in understanding the PBL and I was confident about what I am discussing in the last session” (SM4)

“It was difficult to answer any question in the PBL session in the previous block, but in this block I was confident because I trust my understanding, as I am visiting the information more than one time in different ways.” (SM4)

“It solves problems; I feel it improves shy girls by 15%” (SF2)

“We were avoiding questions during the second session because the tutor can stop you at any time and he asks you, but in this block, reading the posts improved my understanding, so I was not afraid because I know and understand what I said.” (SM2)

- **Develop English skills**

As expected, students were cautious about their writing to avoid mistakes, such as grammar and spelling.

“I am not good in English, and I was suffering from spelling, therefore I spent some time in checking spelling and grammar: that took time, but was helpful.” (SF5)

“It improved my writing skills, as I was writing a lot.” (SM9)

“It helped improving two skills: writing skills and summarizing skills.” (SM1)

- **Enhance interrelationship**

Application of online discussion, unexpectedly, increased the interrelationship between students, since students met face-to-face and discussed what happened on the forum.

“Online discussion has enhanced the relationship between us, I was happy when someone replied to me and we interacted and then we met at the university talking about what happened online.” (SF2)

“It helps in enhancing the relationship between us, so we communicate in face to face and online” (SM1)

5.7.2.2. Individual interviews (tutors)

- **Gradual improvement of students’ performance in the PBL sessions**

“I noticed from the second and third and fourth it is a much better performance, for the students, than the first one.” (TF2)

“This improved their performance, even in the second session.” (TF2)

“I think they got a lot of experience in the late sessions after opening the e-learning for all the groups, they evaluate the work of the others and evaluate their work, and the more experienced they are, there is more improvement in dealing with the following problems” (TF1)

“I think that this is not, with experience, with more experience, the students, it will not be time consuming. It may be time consuming because they do not have the skills to deal with the and be targeted, so they spend a lot of time to deal with the technical problems and with the searching, but I think it will be, after they are experienced, it will be, this will not be a problem, I think.” (TF1)

- **Students’ Self-confidence**

Female tutors noticed that contribution in the forum and interaction with other students helped some students gain confidence:

“The self-confidence of the students became high” (TF2)

“Second session, she was proud with her presentation and she was never talking before, she talked about this presentation and how she collected it and how it is presented, and she was proud of herself. That is one student where I noticed a change in her behaviour about presenting her work.” (TF2)

“Also, students become more self-confident because they have got the knowledge, and even if they got the knowledge, they did not actively, they got the knowledge by reading the other comments and getting by discussions, so in the second session they have more knowledge and so more self-confidence” (TF1)

“Sometimes we found that the shy student is shy because she did not have a good knowledge or she did not trust in her knowledge, but she discussed it before, so now she is confident from the quality of her knowledge, for this she can share actively and she can ask and it makes the second session more interactive and makes the students have more interactive skills.” (TF1)

“By the second session, these non-talkative students become more confident, and there is more participation from these shy students, these non-talkative students would be in the next and next and next PBL.” (TF2)

“It is become they express themselves not face to face, first in the online and they get confidence” (TF2)

• **Understanding of the weekly PBL**

Some tutors asserted that due to online collaboration, students understood the PBL comprehensively and in more depth:

“The achievement of more understanding and more comprehensive explanation of the weekly problem and the weekly objective” (TF2)

“This leads to more understanding of the objectives” (fem 2)

“They go to a great depth. And expanding relevant issues, focusing on needed gaps; this all leads to comprehensive study” (TF2)

“Because they read all the responses from others, so they get more of the whole idea about the objectives, rather than studying their own objectives, and they can formulate their hypotheses, their own hypotheses about the others’ research and the others’ findings.” (TF3)

“from the first day there is the system to deal with all the objectives of the problem and all the students share all the objectives, they

understand the problems as a whole and they discuss with each other” (TF1)

“And this collaborative learning made the group go into greater depths” (TF2)

“Become better, because they read all the posts” (TF3)

- **Develop knowledge selection and retention**

Two tutors stated that the use of online discussion is improving students’ skills in knowledge selection. In addition, a tutor expected that students’ exam performance will improve:

“They can make filters about the important knowledge from the non-important and selective in the knowledge. Also there is improvement after they collect this together.” (TF1)

“they get more conclusions and better, I mean that they can present the knowledge in the best format or put the knowledge needed to fulfil the objectives of their problem” (TF1)

“Focusing on needed gaps” (TF2)

“And how to recognise and define the knowledge that they actually need to solve or work on their problems” (TF1)

“They can make filters about the important knowledge from the non-important and selective in the knowledge.” (TF1)

“Get information and more improvement in the method of research” (TF1)

“And retaining this information, better recalling; as we said before, this will improve the students’ performance in the exam” (TF2)

5.8. R Q 6: participants' satisfaction

5.8.1. Questionnaires results

5.8.1.1. Students' satisfaction

The tables below reveal students' satisfaction towards the integration on DF with conventional PBL. They are unlike the other tables in the number of students that disagreed. In all the above tables both genders were similar in their response, however in the tables below they are not. The number of female students who disagreed is higher than that of the male students in most of the items. Five out of 39 female students, for instance, found the integration not enjoyable, while only one male student did so. Similarly, 15% of female students refused to have the same experience in the future, whereas only 1% of males preferred not to repeat the experience. In general, half of the male students strongly agreed with all the satisfaction items, while half of the females only agreed (Table 28 and Table 29).

Table 28: Students' satisfaction about using integration discussion forums (males)

Students' satisfaction				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
I was motivated to use the online discussion forum integrated with PBL	4	4	33	4.20
I enjoyed the online discussion forum	1	2	38	4.41
I prefer (integration of online discussion forum with PBL).	2	3	36	4.41
I am satisfied with using the online discussion forum integrated with PBL	2	4	35	4.32
I look forward to learning using an online discussion forum integrated with PBL in the future blocks.	3	5	33	4.29

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

Table 29: Students' satisfaction about using integration discussion forums (females)

Students' satisfaction				
Items	Disagree 1 and 2	N 3	Agree 4 and 5	Mean
I was motivated to use the online discussion forum integrated with PBL	4	5	30	3.90
I enjoyed the online discussion forum	5	4	30	3.95
I prefer (integration of online discussion forum with PBL).	5	6	28	3.85
I am satisfied with using the online discussion forum integrated with PBL	2	8	29	3.92
I look forward to learning using an online discussion forum integrated with PBL in the future blocks.	6	2	31	3.90

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree

5.8.1.2. Tutors' satisfaction

Of the 11 tutors who completed the questionnaire, eight were motivated, enjoyed, and satisfied with using DFs between the conventional sessions. Similarly, eight of the tutors agreed to repeat the experience in the upcoming blocks (Table 30).

Table 30: Tutors' satisfaction about using integration discussion forums

Tutors' satisfaction					
Items	Disagree 1 and 2	N 3	Agree 4 and 5	NO 0	Mean
I was motivated to use the online discussion forum integrated to the Face-to-face PBL	1	2	8	0	4.09
I enjoyed use of the online discussion forum	0	3	8	0	4
I prefer the integration of online discussion forums with PBL rather than using face to face only.	2	2	7	0	3.82
I am satisfied with using the online discussion forums.	2	1	8	0	3.73
I look forward to tutoring using the online discussion forum in the future blocks.	1	2	8	0	3.82

SA: strongly agree; **A:** agree; **N:** neither agree nor disagree; **DA:** disagree; **SD:** strongly disagree; **NO:** not observed

5.9. R Q 7: Advantages and limitations of the integration

5.9.1. Focus group (students)

5.9.1.1. Advantages of the integration

Interviewees have been asked about the pros and cons of the intervention. Students experienced the intervention as they expected it at the training (see • o • •). The integration of the DF helped students prepare for the exam in advance because it supports sharing of knowledge using different resources, helps cover the learning issues during the week and provides the right direction for the weekly PBL by discussing the requisite learning issues.

- **Sharing knowledge and multimedia resources**

Students stated that the DF was an effective area for sharing knowledge in a different format. It helped in sharing knowledge through multimedia (e.g. pictures and animations); and they received support from each other by sharing beneficial websites.

“We used animations and other media that helped in understanding the PBL and I am confident about what I am discussing in the last session” (SM4)

“It helped in that we supported each other by answering each other’s questions or by sharing pictures, animations and trusted webpages.” (SM5)

- **Overcome the current issues of the conventional PBL**

In the majority of the quotes underneath, students compared the blended approach with the conventional, confined to face-to-face PBL sessions. Integration of online discussion made the direction of the discussion explicit. It also overcomes the shortage of time by providing room for continuous asynchronous discussion throughout the week. This gave the feeling as if the first session continued for days.

“It helps me to know the direction of the discussion.” (SF4)

“In the first session, the time was not enough, and we were continuing the discussion online” (SF1)

“In my opinion, the discussion forum makes the face to face session continue throughout the week” (SM3)

The DF likewise provides an area for shy and quiet students to participate in the discussion without the stress of the tutor, the English language and the issue of the dominating students.

“Some girls did not attend the first session; they visited the discussion forum and then understand the problem.” (SF10)

Some girls had a lot of information about the topic, but they were shy in the face to face session, even though the tutor encouraged them” (SF9)

“It solves problems; I feel it improves shy girls by 15%” (SF2)

“I was very disappointed in the last block, and I dislike the PBL. I was preparing for the PBL but I did not participate. While in the current block, my online contribution gives me confidence to participate online.” (SM4)

“The experience was very helpful, because in face to face sessions the tutor focuses on you which is a stressful moment but online there is no pressure.” (SM9)

After integration, students did not miss the weekly problem due to being absent for the first session. That is because the online discussion forum was considered a continuity of the face-to-face sessions.

In addition, even if you miss the last session for any reason, you can visit the online forum at any time.” (SM3)

“Previously, if you could not attend the first session, this means you miss the PBL of the same week. However, online students can follow others any time.” (SM7)

“A friend was discussing the problem perfectly and he was absent in the first session, online discussion made it easy for him.” (SM6)

- **Cover all learning issues**

Continuity of the DF thorough the week allowed students to have enough time to discuss all learning issues by all students before attending the second session.

“As we logged in from Saturday, we should read every post before we add anything; that helps everybody to cover all the learning issues.” (SF2)

“When I was in the previous block I was searching unrelated topics, I was not aware, while in this block I am aware and I contributed effectively.” (SF5)

Previously, I would delay the search on PBL till Tuesday, and I can't cover all of them, however in this block we cover 2-3 learning issues daily and on Tuesday we cover them all.”(SF4)

“It is very difficult for a student to cover all the learning issues of a PBL week. Previously we shared by email what we searched during the week, but now we do it online.” (SF2)

- **Early exam preparation**

The visiting and revisiting of the information shared on the DFs made students ready in advance for the end of block exam. That saved time that could be used for covering the PBL learning objectives.

“At the exam there was no need to read all the PBL in detail as it was all in my head. And every PBL was covered with less effort.”(SF4)

“I realized my information level increased and at the exam it was not very difficult because we read and then we share knowledge with friends.” (SM4)

“I saved our time, in which you can fill the knowledge gaps by visiting the online discussion.” (SM1)

“We visit the information two times or more in the online discussion, which made information stay longer, which made the study for exam easier than face to face only.” (SM2)

- **Miscellaneous advantages**

There were other advantages students noticed. For instance, they spent their time on the internet on something useful (discussion forum). They consider the DF an area free of stress. Information was posted in several presentations that accommodate different learning styles.

“There are some students who spend most of their time on the net uselessly, but with the discussion forums they spend their time on effectively.” (SF2)

“The good about it was no stress, so you can ask and anybody answer with no force not like the face to face” (SM7)

“The online discussion helped three types of students: who prefer listening, reading, or watching.”(SM5)

“Another positive is that I was making sure it was 100% correct before I post it.” (SF9)

5.9.1.2. Limitations of the integration

There were some disadvantages observed by students. Some related to overload and others related to students’ attitudes and the virtual learning environment functionality.

- **Time consuming**

Time consumption concerned some students, because the use of the DF increased the workload, and using the internet caused some distraction.

“It is a cause of waste of time for some students, because they were asked to connect to the net and were disturbed by other communication tools like Hotmail massager.” (SF4)

“The use of online discussion in the current block is accepted but I am wondering, will the project work if implemented in a more difficult block?” (SM8)

“Time problem, it increased the overload on us because we have lectures with different topics” (SM2)

5.9.2. Individual interviews (tutors)

5.9.2.1. Advantages of the integration

Tutors revealed that applying such a project has several advantages that helped both students and tutors:

- **Day by day mentorship**

Some tutors found the intervention contributed to improving the mentorship and giving and receiving feedback. In addition, it encouraged the peer assessment in which students give feedback to each other:

“So you can see for example what the students have studied the day before and then you post questions. So it gives you like an interactive way of monitoring their self-learning. This is the most important thing I think for me from a staff point of view or a tutor point of view.” (Tm1)

“The students shared their resources with each other, asked questions and answered, mainly by their colleagues, not mainly by the tutors, by their colleagues, and also by the help of the tutor. Giving the feedback to each other” (TF2)

“I think on the point of feedback there is improvement,....Not only you either, but students will monitor each other by posting material and saying “that is ok, that is not”, so this feedback itself is a form of feedback as to your performance.” (Tm1)

- **Starting earlier leads to less effort before exam**

They noticed that the experience of online discussion encouraged students to engage with the weekly problem as soon as the discussion started on the forum. One tutor believed this makes the exam review easier:

“It encourages the students that late to start to research as early as possible. Usually students start to study or collect data on Tuesday or sometimes Monday not before that so it helps the students to start from the very beginning from Saturday to start working and I notice that.” (Tm2)

“That they have already discussed their ideas and their objectives for the first session maybe on the same day, not waiting until they meet.” (TF3)

“Student came to the exam; he found himself knowing all this knowledge and did not have to spend more time to study these things.” (TF2)

“Rapid access for the objective, and how to share it, before they meet today” (TF3)

- **Overcome the current issues of the conventional PBL**

Tutors commented that integration of online discussion was an effective solution to some current issues. For instance, some shy students were not talking in the face-to-face session; however, they participated effectively online:

“Shy students, there are shy students in the session, and I noticed that some students were very shy, and whenever you tackled some tips to let the students engage with me in the discussions, still their performance in the session was a little low. But it surprised me, the least talkative students would express themselves beautifully in the online forum, by the help of the tutor and the motivation and the encouragement.” (TF2)

“I notice some students who are not very forthcoming in discussions.” (Tm1)

Tutors found that the PBL was not over at the end of the first face-to-face session; it continued during the whole week, which filled the usual gap in interaction. Online discussion, in addition, helped overcome the time limit. Subsequently, that increased contact time between group members:

“To have interaction the whole time or the whole week because usually there is gap between Saturday and Wednesday.” (Tm2)

“It gives extension to the activities of the PBL and also it is a continuation of student communication and student interaction for the other steps of the PBL.” (TF1)

“I think one of the main advantages is that the group will continue to function and the group after the PBL session is over, because online they have access to their resources and to their tutor online” (Tm1)

“The contact between the student and the tutor becomes more, because the tutor is engaged in other activities, but if it is in the online discussion, they are exposed to the tutor more time than in the college.” (TF2)

“And they can access me any time; they can find me any time.” (TF2)

“Between the students and with the students and tutors” (TF1)

“Well the main advantage is going beyond the time limits; I think this is the main advantage. It gives the students more space and more time to think and to participate in the area of discussion and this is the main thing” (Tm3)

One of the existing problems is that students do not cover all the learning issues, but with integrating the discussion forum all students are exposed to all learning issues:

“Filling the gaps of knowledge of each other of course, this does not only enable the students in the group to be exposed to all the

objectives, we have some fallacies in the PBL that some students are exposed to some objectives and not exposed to the others.” (TF2)

A female tutor pointed out an issue particular to female section is that their time is limited, as they have to leave the school in a particular time. Thus, they do not have time for their students and can't give feedback:

“One point of the advantages, that it may be specific for us as the female section that we have limited time, so this extension of the time gives more study time, more study time for the students, we are open, this is a good solution for certain specific problems of limited time.” (TF1)

- **Sharing knowledge and multimedia resources**

Sharing knowledge was a perceived advantage of the integration of the online discussion. Some of this knowledge was presented via multimedia, using illustrations and video clips. A tutor stated that this helps students understand the weekly problem:

“Share their knowledge and resources with each other” (TF2)

“Advantages they post for example video clips, which is really, I think is very nice. It gives them the idea and the concept for some scientific things so they can understand.” (Tm3)

“Furthermore, being based on computers, multimedia can be used. It encourages the use of graphics, videos, not just talking as in the BBL session. It encourages the use of multimedia.” (Tm1)

- **Miscellaneous advantages**

The group members of the same group became closer, including the tutor:

“After the online forum, the group that I work with, we are very close after that with each other. They came after that to ask me, it shortened the distance between the tutor and the students.” (TF2)

In addition to the learning issue, students sometimes expanded their discussion to other topics depending on their needs:

“Expanding some relevant issues, there are some relevant issues that were expanded more than the objectives, upon demand or according to the need of the students.” (TF2)

A tutor pointed that when the discussion forums were accessible and opened to all students; it helped them see the different points of view of different groups:

“Benefit from the experience of other colleagues of other groups.... other groups work with other tutors with different visions or different discussions” (TF1)

A tutor noticed that students were stimulating each other by posting new information, so it helped all students to contribute:

“Another thing is that students encourage each other and one goes and reads something and posts it online, it will stimulate other people to go and study. It is better than having someone going and searching alone.” (Tm1)

5.9.2.2. Limitations of the integration

Tutors revealed that the integration had some limitations, either for students or tutors:

- **Time consuming**

Some tutors pointed out that the integration consumed students' and tutors' time, especially since students and tutors have other activities to do. For example, students have lectures and seminars to prepare for:

“Time consuming for both the students and tutors” (TF1)

“It is like an obstacle for this. I did not find it a disadvantage, but it is sometimes time-consuming and not every student has the time to go to the end of the unit and they start posting and reading only the student responses. This is the main disadvantage.” (TF3)

“I think so for the tutor or the student because I think not the whole thing they do. They do lectures and seminars and many other activities. So in this way I think it takes more time than usual. (Tm2)

“I think it is more a constraint for the student than the tutor.” (TF3)

A tutor with a busy timetable criticized that it should not be opened on all weekdays. He also claimed that it is not convenient to do it from home:

“It should not be open because neither tutor nor students are really willing or able to function all the time” (Tm1)

“I think yes, here is a problem. Maybe this is only me or other people, you see administrative duties in the college differ. I personally have a lot of administrative duties. I attend a lot of meetings; sometimes four meetings per day. May be that’s a factor limiting my online participation.” (Tm1)

“It is less than what I want. Because my duties. Now why don’t I do it from home? Again there are limitations there. It is much easier for me to do the online discussions from the college, to be frank with you, than to do it from home. At home I find many things that distract me from getting engaged in to online discussions with students, and that’s what I said earlier about solving the problem. You should not assume that staff when they go home will go and open their computers and communicate with students, no. They have other things to do frankly. So it is during the college hours that most of the interactions will happen, and because of my many responsibilities I did not do as much as I would have liked to have done really.” (Tm1)

There is unequal participation on the discussion forum; a tutor claimed that there were differences in students’ interest toward the use of the discussion forum, and some students decided not to share:

“Some students are interested and some are uninterested, so there is an unequal share, some predominant students and others.” (TF1)

“Except some students decided from the start not to share but people” (Tm2)

Internet connection was an issue mentioned in the female section:

“Slow or disconnected net may be somewhat frustrating” (TF2)

“Internet access is not present all the time for us” (TF3)

5.10. Other evidence

5.10.1. Participants’ expectation of the intervention

Finally, before the start of interviewing, I started with a question exploring participants’ expectation of the idea of integration before its implementation.

5.10.1.1. Expectation (students)

The majority of students' responses to the question: "What do you think about the idea of integrating an online discussion forum with your PBL course?" were that students were excited.

- **Excited:**

There was a variety of motives that drove student excitement about the intervention for both male and female students.

First, there was a consensus among students that the most exciting factor was that it would overcome current issues in PBL. A group of students reported some current issues that might be overcome. Students, for instance, would be able to cover all the learning issues; learning issues would be standardized among groups; and increased interaction could enlighten the right way for students to study materials related to the weekly PBL.

"We were excited, because in the integration I will cover all the topics, while before I never covered all the topics. But in this block I was excited to use online discussion to cover all of them." (SF1)

"In the previous block, I worried about every PBL, I did not know how to start, I was waiting to use online discussion to start as it seems to overcome this problem" (SF4)

"I expect the integration will solve the existing issue of PBL, in which every group comes up with different learning issues. Sharing and discussion of the learning issues online will help in standardization of the learning issues produced by the groups. It is a good idea." (SM3)

Other students were excited because they expected it would enhance collaboration and knowledge sharing, which eventually will help them to understand the weekly PBL. Integration would help, for instance, in explaining to each other and filling the knowledge gap. In addition, it would help get questions answered without approaching the tutor.

"In pre-med, we used forums informally to help us explaining to each other, so I was excited to have the same experience in medical school." (SF8)

"In fact we were waiting to start it because we expected the idea of integration would overcome many current issues. For example, by online discussion everyone will help fill the knowledge gaps of others." (SM1)

"I was very happy in the workshop as I was suffering in the previous block that I cannot understand everything and the tutor became angry once I asked." (SM4)

"I was happy since you told us that we can visit others' discussion after the second session, which is added value to our information and discussion." (SF6)

One student compared this integration with a previous experience, in which the use of DF was constrained to posting the learning issues without discussion. Another interesting quote by a student is below; he found it exciting because the discussion contribute to the end of week students' marks, which improves fairness/inter-rater reliability.

"It was a new idea compared with the current use of elearning, which it is only to post the learning issues without any discussion. While you were presenting, I was very excited for the PBL to begin." (SM2)

"Honestly, I was very happy that our contribution on the online discussion might affect our marks because many students are losing marks because they are not talking" (SM1)

- **Worry**

On the other hand, two female students were concerned that the integration will be an overload or would be a waste of time.

"At the beginning, it seems it will increase the load on us, because it is necessary to log in daily" (SF2)

"We did not like the idea; I was expecting that it will be a waste of time." (SF5)

5.10.1.2. Expectation (tutors)

After attending the training session, tutors were had some expectations about the idea. Some expected that integration of the online discussion forums would improve students' performance in PBL by increasing the contact time between them. In addition, it might solve the current issues of face-to-face PBL:

“The idea of integration is a very good idea. It is important for the performance of students in PBL. It gives extension to the activities of the PBL and also it is a continuation of student communication and student interaction for the other steps of the PBL.” (TF1)

“I think it’s good and it gives the students the chance to participate not only in the room of the PPL discussion, it goes beyond the time limit of the sessions – I mean the real sessions in the PBL room.” (Tm3)

“Good idea provided the shortcomings are considered” (Tm3)

A tutor expected that the integration would help students improve their communication and teamwork skills and knowledge construction:

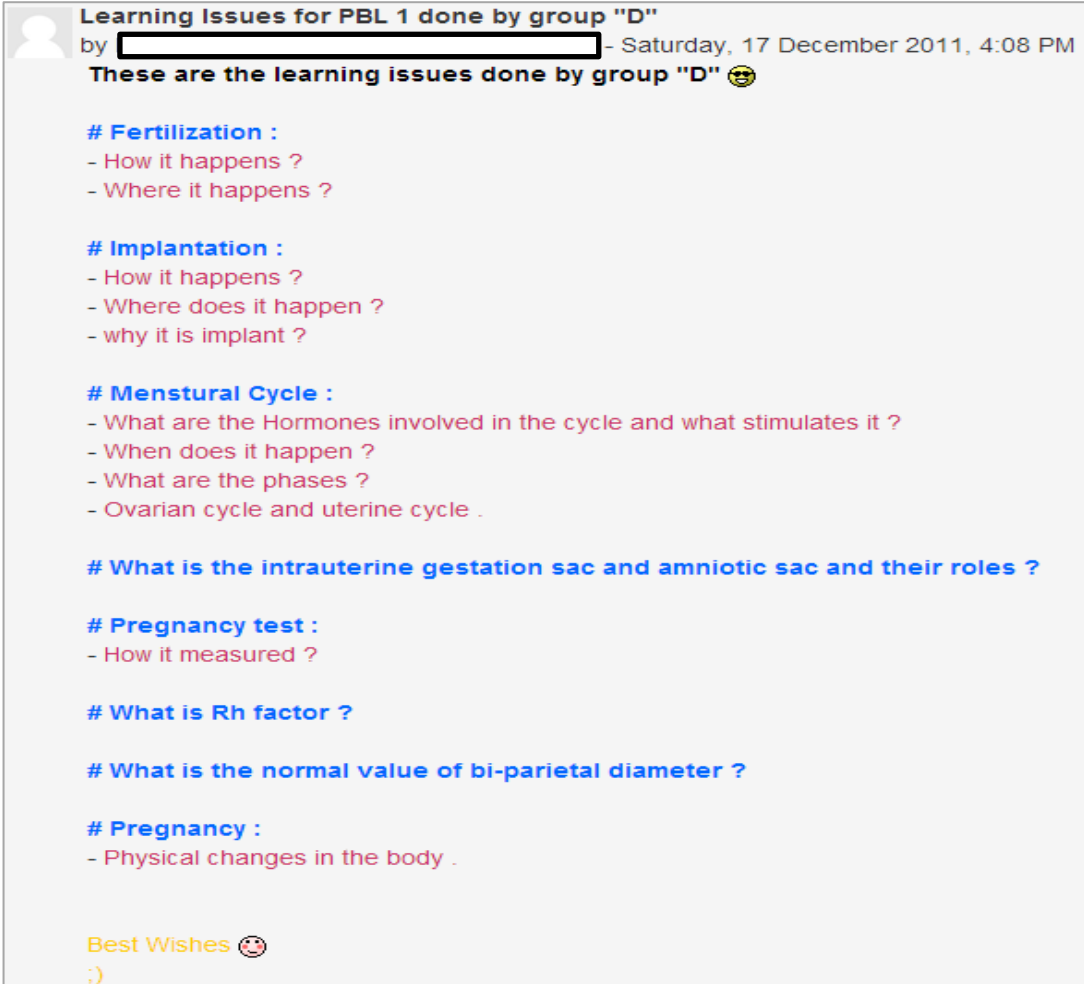
“Yes, for better outcomes, for better- I mean by the outcome, the discussion in the second session, acquiring information and learning how to get the information and learn how to extract the information, and also learn how to communicate with their colleagues, how to do teamwork with each other and how to improve their knowledge by discussion with their colleagues and it is more brainstorming and more building of knowledge.” (TF1)

5.10.2. Participants' attitude in the discussion forums

In this section, I am presenting snapshots (print screen) of participants' activity on DFs as evidence. I will show photos of how students and tutors used the DF. I will provide samples of students' interactions and interactions with tutors and so forth.

5.10.2.1. Use of discussion forums

First, following the first session (Saturday), students posted the learning issues that were decided at the first session, as shown in Figure 29 and 30.



Learning Issues for PBL 1 done by group "D"
 by [redacted] - Saturday, 17 December 2011, 4:08 PM
 These are the learning issues done by group "D" 😊

- # Fertilization :
 - How it happens ?
 - Where it happens ?
- # Implantation :
 - How it happens ?
 - Where does it happen ?
 - why it is implant ?
- # Menstrual Cycle :
 - What are the Hormones involved in the cycle and what stimulates it ?
 - When does it happen ?
 - What are the phases ?
 - Ovarian cycle and uterine cycle .
- # What is the intrauterine gestation sac and amniotic sac and their roles ?
- # Pregnancy test :
 - How it measured ?
- # What is Rh factor ?
- # What is the normal value of bi-parietal diameter ?
- # Pregnancy :
 - Physical changes in the body .

Best Wishes 😊
 ;)

Figure 29: Example of learning issues posted by a student

learning issues
by [redacted] Saturday, 7 January 2012, 4:19 PM

Hello guys these issues with the correct spelling

1-puberty
-definition
-hormone
-onset
-physiological change

2-describe the need of adolescence

3-discuss delayed puberty

4- normal values

good luck

Figure 30: Example of learning issues posted by a student

5.10.2.2. Flexibility and accessibility

The following photo shows examples of time diversity of students' posts/replies in two days (Sunday and Monday) (Figure 31).

Re: PBL 1. Bring it on!
by [redacted] Saturday, 18 December 2011, 10:37 AM

Re: PBL 1. Bring it on!
by [redacted] 18 December 2011, 1:24 PM

Re: PBL 1. Bring it on!
by [redacted] Sunday, 18 December 2011, 3:06 PM

Re: PBL 1. Bring it on!
by [redacted] 18 December 2011, 6:54 PM

Re: PBL 1. Bring it on!
by [redacted] December 2011, 8:06 PM

Re: PBL 1. Bring it on!
by [redacted] December 2011, 9:53 PM

Re: PBL 1. Bring it on!
by [redacted] Monday, 19 December 2011, 12:06 AM

Re: PBL 1. Bring it on!
by [redacted] Saturday, 19 December 2011, 1:36 AM

Figure 31: Students of one group's posts at different times of day.

Figure 32 represents examples students' (males and females from different groups) engagements with the discussion forum on different days of the week.

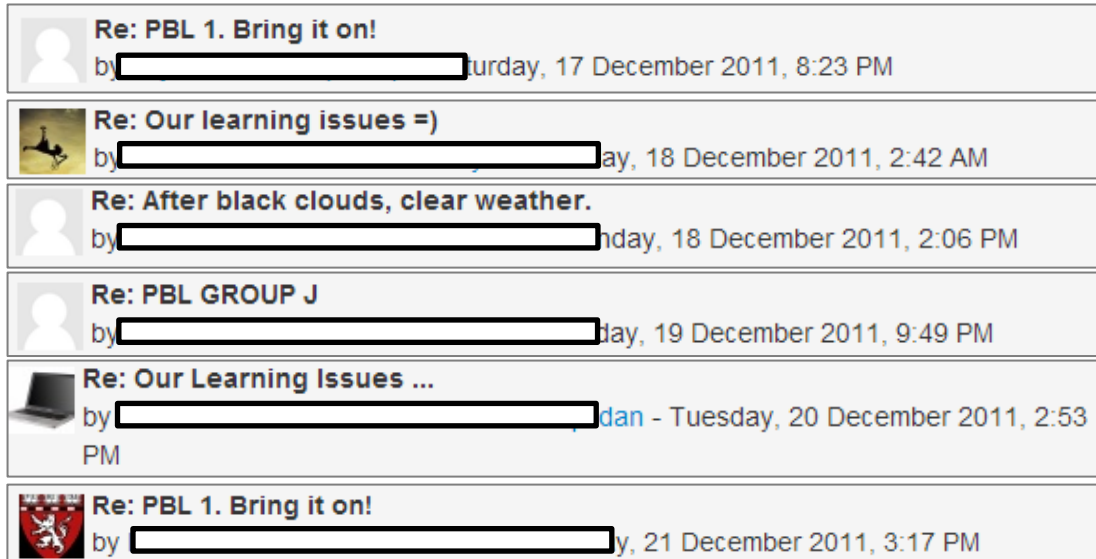


Figure 32: Students' posts/replies in different days

Tutors also had the same accessibility and flexibility; therefore, they could access the DF at any time. Figure 33 reveals that tutors accessed and posted/replied at different times.

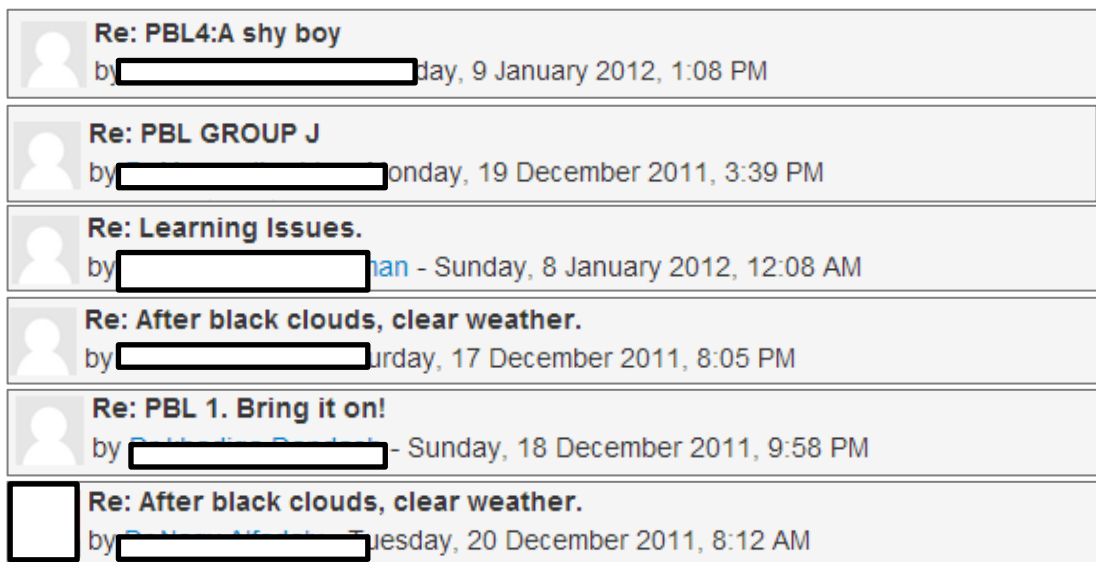


Figure 33: Tutors posted/replied at different times

5.10.2.3. Knowledge share

The discussion forum in MOODLE allows participants to share knowledge and resources in a range of formats. It might be shared as text (post/reply), pictures, videos or attached documents. In the DF, students shared knowledge of ovulation and fertilization differently. In Figure 34 , student shared a picture in an attached file.

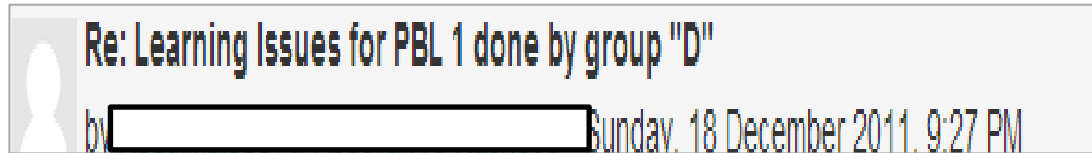


Figure 34: A word document shared

Other students preferred to share the picture as part of the post (Figure 35).

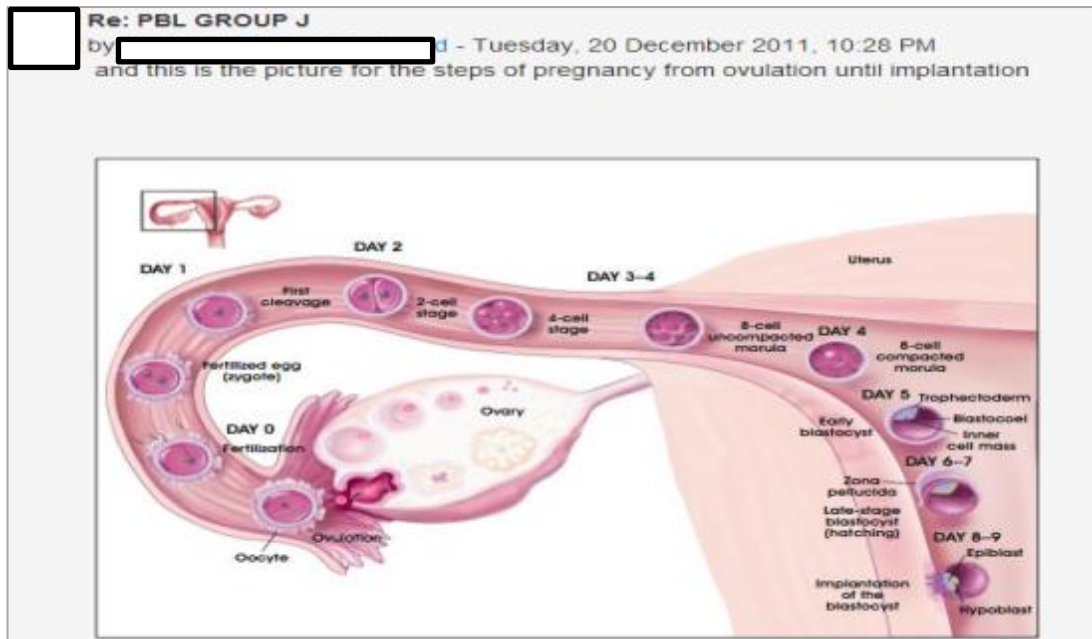


Figure 35: sharing a picture

In the following figure, a female student pasted an animation (video file) to illustrate the steps of ovulation and fertilization to her colleagues.



Figure 36: sharing a video

Students could also share/post YouTube video links that explain fertilization (Figure 37) (armyofda12monkeys, 2007; Teencompanion, 2008).

and this is the video :

<http://www.youtube.com/watch?v=vXNaTRs83hE>

<http://www.youtube.com/watch?v=9MnQxiSjZ4Q>

Notice: the videos have music :(, so try to mute the sound ..

waiting for comments ;)

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Figure 37: Shared YouTube video link

Figure 38 is another example of knowledge presentations on the DF. A student explained the fertilization process in text and referred to the resource.

Re: Our learning issues =>
 by [redacted] - Monday, 19 December 2011, 7:30 PM
 It is a clear pic layla ,thanks :)

and I got the (site - diff - phases) of fertilization from before we are born book(pages 24-25).
 The usual site of fertilization is in the ampulla, the longest and widest part of the uterine tube(fallopian tube).
 Fertilization is a complex sequence of coordinated molecular events that begins with contact between a sperm and an oocyte and ends with the intermingling of maternal and paternal chromosomes at metaphase of the first mitotic division of the zygote.

Phases of fertilization

- 1-Passage of sperm through the corona radiata of the oocyte.
- 2-Penetration of the zone pellucida.
- 3-Fusion of the plasma cell membranes of the oocyte and sperm.
- 4-Completion of the second meiotic division of the oocyte.
- 5-Formation of the male pronucleus.
- 6-Breakdown of the pronuclear membranes.


Figure 38: Knowledge shared in text form

5.10.2.4. Participants' Interaction

Participants were interacting with each other in different forms. Students, for instance, responded to each other and to their tutor and vice versa. The response was answering a question, giving feedback, redirection of students and so forth.


5.10.2.5. Students

Figure 39 is an example of how a student asked a question and was answered by his colleague.

 **Re: LEARNING ISSUES DONE BY GROUP "D"**
 by [redacted] - Monday, 26 December 2011, 4:19 PM
 Hi it is me agine :
 I have a Q :
 Why the head was large compare to the abdomnal? 😊

Thank You

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

 **Re: LEARNING ISSUES DONE BY GROUP "D"**
 by [redacted] - Monday, 26 December 2011, 9:37 PM
 Hello Abdulmajeed :)

about ur q.

//

Why the head was large compare to the abdominal?

- Because there was a less supply of nutrition for the fetus,
 so the amount of nutrition that goes to the fetus will feed the most important
 organs,
 include the brain, and that explain how the head was large compare to the
 abdominal.

(Not sure about the answer, please correct me if I'm wrong :))

//

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Figure 39: A student asked a question and another responded


Another example was that a student referred his friend to a website (resource) (Figure 40).

 **Re: Group J**
 by [redacted] Saturday, 24 December 2011, 8:49 PM
 At what location does the amniotic cavity develop?
[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

 **Re: Group J**
 by [redacted] Saturday, 24 December 2011, 10:43 PM
 This link may help u , Tameem
<http://www.americanpregnancy.org/pregnancycomplications/iugr.htm>
[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Figure 40: asking and response

In Figure 41, a female student responded to others' confusion about leukocyte by clarifying.

 **Re: Delayed Puberty**
 by [redacted] Sunday, 8 January 2012, 6:36 AM

hello girls ,

i hope to be interesting topic .

okay , i saw some confusion for 😞

[the total leukocyte count & total lymphocyte count]
[Do you mean that TLC = Total lemphocyte counts = total leukocyte count]

leukocyte is another name of white blood cell

The leuko means = white ,and cyte means = cell

there are many type of WBCs [leukocyte] ,
one of them lymphocyte

I hope to be clear now
if any one not understand tell me . 😊

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Figure 41: A student clarifies a medical term

Students also responded to others' posts/replies by complimenting or expressing thanks (Figure 42).

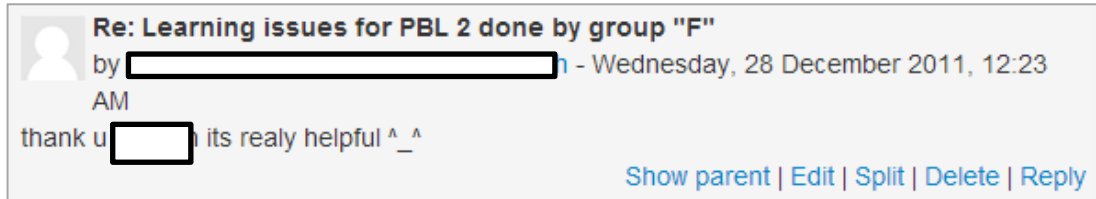


Figure 42: Students showed thankful

5.10.2.6. Tutors

Some tutors also responded to students' questions/needs. Here is an example of a tutor who responded to a student's need with a link (Figure 43).

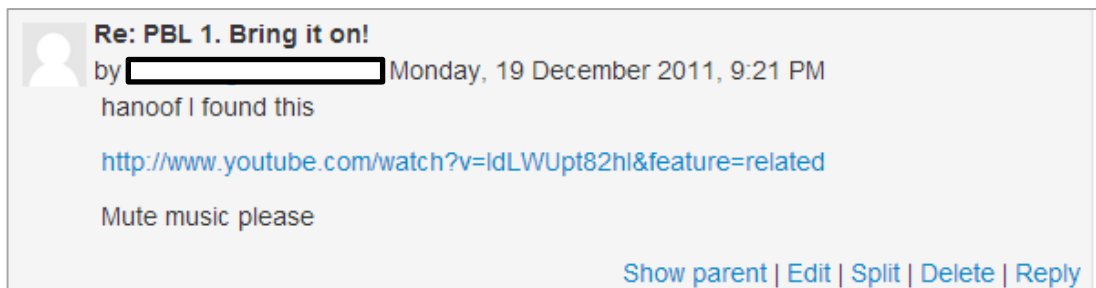


Figure 43: A tutor responded to a student's need

Other responses included appreciation of students' efforts, which played a crucial role in students' motivation. Here is a male tutor complimenting, welcoming, and asking students to participate (Figure 44).



Figure 44: A tutor complimenting and advising students.

Tutors' contributions were often feedback, redirection or provoking students' discussion. The following posts are samples by three tutors with different purposes (Figure 45).

Re: After black clouds, clear weather.
 by [redacted] Sunday, 19 December 2011, 11:13 AM
 Dear all

Well done but I would like to suggest that you add one more learning issue which is the anatomy and histology of female genital system.

Good luck

[redacted]

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Re: PBL 1. Bring it on!
 by [redacted] Sunday, 18 December 2011, 7:00 PM
 [redacted]

really I enjoyed by this video thank you

Dear girls can we start by the menstrual cycle , what its mechanism I think you have a lecture let us understand its process how it is regulated till we reach the ovulation thanks

[redacted]

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Re: Our Learning Issues ...
 by [redacted] Sunday, 19 December 2011, 1:19 PM

Dears good work
 but nobody talk about who could you know that women is pregenant or not and when and by what ?
 good luck

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Re: Our learning issues =)
 by [redacted] Saturday, 17 December 2011, 8:46 PM
 [redacted]

I think your group did very good job.

But what do u think to change what in the learning obj # 2 to describe

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Figure 45: Tutors' interaction with students

Interestingly, a female tutor was asking her students to be online at a certain time to discuss a topic, although it is not a synchronous discussion (Figure 46).

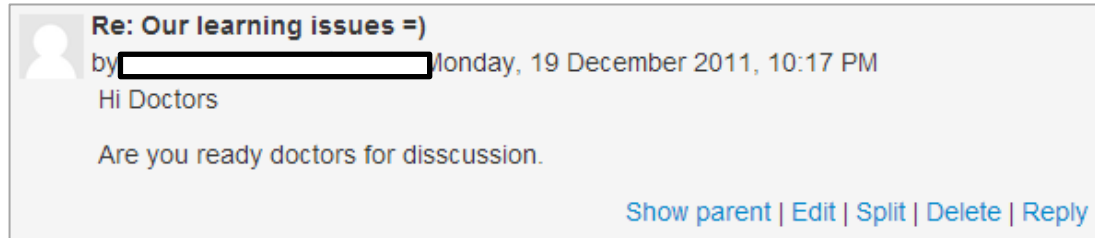


Figure 46: A tutor asking students to discuss a topic in a particular time

5.10.2.7. Participants' motivation

This is the main motive for the discussion to continue. Students motivate each other and were motivated by their tutors.

5.10.2.8. Students motivated each other

In Figure 47, in the first two samples, a student challenged his colleagues with a question, and in the 2nd post he gave a hint after several answers were given by his friends. In the last example, another student did the same, and in both examples students played the tutor's role, made the discussion interesting, and tried to provoke discussion.

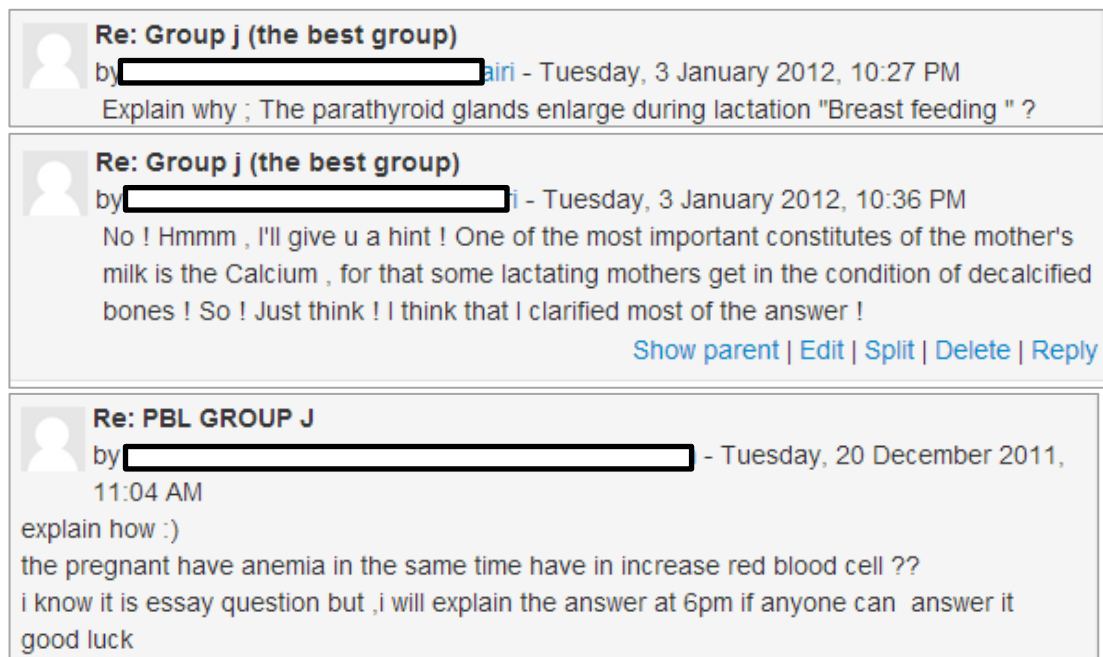


Figure 47: Tricky questions from a student motivated others

Another way of motivation by students was asking each other to participate in a nice manner. A student, for instance, requested others to share their knowledge politely (lovely doctor) (Figure 48).

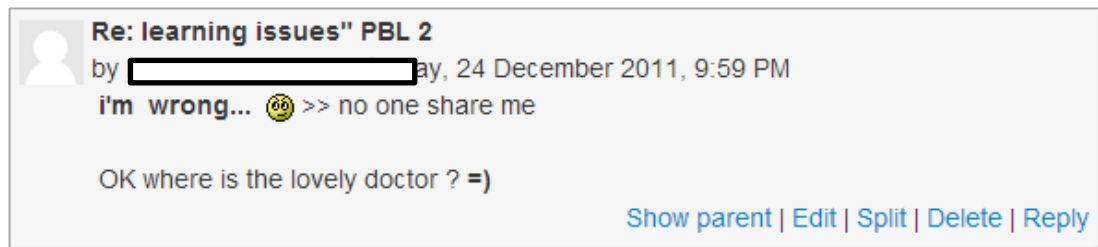


Figure 48: A student asked for others' participation

Students frequently complimented or thanked others for their contributions. These are samples of students thankful for another student's post (Figure 49).

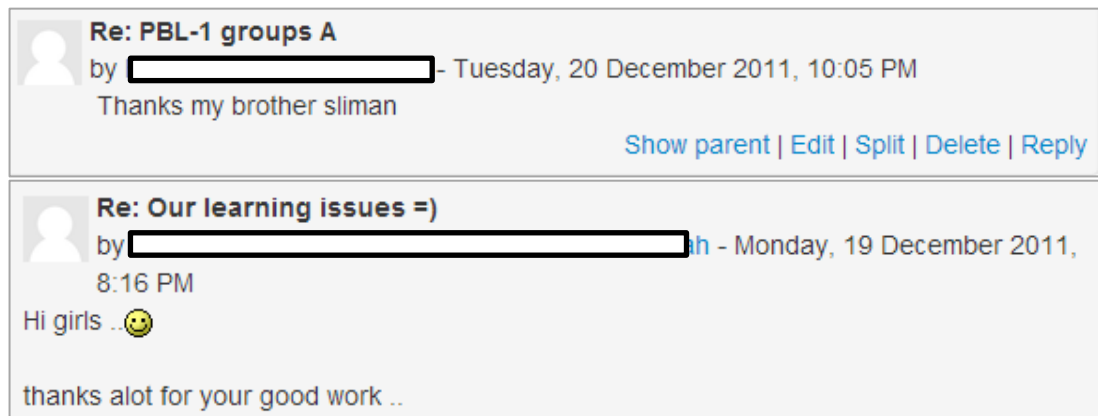




Figure 49: Students thanked their friends for knowledge was shared

5.10.2.9. Tutor as motivator


Tutors had several approaches to motivate students and provoke interaction. The below examples from four tutors show samples of ways the tutors enhanced students' contributions. One tutor, for instance, asked after a student that did not post, thanked a student or offered a compliment (Figure 50).

 **Re: PBL 1. Bring it on!**
by [redacted] Sunday, 18 December 2011, 7:06 PM
Dear lamees where are you today?

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

 **Re: PBL4:A shy boy**
by [redacted] day, 9 January 2012, 1:04 PM
excellent effort with good explanation


[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

 **Re: After black clouds, clear weather.**
by [redacted] day, 20 December 2011, 8:12 AM
I see


You are on the right track

Good luck for you all

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

 **Re: Our learning issues =)**
by [redacted] Sunday, 18 December 2011, 9:53 PM
It is truly amazing work [redacted] u r on the right trak.

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

 **Re: PBL GROUP J**
by [redacted] - Monday, 19 December 2011, 11:02 PM
Anybody knows about body mass index (BMI)?
How it is calculated?
What is the normal?
How much is yours ? :) (BTW, mine is 26.4)

[Show parent](#) | [Edit](#) | [Split](#) | [Delete](#) | [Reply](#)

Figure 50: Tutor as motivator

5.10.2.10. Observed issues

Internet connection issues sometimes caused a delay in some students' contributions. In Figure 51, I asked about other students that did not participate, and whether it was because of technical issues with the internet provider (STC=Saudi telecommunication company).



Figure 51: Internet issue

5.11. Summary

In summary, evaluation of students' interactions reveals that there was knowledge construction in all groups. Most of the posts were sharing of knowledge. The variation in the number of posts was high. Evaluating the social presence showed that groups with a high number of posts coded higher in social presence.

Observing participants' attitude on the discussion forum represents that students contributed on the DF constantly, which students perceived as if the first session continued. Students shared knowledge through different presentations (multimedia). There were frequent enquiries by students and responses by students or/and tutors. Students were motivated by their colleagues or/and by tutors that would seek contributions. Students used coloured text to make the posts look better, and they used humour often to make the interaction interesting.

Participants perceived the intervention positively from different perspectives. Most students and tutors looked forward to have the same intervention in future blocks. They found it enhanced their interaction and provided an effective area to give and receive feedback. It was an appropriate platform to share resources. Integration also provided students with more space and freedom to ask and respond, without the pressure of the tutor and face-to-face interaction. They perceived the DF as a tool to enhance writing, computer and teamwork skills. Nevertheless, not all students were satisfied with the training and were not sure if it was understood properly. Likewise, not all students were happy with the tutors' contributions.

Investigating participants' perception in detail (through interviews) supports the above. Interviewees, in addition, presented other advantages of integration of DF with PBL. For instance, discussion forums in-between PBL sessions compensated for missing the first session, as students considered it as a continuation of the first PBL session. It advanced students' interrelationship and confidence. Interactions and sharing over the DF made students digest the weekly PBL effectively. This subsequently prepared students beforehand for the end of block exam.

Chapter6: Discussion

In the previous chapter, data that resulted from the research tools was presented. The whole chapter was divided according to the research questions.

In this chapter, I will provide discussion, which includes a synthesis of what has been analysed in chapter 4 and provides the meaning of the data analysed according to the research questions ends with synthesis of overall findings. That is followed by conclusion and recommendations. The chapter will be structured around the research question.

6.1. Overview

It has been noted from the previous chapter that only 55% of the students participated in the self-administered questionnaire. There are possible reasons behind this low figure. The low response rate could be because that in addition to the questionnaire applied in this study, students are asked to fill out another questionnaire. The questionnaire is at the end of the course evaluation and its completion is compulsory in order for students to see their marks. This could make students lose interest to fill the questionnaire related to my study. The low response (55% of students) to the questionnaire is questioned and could actually be unreliable as it is could be completed only by students who were happy with the integration.

Additionally, variations were identified in terms of performance of individuals, groups and weeks. Firstly, individual student contributions online differed from week to week, which could be due to different reasons. Some students have previous commitments preparing for e.g. student seminars (a presentation given by students). Some students lose their trust and interest in the discussion because the tutor has not participated effectively. Another possible reason that could inhibit individual contributions is the permanency of the discussion on the computer. A student could avoid posting because of the language issue as all students know it will be seen by the tutors and others. Availability of Internet connection at home is another possible constraint for

some students, making it impossible for them to log into the discussion forums all the time.

Data analysis showed that there was also variation in the weekly performance. The possible reasons are that in the first week students were new to the intervention and new to the process, while low performance in the fourth week was due to the end of the block and lap exams. Group variations were noted, too. There was variation in performance between the two genders and between groups in the same gender. (For group performance variation more detail is provided in the next section).

6.2. R Q 1: Knowledge construction in the online discussion forums

This section is the main focus of my research. It includes the results of the interaction analysis model (IAM), and other observed findings that could play a crucial role in the IAM outcomes and differences between groups, such as gender difference and social presence.

In my study, IAM showed that most of the students' discussion is coded under the sharing of knowledge phase (appendix 28). In my study, there are a total of 1349 coded incidents. There are 1327(98.37%); 16(1.19%); 6(0.44%); 0(0%); and 0(0%) posts coded from Phase 1 to Phase 5 respectively (Figure 52).

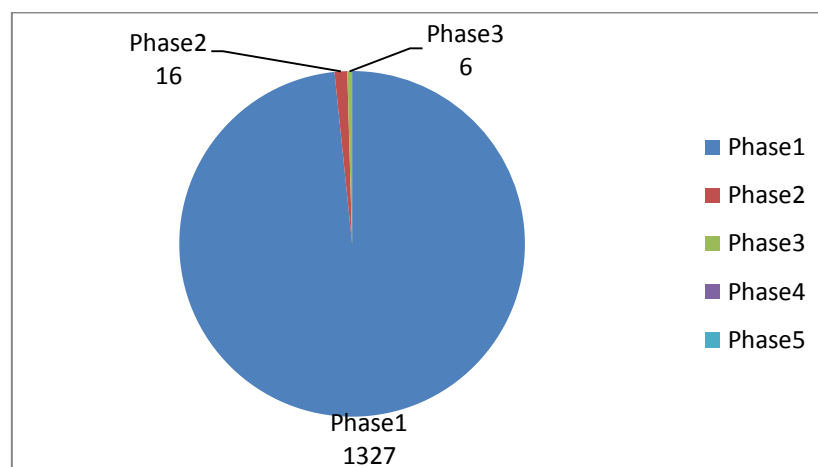


Figure 52: The Distribution of Knowledge construction activities among the five phases

This result is not an isolated phenomenon. The same result has been reported in several studies in the literature that used the IAM model to evaluate online discussion in different contexts. Gunawardena et al.'s (1997) study obtained a result of 191; 5; 4; 2; 4 posts coded from Phase 1 to Phase 5 respectively. The study participants were practitioners of online education or graduate students. Schellens and Vackle (2005) applied IAM to analyse undergraduates' online posts, and found 52%; 14%; 33%, 1.2% and 0.4 % coded posts from Phase 1 to Phase 5 respectively. In a study applied to 11 in-service teachers and a tutor, Sing and Khine (2006) found 138; 46; 29; 10; 6 coded posts from Phase 1 to Phase 5 respectively. According to the results above, it seems that higher phases of co-construction of knowledge are not easy to attain. However, in my study there is a possible explanation why most of the coded posts are in phase 1.

There are several possible reasons that could account for the results obtained in this study. First, the ratio of integration of the online discussion forums is 1:2 of the face to face activity of the PBL. In other words, students meet face-to-face in the first session to discuss the problem and agree provisionally on the learning issues, and then meet in the discussion forum and finally in the second session. Hence, students will not discuss the whole problem in detail as they will discuss it in the last session. Some students decided not to share because they presumed if they discussed everything they knew, nothing will be left for the second session.

Second, tutors complained of time constraints because they were busy with school commitments, such as lectures, meetings and marking. This was proved by the results, which shows that a tutor did not participate and the rest did not participate effectively. This issue might, subsequently, affect the ZDP and scaffolding, which are the crucial aspects in taking participating students from one level/phase to another.

Third, students acknowledged the importance of the tutor's presence in the discussion. The tutor's presence affected, in way or another, students' confidence. This is why it was decided to make the discussion facilitated by the tutor in my study.

There are observed features of the result of knowledge construction activities in the discussion forum. They include gender difference, with female groups coding high compared to males; however, there is only one male group (J) coded high and it is one of the top 3 coded groups in IAM. This phenomenon has been explained by results of evaluation of the social presence activities in discussion forums, in which female groups scored higher than male groups in social presence. Meanwhile, group J scored high in social presence activities in the discussion forums. Hence, the explanation for the high activity in these groups is that social presence made students perceive the DF as real, which led to an increase in the number of posts and discussion, which subsequently enhanced the opportunity for knowledge construction (Figure 53). In a study of perception of 51 students on social presence in online discussion, Tu and McIsaac (2002) conclude that social presence is a vital element in influencing online interaction.

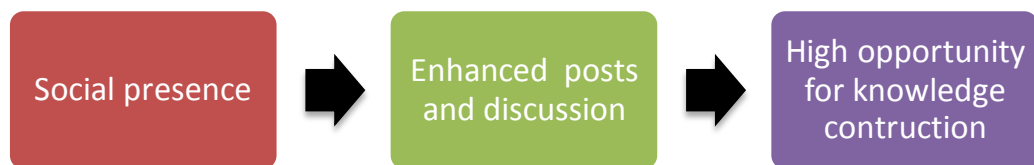


Figure 53: Effect of social presence on knowledge activity

The results indicate that there is a gender difference in the number of posts, which is not striking. The literature showed that there is a gender difference in perceptions and online activity (Davidson-Shivers et al., 2010; Barrett and Lally, 1999). Female students' and tutors' posts were more frequent than males' posts. However, this does not match with their perceptions and satisfaction about the integration, which are similar to the pilot study results. That could explain one aspect of why females are more active in knowledge and social presence activities. (Thayalan et al., 2012)

However, there are aspects of Saudi culture that might play an important role in making female groups more active in social presence activities. First, females have to leave at 2:30 pm, which is at the end of the last activity in the day, as the female section is then closed. Second, some female students face difficulty in meeting outside the university time due to cultural restrictions. Hence, online discussion forums seem to provide a space for females to discuss the PBL and other off-topic issues, which led to high social presence.

Finally, this might explain why female students posted more than male students and have a high number of codes in the interaction analysis model.

For group J (male), it was not facilitated by an effective tutor. However, the group is characterised by fact that the members motivated each other throughout the week, and this is an explanation of the high social presence activity. This attribute subsequently made the members acknowledge each other's contributions by thanking and complementing, in addition to addressing other participants by name. Another attribute of this group is that they were asking each other questions, which enhanced their motivation. Hew and Cheung (2008) explored what could attract students to participate in asynchronous online discussions in a case study of peer facilitation. In individual interviews, 22 students reported that questioning and showing appreciation were techniques peers apply to encourage their group members to contribute.

6.3. R Q 2: Participants' perception towards the training

Most of the self-reported items and participants' perception towards the training in the questionnaire evaluation are reported positively. However, this was not the case in the interviews. Looking at deep information on training raised the issue of clarity. Some interviewees (tutors and students) claim that it is not an issue for the students as it was an orientation, because this was overcome by providing all the steps they need to use and understand the facilities.

However, this issue cannot be ignored in terms of tutors, first because it could be the reason why students in some groups did not participate as effectively as others, or why they did not go to higher levels in knowledge construction activities. Second, unclear training may affect a tutor negatively, making him/her not participate because s/he lacks the rationale/skills of the intervention. Third, poor training may lead to a tutor requesting that students do a task in the wrong manner.

6.4. R Q 3: Participants' perception towards the Interaction/Collaboration

Both students' reactions and participants' perceptions propose that integration of DF was an enrichment factor for advancing collaborative learning, a key characteristic of F2F PBL (Davis and Harden, 1999). The results clearly show that integration of a facilitated online discussion forum between PBL sessions enhances student-student and student-tutor interactivity during the SDL period. These results have been reported similarly in studies that used online discussion forums in their context (Woltering et al., 2009; Taradi et al., 2005; Cheaney, 2006). Moreover, the results are similar to the results of the pilot study (Alamro, 2010; Alamro and Schofield, 2012)

Most students in my study believed that using the discussion forum was useful in increasing interactivity. Gooding (2002) and many other researchers support my study's result that online discussion improves the collaborative learning. This contrasts with a study of Maastricht Medical Students (Leng et al., 2006). In an integration of DF with PBL study, Leng and colleagues (2006) proposed that Dutch students did not find it useful because they had regular F2F contact in the tutorial group meetings and other activities. This may be true for the small number of Qassim students who did not find the discussion board useful. These differences may also be because of the cultural differences between Dutch and Saudi medical students.

The positive report of students' and tutors' perceptions, in addition to the number of posts (especially within female groups) may reveal how Qassim Medical Students are in need of increased contact time with their tutors in the conventional PBL group. This positive reaction in my study is due to the fact that the intervention helps students overcome the issues they suffer from (Al Robaee et al., 2009; Shamsan and Syed, 2009; Hamad et al., 2004). These issues include the fact that student-student and student-tutor contact about the weekly PBL ended at the end of the PBL session. Some Qassim medical students' spoken English is very poor, and there is no helpful feedback on how they are performing during the SDL period (Shamsan and Syed, 2009). Another issue is that shy and quieter students find it difficult to speak up. The intervention was an effective medium for sharing knowledge and regular

feedback, which was given by the students or students' tutor, helped them to assess their performance during the SDL period, and showed them the right direction toward achieving the learning objectives. This explains the high engagement level of students in the DF and the positive perception of interactivity and collaboration, as well as an explanation of why students and tutors consider the discussion forum as a continuity of the conventional PBL sessions, because the discussion was able to continue.

Most Qassim Medical students reported that the integration of DF was an effective way to express opinions. That could be the main reason why a majority of them found the forum useful, as they found the opportunity to express their opinion. That also explains why the majority of Maastricht students found it not useful, because they can speak up freely, which reveals the cultural difference between the students of each school. Several researchers notices that Asian students are silent in small group teaching, due to cultural effects, and the situation worsens when the discussion is in a language not their own (Jin, 2014; Jin, 2012; Jackson, 2002; Khoo, 2003b). One of the proposed solutions by Jin was adoption of online discussion tools, as the discussion will not be stressed.

Moreover, it has been observed that the asynchronous discussion allows opportunities for contributions and expression of opinions from less dominating types of students who might be reluctant to speak up in F2F PBL (McCall, 2010). The results of my study are consistent with those of Biesenbach-Lucas (2003), who found that students who were very quiet in F2F teaching made lengthy contributions to their group online. They had time to participate and to correct their written English language, reducing their worries of making mistakes in front of others.

6.5. R Q 4: Participants' perception towards the flexibility, accessibility and technical support

For e-learning to occur, Nichols (2008) claims that effective pedagogy must be combined with reliable, easy-to-use technology. Navigation, accessibility and visual appearance are crucial in the technical aspect of usability (Zaharias and Poylymenakou, 2009). Negative effects from these aspects will affect

knowledge construction, the culminated outcome of my study. The present findings seem to be consistent with other research, which found that the majority of participants found that Moodle's interface allows for easy navigation (Beatty and Ulasewicz, 2006; Corich, 2005).

Females reported flexibility, accessibility and technical support more negatively in comparison with males. This explains the difference in satisfaction between the two genders (see R Q 6). Sandars and Lafferty (2010) explain that poor usability, including a visually unappealing or boring interface will affect participants' motivation.

Because participants did not frequently need technical support, some could not give their opinion about the help provided. Nonetheless, the low rating of some students might be because of the internet connection, especially in female sections. They frequently complained of weak wireless internet connection (signal).

The low rating could also be due to Moodle's style. It could be that some females were not happy because editing text was complicated, which may contribute to females' being less satisfied with the intervention (see below). Other issues raised that may affect students' motivation was that posts in the discussion thread do not update automatically, and the system does not show who is online. I do have no control over these issues.

6.6. R Q 5: Participants' perception towards the learning of PBL in the integrated system

As has been shown in the above discussion, my study contributes an enhancement of interactivity and collaboration, which then enhances learning and flexibility. This concurs with the study by McCall (2010), which found that the majority of students' online learning programmes enhanced their learning. It also agrees with Wilson and Whitelock (1989), who found that the preparation of responses off-line provided time for students to reflect on their own understanding of the domain.

In addition to using the discussion forum for inquiries and feedback, it has been used to illustrate understandings and ideas in different multimedia formats. Those supported some students to express themselves, and others to understand the problem effectively. Particularly, the written scenarios given to students in the first session have no pictures or illustrations to make explicit the clinical presentation.

Integration of online discussion gives the students room to start discussing the learning issues throughout the week, rather than discussing them only in the first session. Participants' perceptions and their reactions on the forum suggest that integration of online discussion helped students to focus on the weekly problem by selecting information related to the PBL.

Students' posts and perceptions show that they found the integration helps in finding and sharing resources, which transcends some students' problems, especially that the library is closed very early, for instance. This also accords with Dziuban et al.'s (2004) findings, which showed that students constantly report that they find value in the outside resources that become available in the discussion forum and help in overcoming the limitations in students, and tutors' interactions. Gould also (2003a; p 21) says that integration of DFs "will allow institutions to maximize their available resources to meet their students' educational needs."

Applying the online-based discussion has effects beyond knowledge construction. The results revealed clearly that participants positively perceived that utilizing the discussion forum improves writing skills (Leasure et al., 2000). Biesenbach-Lucas (2003) found that students' writing skills improved over a semester period as result of regular postings. The present findings seem to be consistent with other research by Leasure et al. (2000), which found that a secondary benefit of the online discussion was to increase student confidence with the computer. Students practised all essential teamwork skills (except listening) given by the Bellingham Public Schools (1999), which are: questioning, persuading, respecting, helping, sharing, and participating. However, in my study, findings are based on participants' subjective

perceptions, which could be unreliable. In a four-week course, gaining such skills might not be realistic.

Unexpectedly, a tutor and several students reported that integration increased students' confidence in the F2F PBL discussion. This might be because of either or both of two factors. First, students may underestimate their information, and when they share online their comprehension was acknowledged by the tutor and classmates. Second, the language issue may make students unconfident in the conventional PBL discussion, but when it is online it is not the case, since students can make sure that the language is correct. Their posts are then appreciated by the tutor and/or other colleagues. These two factors led to enhancement of the students' confidence.

6.7. R Q 6: Participants' satisfaction

Since participants' perceptions are positive in all the researched domains, positive satisfaction is foreseen. Participants found the DF enjoyable and motivating, as seen in previous research (Wu and Hiltz, 2004; Li, 2010; Yang et al., 2007). The integration overcomes the issues that students complained of. Moreover, it was a motivational factor for students in the weekly PBL; it helped them improve different skills; it enhanced their interrelationship and the link between students became stronger; it enhanced collaborative learning; and it made the study for the weekly PBL and the exam easier. Hence, most students and tutors were satisfied, motivated and looked forward to having the same experience in another block. Van der Linden et al (2002) claim that collaborative increase students motivation.

Comparing male with female students showed that males perceived the intervention with more satisfaction, although females posted more and were active in knowledge construction and social presence activities. The explanation could be that some female students found it difficult to access the internet at home. That affected the flexibility and accessibility, which led to lower satisfaction than the males perceived.

6.8. R Q 7: Advantages and challenges of the integration

Most of the advantages and limitations have been discussed throughout this chapter because it was necessary to discuss them when the advantage or the limitation related to one of the research questions above. However, there are other interesting advantages.

In face to face discussion, when a student is asked a question, the rest of the group, including the tutor, is staring at the student expecting an answer. This puts students under the stress of potential wrong answers. Interaction in the DF is self-paced, and students found it more comfortable to respond to questions and collaborate without the above-mentioned stress.

At Qassim Medical School, there is a variation in tutors' PBL facilitation and content. The main cause is the annual recruitment of new staff with insufficient knowledge / experience in PBL facilitation. Although they receive training on facilitation when they arrive, students are still not happy with the tutors' roles or how the tutors emphasize their own specialties (Shamsan and Syed, 2009). Since a tutor can visit any of the PBL groups throughout the week, it has been an opportunity to standardize the facilitation of the weekly PBL.

A group of student quotes indicated that the discussion forum was helpful for end of block exam preparation. This may result from the wide range of learning objectives covered in the discussion, and the permanency of discussion content that allows the content to be revisited, while in F2F PBL they only discuss issues verbally (Ellis, 2001).

However, there are some challenges that have been faced. As noticed above, time consuming is limiting, especially in my study as the DF was integrated with F2F (Klimova, 2011). In a recent study, Anderson and Simpson (Anderson and Simpson, 2014), evaluating an integrated project, found that participants complaining that it was time consuming to read a lot of posts. Frankola (2001), claims that time limitation is the first cause of the dropout rate. This could explain the low activity of tutors and some students.

Internet connection is another challenge facing the female section. This may be the reason that females' satisfaction was rated lower than the males'. That is due to the segregation in buildings. In the females' building, internet connection problems were frequently experienced, while in the males' building they were very rare. Even if the connection worked properly, females found the network to be very weak in some rooms (especially tutors), whereas in the males' building it reached all rooms. This problem may disappear when the school moves to the new building. Another factor is that males can freely go to a coffee shop and engage in online discussion, while females cannot after school time.

6.9. Synthesis of overall findings

The integration of the online discussion forum with PBL could enhance student learning. This statement is based on the participants' perceptions and based on the evaluation of the discourse on the discussion forums as a validation tool. The objective investigation showed that knowledge is constructed in the online discussion through the sharing of knowledge. However, the sharing of knowledge is the first phase in the evaluation tool and is considered a lower level of knowledge construction.

Integration of the discussion forums with PBL helps student understanding of the weekly problem as students share knowledge in different presentations (e.g. using multimedia resources). The repetition of the knowledge in the discussion forums helps the PBL students in terms of knowledge retention and mastering learning objectives. The permanency of the discussion forums makes it a valuable source of knowledge that students can visit and review their information at any time.

If the PBL tutors engage in the discussion forums effectively and follow the students' discussion, the activity online will keep the tutors apprised of which student is in need of feedback and redirection. This will contribute to the improvement of student learning in the weekly PBL as the students receive regular feedback on his performance.

Participants acknowledged that the integration was motivational for students. Motivation will encourage student engagement in the forums and share and construct knowledge. Subsequently, this engagement will enhance student learning and understanding of the weekly problem.

6.10. Conclusion

Integration of a facilitated online discussion forum between problem-based learning sessions can increase students' knowledge construction and sharing in PBL sessions, in addition to overcoming current issues and enhancement of different skills.

The integrated approach in the pilot study was developed to overcome some existing problems in the conventional PBL at Qassim Medical School. It was also found to be a complementary pedagogical tool for conventional PBL. It enhances PBL instructional goals such as self-directed learning, collaborative learning, active learning, motivation, and deep learning, and also enhances different skills, such as English writing and teamwork.

The frequency of posts and level of activity in knowledge construction and social presence show that Qassim Medical Students needed the integration. Moreover, in my study, results of participants' perceptions validate the pilot study's results. This similarity reveals the importance of and need for the integration, both in Qassim Medical School and for students in any context or institution that experience the same PBL issues.

The integration approach has supported Qassim Medical School's students and tutors. Students have been assisted through increased knowledge construction, maximisation of learning resources, regular feedback, heightened motivation, enhanced collaboration, increased flexibility, and opportunities to improve writing and computer skills. Tutors have been helped by being able to overcome the time challenge of following up with the students during the SDL period.

This study provides insight into QMS and similar institutions integration of facilitated DFs can overcome current PBL issues; improve students' skills, e.g. English writing; and enhance students' knowledge construction.

Integration of DF could enhance any learning and teaching experience, provided there is a need for it. Hence, the use of collaborative online discussion needs to be employed deliberately to support students' learning, not simply because the technology is available. It is difficult for students to achieve online collaboration if they do not clearly perceive the goal of the activity.

6.11. Limitations

I faced challenges during my study that might affect the study outcomes, and should be considered in any future research. The following are the limitations; some of them have already been discussed.

Internet connection problems were a strong confounding variable, affecting participants' perceptions. Females work in a separate building with a low-quality internet connection. This affected the engagement of the female participants, and thus their perception of the DF integration.

Having the face-to-face tutor facilitate the online discussion has advantages that I have mentioned before; however, in my study some tutors became busy and could not participate in the DF. Some students were not satisfied with the tutor's support, which affected these students' perceptions. Hence, it would be more effective to select tutors with fewer commitments who will have more time for students. Another suggestion is to assign two tutors to each board, in case one is busy.

I am a member of the QMS faculty, and this fact cannot be isolated from the study. It would have the greatest effect during the interviews. The interviewees know I will return to QMS after I complete my PhD, which might have affected their responses. My position has been considered during the interview (as mentioned in the methodology chapter). To make sure that social desirability bias is avoided, an outside interviewer should be assigned. In addition, the

interviewer assured the interviewees that their responses will be reported to me anonymously.

There were some limitations related to the training, based on participants' opinions. Time was limited for students, so I could not repeat the most important parts of the training. It would be more effective if more time was dedicated to the training, or if it could be conducted in two sessions.

6.12. Recommendation for further researches

In light of the present study's findings, the following suggestions are made for further research.

It would be more effective if the level of the discussion on the discussion forums goes beyond phase 1. The possible suggestions to move the discussion to phases 2, 3, 4 or 5 is; the 5th steps of seven-jumps could be moved totally or partially to be discussed in the discussion forums. The 5th step required more discussion and students to be consensus of what to cover. This is in addition to enhancement of the tutors' skills in facilitating online discussion and their roles in the discussion forums by increasing the training. The training should involve a real practical example beforehand.

Another area worth investigation is 'what is the impact of integration of DFs with PBL on educational outcomes?' The study could be conducted using randomise control trial (RCT) trying to investigate the impact of the discussion forums on students that used it and compare it with the control group.

Another suggestion is using blue print and making sure that the learning objectives have not been covered in other teaching and learning methodology. Then, students activities online compared with their performance in the questions that testing the objectives covered only in the PBL.

Findings revealed that the integration enhanced students' confidence in PBL sessions held during the study. It is worth conducting a further study to investigate whether the effect on students continues, or if confidence only rises during the integration of DFs. Investigating student's performance in PBL sessions in the consecutive block is a suggested method to study this effect.

The literature review and students' perceptions in my study show that integration of online discussion improves English writing. The need for this advantage of integration of DF is increased because some medical schools' exams are multiple choice questions and/or other tools that do not depend on writing. In addition, students are not required to submit a piece of writing, either research or other assignments, during their undergraduate study. Therefore, these students have few chances to improve their English. If DF is integrated with f2f for a longer period, it may be worth investigating its effect on students' English writing.

It may also be worth conducting a social network analysis. The analysis will explore students' activity and the relations between posts/participants. This will provide a comprehensive understanding of connectivity and effect of some posts/students on others, if there is any. The analysis may show that in some groups a particular student may play the role of tutor, or have an even greater effect than that of the tutor on her/his colleagues. That could lead to integrated DFs without tutor if students play the same role.

Finally, replication of the same study in other blocks/courses in QMS; and replication of the same study in different context are suggested for further research. Hence, the replication outcomes validate the current study findings.

Chapter7: References

- Adesope, T. et al. 2008. Traditional and Online Forms of Education: Proposing a Common Ground. In: *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2008, Las Vegas, Nevada, USA*. AACE, pp.2071-2076.
- Al-Ajlan, A. and Zedan, H. 2008. Why moodle. In: *Future Trends of Distributed Computing Systems, 2008. FTDCS'08. 12th IEEE International Workshop on*: IEEE, pp.58-64.
- Al-Damegh, S.B.A. et al. 2004. *The undergraduate curriculum of Al Qaseem College of medicine. Pioneer in contemporary education in Saudi Arabia* [Online]. [Accessed 7.5.2014]. Available from: https://www.academia.edu/776997/The_undergraduate_curriculum_of_Al_Qaseem_College_of_medicine_Pioneer_in_contemporary_education_in_Saudi_Arabia
- Al Robaee, A. et al. 2009. Students` Perception of Problem-Based Learning: Experience Of Qassim Medical College, KSA. *Tanta Medical Journal*. **4**(37), pp.261-69.
- Alamro, A. 2010. *Blended Problem-Based Learning: using technology to overcome Face-To-Face Drawbacks and Enhance PBL Advantages at Qassim Medical School, Saudi Arabia*. Master thesis, University of Dundee.
- Alamro, A.S. and Schofield, S. 2012. Supporting traditional PBL with online discussion forums: A study from Qassim Medical School. *Medical teacher*. **34**(s1), pp.S20-S24.
- Albanese, M. and Mitchell, S. 1993. Problem-based learning: a review of literature on its outcomes and implementation issues. *Academic medicine*. **68**(1), pp.52-81.
- Aldridge, A. and Levine, K. 2001. *Surveying the social world*. Open University Press.
- Alebaikan, R. and Troudi, S. 2010. Online discussion in blended courses at Saudi Universities. *Procedia - Social and Behavioral Sciences*. **2**(2), pp.507-514.
- Althaus, S.L. 1997. Computer-mediated communication in the university classroom: An experiment with on-line discussions. *Communication Education*. **46**(3), pp.158 - 174.
- Anderson, B. and Simpson, M. 2014. Group and Class Contexts for Learning and Support Online: Learning and affective support online in small group and class contexts.

- Anderson, G. and Arsenault, N. 1998. *Fundamentals of educational research*. 2nd ed. Routledge Falmer.
- Anderson, T. 2008. Teaching in an Online Learning Context. In: Anderson, T. ed. *The theory and practice of online learning*. 2nd ed., pp.273-294.
- Anderson, T. et al. 2001. Assessing teacher presence in a computer conferencing context. *Journal of Asynchronous Learning Networks*. **5**(2), pp.1-17.
- Ardito, C. et al. 2006. An approach to usability evaluation of e-learning applications. *Universal access in the information society*. **4**(3), pp.270-283.
- Ardito, C. et al. 2004. Usability of e-learning tools. In: *Proceedings of the working conference on Advanced visual interfaces: ACM*, pp.80-84.
- armyofda12monkeys. 2007. *3D sperm fertilization project*. [Online]. Available from: <http://youtu.be/9MnQxiSJZ4Q>
- Association for Medical Education in Europe. 2014. *AMEE abstracts*. [Online]. [Accessed 7/5/2011]. Available from: <http://www.amee.org/index.asp?tm=59>
- Babbie, E.R. 2013. *The practice of social research*. Cengage Learning.
- Ballard, J.K. 2010. *Web site usability: A case study of student perceptions of educational web sites*. thesis, University of Minnesota.
- Barbour, R.S. 2005. Making sense of focus groups. *Medical Education*. **39**(7), pp.742-750.
- Barrett, E. and Lally, V. 1999. Gender differences in an on-line learning environment. *Journal of Computer Assisted Learning*. **15**(1), pp.48-60.
- Barrows, H. 1985. *How to design a problem-based curriculum for the preclinical years*. Springer New York.
- Barrows, H. 1996. Problem-based learning in medicine and beyond: A brief overview. *New directions for teaching and learning*. pp.3-12.
- Bates, T. 2005. *Technology, e-learning and distance education*. RoutledgeFalmer.
- Baxter, P. and Jack, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*. **13**(4), pp.544-559.

- Beatty, B. and Ulasewicz, C. 2006. Faculty perspectives on moving from Blackboard to the Moodle learning management system. *TechTrends*. **50**(4), pp.36-45.
- Biesenbach-Lucas, S. 2003. Asynchronous discussion groups in teacher training classes: Perceptions of native and non-native students. *Journal of Asynchronous Learning Networks*. **7**(3), pp.24-46.
- Bishop, P. 2010. Multi-Site Case Study. In: Mills, A.J., et al. eds. *Encyclopedia of case study research*. Los Angeles: Sage, pp.578-590.
- Blankson, J. and Kyei-Blankson, L. 2008. Nontraditional Students' Perception of a Blended Course: Integrating Synchronous Online Discussion and Face-to-Face Instruction. *Journal of Interactive Learning Research*. **19**(3), pp.421-438.
- Blaxter, L. et al. 2006. *How to research*. Open University Press.
- Boynton, P.M. and Greenhalgh, T. 2004. Selecting, designing, and developing your questionnaire. *BMJ*. **328**(7451), pp.1312-1315.
- Braun, V. and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology*. **3**(2), pp.77-101.
- Bryman, A. 2008. *Social research methods*. Oxford university press.
- Cheaney, J.D. 2006. Problem-based Learning in an Online Course: A case study. *International review of research in open and distance learning*. **6**(3).
- Chen, C. and Jones, K. 2007. Blended learning vs. traditional classroom settings: Assessing effectiveness and student perceptions in an MBA accounting course. *The Journal of Educators Online*. **4**(1), pp.1-15.
- Childs, S. et al. 2005. Effective e-learning for health professionals and students—barriers and their solutions. A systematic review of the literature—findings from the HeXL project. *Health Information & Libraries Journal*. **22**(s2), pp.20-32.
- Chmiliar, L. 2010. Multiple-Case Designs. In: Mills, A.J., et al. eds. *Encyclopedia of case study research*. Los Angeles: Sage, pp.582-583.
- Cindy et al. 2011. Learning Theories and problem-based learning. In: Bridges, S., et al. eds. *problem-based learning in clinical education the next generation*. Springer.

- Cobb, S. 2009. Social presence and online learning: a current view from a research perspective. *Journal of Interactive Online Learning*. **8**(3), pp.241-254.
- Coghlan, D. 2003. Practitioner research for organizational knowledge mechanistic-and organistic-oriented approaches to insider action research. *Management Learning*. **34**(4), pp.451-463.
- Cohen, L. et al. 2007. *Research methods in education*. 6 ed. Routledge.
- Cole, J. and Foster, H. 2007. *Using Moodle: Teaching with the popular open source course management system*. second edition ed. O'Reilly Media.
- Corich, S. 2005. Is it time to Moodle. In: *18th Annual NACCQ Conference* pp.155-158.
- Costley, C. et al. 2010. *Doing work based research: Approaches to enquiry for insider-researchers*. Sage.
- Crawford, K. 1996. Vygotskian approaches in human development in the information era. *Educational Studies in Mathematics*. **31**(1-2), pp.43-62.
- Creswell, J.W. and Clark, V.L.P. 2007. *Designing and conducting mixed methods research*. SAGE
- Creswell, J.W. and Clark, V.L.P. 2011. *Designing and conducting mixed methods research*. 2nd ed. SAGE
- Darke, P. et al. 1998. Successfully completing case study research: combining rigour, relevance and pragmatism. *Information systems journal*. **8**(4), pp.273-289.
- Davids, M.R. et al. 2013. An efficient approach to improve the usability of e-learning resources: the role of heuristic evaluation. *Advances in physiology education*. **37**(3), pp.242-248.
- Davids, M.R. et al. 2014. Effect of improving the usability of an e-learning resource: a randomized trial. *Advances in physiology education*. **38**(2), pp.155-160.
- Davidson-Shivers, G.V. et al. 2010. How do female students participate in online debates? *International Journal on E-Learning*. **9**(2), pp.169-183.
- Davis, M. and Harden, R. 1999. AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide. *Medical teacher*. **21**(2), pp.130-140.

- De Leng, B.A. et al. 2006. Student perceptions of a virtual learning environment for a problem-based learning undergraduate medical curriculum. *Medical education*. **40**(6), pp.568-575.
- De Wever, B. et al. 2006. Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education*. **46**(1), pp.6-28.
- Des Marchais, J. 1993. A student-centred, problem-based curriculum: 5 years' experience. *CMAJ: Canadian Medical Association Journal*. **148**(9), p1567.
- DeVries, J. and Lim, G. 2003. Significance of online teaching vs. face-to-face: Similarities and difference. In: Citeseer.
- Divitini, M. et al. 2005. Blog to support learning in the field: lessons learned from a fiasco. In: *Advanced Learning Technologies, 2005. ICALT 2005. Fifth IEEE International Conference on, 5-8 July 2005*, pp.219-221.
- Dodd, L. 2007. The impact of problem-based learning on the information behavior and literacy of veterinary medicine students at University College Dublin. *The Journal of Academic Librarianship*. **33**(2), pp.206-216.
- Dolmans, D. and Schmidt, H. 2006. What Do We Know About Cognitive and Motivational Effects of Small Group Tutorials in Problem-Based Learning? *Advances in health sciences education*. **11**(4), pp.321-336.
- Dolmans, D.H.J.M. et al. 2005. Problem-based learning: future challenges for educational practice and research. *Medical education*. **39**(7), pp.732-741.
- Dolmans, D.H.J.M. et al. 2001. Solving problems with group work in problem based learning: hold on to the philosophy. *Medical education*. **35**(9), pp.884-889.
- Donner, R. and Bickley, H. 1993. Problem-based learning in American medical education: an overview. *Bulletin of the Medical Library association*. **81**(3), pp.294-298.
- Dörnyei, Z. and Taguchi, T. 2010. *Questionnaires in second language research: Construction, administration, and processing*. Routledge.
- Driscoll, M.P. 2005. *Psychology of learning for instruction*. 3rd ed. Pearson Education (US).

- Dzakiria, H. et al. 2006. Moving Forward with Blended Learning (BL) as a Pedagogical Alternative to Traditional Classroom Learning. *Malaysian Online Journal of Instructional Technology (MOJIT)*. **3**(1), pp.11-18.
- Dziuban, C. et al. 2004. Blended learning. *EDUCAUSE Center for Applied Research Bulletin*. (7), pp.1-12.
- Ellaway, R. and Masters, K. 2008. AMEE Guide 32: e-Learning in medical education Part 1: Learning, teaching and assessment. *Medical teacher*. **30**(5), pp.455-473.
- Ellis, A. 2001. Student-centred collaborative learning via face-to-face and asynchronous online communication: What's the difference. In, p.2006.
- Esposito, N. 2001. From meaning to meaning: the influence of translation techniques on non-English focus group research. *Qualitative Health Research*. **11**(4), pp.568-579.
- Finucane, P. et al. 1998. Problem-based learning: its rationale and efficacy. *Medical Journal of Australia*. **168**(9), pp.445-447.
- Fitzpatrick, J.J. and Wallace, M. 2012. *Encyclopedia of nursing research*. Springer Publishing Company.
- Flyvbjerg, B. 2006. Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*. **12**(2), pp.219-245.
- Fosnot, C.T. 1996. Constructivism: A psychological theory of learning. *Constructivism: Theory, perspectives, and practice*. New York, NY: Teachers College Press., pp.8-33.
- Frankfort-Nachmias, C. and Nachmias, D. 2000. *Research in methods in the social sciences*. Worth Publishers (New York).
- Frankola, K. 2001. Why online learners drop out. *Personnel Journal*. **80**(10), p52.
- Fuks, H. et al. 2002. The development and application of distance learning courses on the Internet. *Open Learning: The Journal of Open and Distance Learning*. **17**(1), pp.23-38.
- Garrison, D.R. 1990. An analysis and evaluation of audio conferencing to facilitate education at a distance. *The American journal of distance education*. **4**(3), p13.
- Garrison, D.R. 1992. Critical thinking and self-directed learning in adult education: An analysis of responsibility and control issues. *Adult Education Quarterly*. **42**(3), pp.136-148.

- Garrison, D.R. 1997. Computer conferencing: the post-industrial age of distance education. *Open learning*. **12**(2), pp.3-11.
- Garrison, D.R. 2011. *E-learning in the 21st century: A framework for research and practice*. second ed. Routledge.
- Garrison, D.R. et al. 1999. Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. *The Internet and Higher Education*. **2**(2–3), pp.87-105.
- Garrison, D.R. et al. 2001. Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of distance education*. **15**(1), pp.7-23.
- Gibbs, A. 1997. *Focus groups, Social Research Update*. [Online]. [Accessed 14/3/2014]. Available from: <http://sru.soc.surrey.ac.uk/SRU19.html>
- Gold, S. 2001. A constructivist approach to online training for online teachers. *Journal of Asynchronous Learning Networks*. **5**(1), pp.35-57.
- Gooding, K. 2002. Problem based learning online. In: *ASET Conference 2002, 7-10 July, Melbourne, Australia*.
- Gould, T. 2003a. Hybrid classes: Maximizing institutional resources and student learning. In: *Proceedings of the 2003 ASCUE Conference*, pp.54-59.
- Gould, T. 2003b. Hybrid classes: Maximizing institutional resources and student learning. In: *Proceedings of the 2003 ASCUE*.
- Graf, S. and List, B. 2005. An Evaluation of Open Source E-Learning Platforms Stressing Adaptation Issues. In: *ICALT*, pp.163-165.
- Gray, A. 1997. *Constructivist teaching and learning (SSTA Research Centre Report #97-07)*. [Online]. [Accessed 1/6/2014]. Available from: <http://www.saskschoolboards.ca/old/ResearchAndDevelopment/ResearchReports/Instruction/97-07.htm#What> is Constructivism?
- Gray, D.E. 2004. *Doing Research in the Real World*. SAGE.
- Gunawardena, C. et al. 2000. Evaluating online learning: Models and methods. In: *Society for Information Technology & Teacher Education International Conference*, pp.1677-1684.
- Gunawardena, C.N. 1995. Social presence theory and implications for interaction and collaborative learning in computer conferences. *International journal of educational telecommunications*. **1**(2), pp.147-166.

- Gunawardena, C.N. et al. 1997. Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of educational computing research*. **17**(4), pp.397-431.
- Hacker, D.J. and Niederhauser, D.S. 2000. Promoting deep and durable learning in the online classroom. *New Directions for Teaching and Learning*. **2000**(84), pp.53-63.
- Haghparast, N. et al. 2007. Evaluation of student and faculty perceptions of the PBL curriculum at two dental schools from a student perspective: a cross-sectional survey. *European Journal of Dental Education*. **11**(1), pp.14-22.
- Haig, A. and Dozier, M. 2003a. BEME Guide No 3: Systematic searching for evidence in medical education--Part 1: Sources of information. *Medical Teacher*. **25**(4), pp.352-363.
- Haig, A. and Dozier, M. 2003b. BEME guide no. 3: systematic searching for evidence in medical education--part 2: constructing searches. *Medical Teacher*. **25**(5), pp.463-484.
- Hall, B.M. 2011. *HOW COGNITIVE REQUIREMENT OF PROMPT AND TIME IN COURSE ARE CORRELATED WITH INTERSUBJECTIVITY WITHIN THREADED DISCUSSIONS*. Doctor of Philosophy thesis, Capella University.
- Hamad, B. et al. 2004. The challenges of implementing a new curriculum at Al Qaseem College of Medicine, Saudi Arabia: A Study on the Initial Implementation Problems. In: *presented during the International Conference on Medical Education, King Saud University, Riyadh*.
- Henri, F. 1992. Computer conferencing and content analysis. *Collaborative learning through computer conferencing*. Springer, pp.117-136.
- Hew, K.F. and Cheung, W.S. 2003. Models to evaluate online learning communities of asynchronous discussion forums. *Australian Journal of Educational Technology*. **19**(2), pp.241-259.
- Hew, K.F. and Cheung, W.S. 2008. Attracting student participation in asynchronous online discussions: A case study of peer facilitation. *Computers & Education*. **51**(3), pp.1111-1124.
- Hillman, D.C.A. et al. 1994. Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *American Journal of Distance Education*. **8**(2), pp.30 - 42.

- Hitchcock, G. and Hughes, D. 1995. *Research and the teacher: A qualitative introduction to school-based research*. Psychology Press.
- Hmelo-Silver, C.E. 2004. Problem-based learning: what and how do students learn? *Educational Psychology Review*. **16**(3), pp.235-266.
- Hodkinson, P. and Hodkinson, H. 2001. The strengths and limitations of case study research. In: *Learning and Skills Development Agency Conference at Cambridge*, pp.5-7.
- Holmberg, B. 1986. *Growth and structure of distance education*.
- Homan, R. 2001. The principle of assumed consent: the ethics of gatekeeping. *Journal of Philosophy of Education*. **35**(3), pp.329-343.
- Howard, J. et al. 2011. Alcohol, cannabis and amphetamine-type stimulants use among young Pacific Islanders. *Drug and Alcohol Review*. **30**(1), pp.104-110.
- Hrastinski, S. 2008. Asynchronous and synchronous e-learning. *Educause quarterly*. **31**(4), pp.51–55.
- Huang, H. 2002. Student Perceptions in an Online Mediated Environment. *International Journal of Instructional Media*. **29**(4), pp.405-423.
- Jackson, J. 2002. Reticence in second language case discussions: anxiety and aspirations. *System*. **30**(1), pp.65-84.
- Jiang, M. et al. 2000. A Study of Factors Influencing Students' Perceived Learning in a Web-Based Course Environment. *International Journal of Educational Telecommunications*. **6**(4), pp.317-338.
- Jin, J. 2012. *Silence in small group interactions for problem-based learning at an English-medium university in Asia*. PhD thesis, THE UNIVERSITY OF HONG KONG.
- Jin, J. 2014. Understanding silence in problem-based learning: A case study at an English medium university in Asia. *Clinical Linguistics & Phonetics*. **28**(1-2), pp.72-82.
- Johnson, B. and Christensen, L. 2011. *Educational Research: Quantitative, Qualitative, and Mixed Approaches*. 4th ed. SAGE Publications Inc.
- Johnston, A. and Tinning, R. 2001. Meeting the challenge of problem-based learning: developing the facilitators. *Nurse Education Today*. **21**(3), pp.161-169.

- Joutsenvirta, T. and Myyry, L. 2010. *Blended Learning in Finland*. [Online]. [Accessed 1/7/2011]. Available from: http://www.helsinki.fi/valtiotieteellinen/julkaisut/blended_learning_Finland.html
- Kakasevski, G. et al. 2008. Evaluating usability in learning management system Moodle. In: *Information Technology Interfaces, 2008. ITI 2008. 30th International Conference on: IEEE*, pp.613-618.
- Kanuka, H. and Anderson, T. 2007. Online social interchange, discord, and knowledge construction. *The Journal of Distance Education/Revue de l'Éducation à Distance*. **13**(1), pp.57-74.
- KASSIMI, M.A. 1983. Problems of undergraduate medical education in Saudi Arabia. *Medical education*. **17**(4), pp.233-234.
- Khoo, H.E. 2003a. Implementation of problem-based learning in Asian medical schools and students' perceptions of their experience. *Medical Education*. **37**(5), pp.401-409.
- Khoo, H.E. 2003b. Implementation of problem based learning in Asian medical schools and students' perceptions of their experience. *Medical education*. **37**(5), pp.401-409.
- Kilroy, D. 2004. Problem based learning. *British Medical Journal*. **21**(4), pp.411-413.
- Qualitative research. Introducing focus groups*. 1995. s.v. p.299.
- Kitzinger, J. 2005. FOCUS GROUP RESEARCH: using group dynamics to explore perceptions, experiences and understandings. In: I., H. ed. *Qualitative Research in Health Care* Maidenhead: Open University Press.
- Klimova, B.F. 2011. Making academic writing real with ICT. *Procedia Computer Science*. **3**(0), pp.133-137.
- Kothari, C. 2004. *Research methodology: methods and techniques*. New Age International.
- Krathwohl, D.R. 2002. A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice*. **41**(4), pp.212-218.
- Kvale, S. 1996. *Interviews: An introduction to qualitative research interviewing*. Sage Publications (Thousand Oaks, Calif.).

- Lally, V. 2001. Analysing teaching and learning interactions in a networked collaborative learning environment: issues and work in progress. *Educational Research in Europe: Yearbook 2001*. p219.
- Laurillard, D. 2012. Teaching as a design science. *Building Pedagogical Patterns for Learning and Technology*, New York, NY, Routledge.
- Leasure, A. et al. 2000. Comparison of student outcomes and preferences in a traditional vs. World Wide Web-based baccalaureate nursing research course. *The Journal of nursing education*. **39**(4), p149.
- Leeds University. 2011. *Developing your search strategy, PICO model*. [Online]. [Accessed 5/2/2011]. Available from: http://library.leeds.ac.uk/info/200234/research/916/developing_your_search_strategy/2
- Leng, B.A.d. et al. 2006. Student perceptions of a virtual learning environment for a problem-based learning undergraduate medical curriculum. *Medical education*. **40**(6), pp.568-575.
- Lewis, D. 2011. *Discussion Board vs. Blog*. [Online]. [Accessed 3/6/2011]. Available from: <https://www.nothingbutsharepoint.com/sites/eusp/Pages/discussion-board-vs-blog.aspx>
- Li, L. 2010. *Computer-Mediated Education And Globalization-A Case Study On Cross-border Course "Globalization and Media"*. [Online]. [Accessed 19/5/2010]. Available from: [http://www.iiisci.org/journal/CV\\$/sci/pdfs/P696862.pdf](http://www.iiisci.org/journal/CV$/sci/pdfs/P696862.pdf)
- Lister Hill Library. 2014. *Grey Literature in the Health Sciences, Provides resources and strategies for finding and using grey literature in health science research*. [Online]. [Accessed 7/7/2014]. Available from: <http://libguides.lhl.uab.edu/content.php?pid=175179&sid=1478684>
- Littlejohn, A. and Pegler, C. 2007. *Preparing for blended e-learning*. Psychology Press.
- Lockyer, J. et al. 2006. The transition from face-to-face to online CME facilitation. *Medical teacher*. **28**(7), pp.625-630.
- Lopez, A. et al. 2011. *What are the pros and cons of online education?* [Online]. [Accessed 22/4/2011]. Available from: <http://www.elearners.com/guide/faq-glossary/elearning-faq/what-are-the-pros-and-cons-of-online-education/>
- Malik, M. 2009. Benefiting from electronically blurred boundaries between students and academics in problem based learning. In: *39th*

ASEE/IEEE Frontiers in Education Conference: IEEE Press, pp.877-882.

Marczyk, G.R. et al. 2010. *Essentials of research design and methodology*. John Wiley & Sons.

Martins, L.L. and Kellermanns, F.W. 2004. A model of business school students' acceptance of a web-based course management system. *Academy of Management Learning & Education*. **3**(1), pp.7-26.

Mason, R. 1992. Evaluation Methodologies for Computer Conferencing Applications. In: Kaye, A. ed. *Collaborative Learning Through Computer Conferencing*. Springer Berlin Heidelberg, pp.105-116.

Mason, R. and Rennie, F. 2006. *Elearning: The key concepts*. Routledge

Maudsley, G. 1999. Roles and responsibilities of the problem based learning tutor in the undergraduate medical curriculum. *Bmj*. **318**(7184), pp.657-661.

Mazzolini, M. and Maddison, S. 2003. Sage, guide or ghost? The effect of instructor intervention on student participation in online discussion forums. *Computers & Education*. **40**(3), pp.237-253.

McAuley, L. et al. 2000. Does the inclusion of grey literature influence estimates of intervention effectiveness reported in meta-analyses? *The Lancet*. **356**(9237), pp.1228-1231.

McCall, I. 2010. Online enhanced problem-based learning: assessing a blended learning framework. *The Law Teacher*. **44**(1), pp.42 - 58.

McKimm, J. et al. 2003. Web based learning. *Bmj*. **326**(7394), pp.870-873.

Mehrabian, A. 1968. Some referents and measures of nonverbal behavior. *Behavior Research Methods & Instrumentation*. **1**(6), pp.203-207.

Meyer, K. 2003. Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Learning Networks*. **7**(3), pp.55-65.

Moore, M. 1989. Editorial: Three types of interaction. *American Journal of Distance Education*. **3**(2), pp.1-7.

Morgan, D.L. 2008. FOCUS GROUPS. In: Given, L.M. ed. *The Sage encyclopedia of qualitative research methods*

Sage.

- Musal, B. et al. 2004. Perceptions of first and third year medical students on self-study and reporting processes of problem-based learning. *BMC Medical Education*. **4**(1), p16.
- Newman, D.R. et al. 1995. A content analysis method to measure critical thinking in face-to-face and computer supported group learning. *Interpersonal Computing and Technology*. **3**(2), pp.56-77.
- Nichols, M. 2008. *No. 1: E-Learning in Context*. [Online]. [Accessed 17/3]. Available from: <http://akoaootearoa.ac.nz/download/ng/file/group-661/n877-1---e-learning-in-context.pdf>
- Noor, K.B.M. 2008. Case Study: A Strategic Research Methodology. *American Journal of Applied Sciences*. **5**(11).
- Norman, G. and Schmidt, H. 1992. The psychological basis of problem-based learning: a review of the evidence. *Academic medicine*. **67**(9), pp.557-565.
- Ogawa, R.T. and Malen, B. 1991. Towards rigor in reviews of multivocal literatures: Applying the exploratory case study method. *Review of Educational Research*. **61**(3), pp.265-286.
- Oppenheim, A.N. 2000. *Questionnaire design, interviewing and attitude measurement*. Bloomsbury Publishing PLC.
- Palloff, R.M. and Pratt, K. 2002. *Lessons from the cyberspace classroom: The realities of online teaching*. John Wiley & Sons.
- Paré, G. 2002. Enhancing the rigor of qualitative research: application of a case methodology to build theories of IT implementation. *The Qualitative Report*. **7**(4), pp.1-30.
- Patton, M.Q. 1990. *Qualitative evaluation and research methods*. SAGE Publications, inc.
- Pereira, J. et al. 2007. Effectiveness of using blended learning strategies for teaching and learning human anatomy. *Medical education*. **41**(2), pp.189-195.
- Piaget, J. 1952. *The origins of intelligence in children*. Taylor & Francis Ltd.
- Picciano, A. 2002. Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks*. **6**(1), pp.21-40.

- Pouyioutas, P. et al. 2011. *Problem Based Learning in the Educational System of Cyprus*. [Online]. [Accessed 10/3/2011]. Available from: <http://www.unic.ac.cy/media/Research/Photos/papereuclides.pdf>
- Qassim College of medicine. 2011. *Introduction* [Online]. [Accessed 10/3/2011]. Available from: <http://www.qumed.org/en/>
- QSR International. 2014. [Online]. [Accessed 20/3/2014]. Available from: <http://www.qsrinternational.com/>
- Rabiee, F. 2004. Focus-group interview and data analysis. *Proceedings of the nutrition society*. **63**(04), pp.655-660.
- Radu, F. et al. 2011. The advantage of the new technologies in learning. In: World Scientific and Engineering Academy and Society (WSEAS), pp.150-155.
- Ramanathan, T.R. 2009. *The Role of Organisational Change Management in Offshore Outsourcing of Information Technology Services: Qualitative Case Studies from a Multinational Pharmaceutical Company*. Dissertation.com.
- Richardson, J.C. and Swan, K. 2003. Examining social presence in online course in relation to students' perceived learning and satisfaction. *ALN* **7**(1). **2003**, pp.68-88.
- Riddle, E.M. and Dabbagh, N. 1999. *Lev Vygotsky's social development theory*. [Online]. [Accessed 10/6/2014]. Available from: <http://tonymcarthur.edublogs.org/files/2007/03/vygotsky1.htm>
- Robson, C. 2011. *Real world research*. third edition ed. John Wiley & Sons Ltd.
- Romiszowski, A. and Mason, R. 1996. Computer-mediated communication. *Handbook of research for educational communications and technology*. **2**, pp.397-431.
- Romiszowski, A. and Mason, R. 2008. Computer-mediated communication. In: Jonassen, D.H. ed. *Handbook of research for educational communications and technology*. 2nd ed. lawrence erlbaum associate, pp.397-431.
- Ronteltap, F. and Eurelings, A. 2002. Activity and interaction of students in an electronic learning environment for problem-based learning. *Distance Education*. **23**(1), pp.11-22.

- Rooney, P. 2005. Researching from the inside--does it compromise validity?-A discussion. *Articles*. [Online]. (3), p5. Available from: <http://level3.dit.ie/html/issue3/rooney/rooney.pdf>
- Rourke, L. and Anderson, T. 2004. Validity in quantitative content analysis. *Educational technology research and development*. **52**(1), pp.5-18.
- Rourke, L. et al. 2001. Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education/Revue de l'enseignement à distance*. **14**(2), pp.50-71.
- Rovai, A.P. 2007. Facilitating online discussions effectively. *The Internet and Higher Education*. **10**(1), pp.77-88.
- Rubin, H.J. and Rubin, I.S. 2012. *Qualitative interviewing: The art of hearing data*. Sage Publications.
- Rugg, G. and Petre, M. 2007. *A gentle guide to research methods*. McGraw-Hill International.
- Runeson, P. and Höst, M. 2009. Guidelines for conducting and reporting case study research in software engineering. *Empirical software engineering*. **14**(2), pp.131-164.
- Salmon, G. 2012. *E-moderating: The key to online teaching and learning*. Routledge.
- Sandars, J. 2010. The importance of usability testing to allow e-learning to reach its potential for medical education. *Education for primary care: an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors*. **21**(1), pp.6-8.
- Sandars, J. and Lafferty, N. 2010. Twelve Tips on usability testing to develop effective e-learning in medical education. *Medical teacher*. **32**(12), pp.956-960.
- Santos, C. et al. 2007. The PICO strategy for the research question construction and evidence search. *Revista Latino-Americana de Enfermagem*. **15**, pp.508-511.
- Saunders, M. et al. 2009. *Research Methods for Business Students*. Pearson Education Limited.
- Savenye, W.C. and Robinson, R.S. 2004. Qualitative research issues and methods: An introduction for educational technologists. In: Jonassen, D.H. ed. *Handbook of research for educational communications and*

technology. 2nd edition ed. Lawrence Erlbaum Associates, pp.1145-1171.

Savin-Baden, M. 2008. *A practical guide to problem-based learning online*. Taylor & Francis.

Savin-Baden, M. and Wilkie, K. 2006. *Problem-based learning online*. Open Univ Pr.

Sawyer, R.K. 2008. Optimising learning: Implications of learning sciences research. *Innovating to learn, learning to innovate*. Paris, France: OECD, p.45.

Schellens, T. and Valcke, M. 2005. Collaborative learning in asynchronous discussion groups: What about the impact on cognitive processing? *Computers in Human behavior*. **21**(6), pp.957-975.

Schellens, T. and Valcke, M. 2006. Fostering knowledge construction in university students through asynchronous discussion groups. *Computers & Education*. **46**(4), pp.349-370.

Schmidt, H.G. et al. 1989. Explanatory models in the processing of science text: The role of prior knowledge activation through small-group discussion. *Journal of Educational Psychology*. **81**(4), pp.610-619.

Schwandt, T.A. 2007. *The Sage dictionary of qualitative inquiry*. Sage Publications New York.

Schwier, R.A. and Balbar, S. 2008. The interplay of content and community in synchronous and asynchronous communication: Virtual communication in a graduate seminar. *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie*. **28**(2).

Sefton, A. 2005. Problem-Based Learning. In: Dent, J. and Harden, R. eds. *A practical guide for medical teachers*. second edition ed. Churchill Livingstone, p.143.

Shamsan, B. and Syed, A. 2009. Evaluation of Problem Based Learning Course at College of Medicine, Qassim University, Saudi Arabia. *International Journal of Health Sciences*. **3**(2), pp.249-258.

Sharpe, R. 2011. *Why blend? Rationales for blended e-learning in undergraduate education*. [Online]. [Accessed 12/3/2011]. Available from:
http://jisctechdis.ac.uk/assets/documents/archive/blended_elearning_w hy_blend.pdf

- Shea, P. et al. 2002. Student satisfaction and reported learning in the SUNY Learning Network. In: Bourne, J. and Moore, J.C. eds. *Elements of Quality Online Education, Practice and Direction*. Olin and Babson Colleges: Sloan Center for Online Education.
- Shehab, S.A.J. 2007. *Undergraduate Learners' Perceptions of Blended Learning and its Relationship with Some Demographic and Experiential Variables at the Arab Open University- Bahrain Branch*. Master thesis, ARABIAN GULF UNIVERSITY.
- Simons, H. 2009. *Case Study Research in Practice*. London: SAGE Publications Ltd.
- Simpson, J. 2002. Computer-mediated communication. *ELT journal*. **56**(4), p414.
- Sing, C.C. and Khine, M.S. 2006. An analysis of interaction and participation patterns in online community. *JOURNAL OF EDUCATIONAL TECHNOLOGY AND SOCIETY*. **9**(1), p250.
- Soy, S. 1997. *The Case Study as a Research Method*. [Online]. [Accessed 1/4/2014]. Available from: <https://www.ischool.utexas.edu/~ssoy/usesusers/l391d1b.htm>
- Spatariu, A. et al. 2004. Defining and measuring quality in online discussions. *The Journal of Interactive Online Learning*. **2**(4), pp.1-15.
- Stake, R.E. 1995. *The art of case study research*. Sage.
- Stephen Corich, K., and Lynn.M.Hunt. 2004. Assessing Discussion Forum Participation: In Search of Quality. *international journal of instructional technology and distance learning*. **1**(12).
- Stewart, D.W. et al. 1990. *Focus groups: Theory and practice*. Sage.
- Stinson, J. et al. 2010. Usability testing of an online self-management program for adolescents with juvenile idiopathic arthritis. *Journal of medical Internet research*. **12**(3).
- Streb, C.K. 2010. Exploratory case study. In: Mills, A.J., et al. eds. *Encyclopedia of case study research*. Los Angeles: Sage, pp.372-373.
- Sutton, L.A. 2001. The principle of vicarious interaction in computer-mediated communications. *International Journal of Educational Telecommunications*. **7**(3), pp.223-242.
- Swan, K. 2003. Learning effectiveness online: what the research tells us. In: Bourne, J. and Moore, J.C. eds. *Elements of Quality Online Education*,

Practice and Direction. Needham, MA:: Sloan Center for Online Education, pp.13–46.

- Swan, K. 2004. *Issues of interface*. [Online]. [Accessed 31/5/2010]. Available from: <http://www.eurodl.org/index.php?keyword=interaction&article=102>
- Swan, K. 2005. A constructivist model for thinking about learning online. *Elements of quality online education: Engaging communities*. **6**, pp.13-31.
- Swan, K. et al. 2000. Building knowledge building communities: Consistency, contact and communication in the virtual classroom. *Journal of Educational Computing Research*. **23**(4), pp.359-384.
- Taradi, S.K. et al. 2005. Blending problem-based learning with Web technology positively impacts student learning outcomes in acid-base physiology. *Advan. Physiol. Edu.* **29**(1), pp.35-39.
- Teencompanion. 2008. *Human Fertilization*. [Online]. Available from: <http://youtu.be/vXNaTRs83hE>
- Tellis, W. 1997. Application of a case study methodology. *The qualitative report*. pp.1-17.
- Thayalan, X. et al. 2012. Gender Difference in Social Presence Experienced in e-Learning Activities. *Procedia - Social and Behavioral Sciences*. **67**(0), pp.580-589.
- The Bellingham Public Schools. 1999. *7 Essential Skills for Teamwork*. [Online]. [Accessed 19/5/2010]. Available from: <http://bellingshamschools.org/sites/default/files/studentgal/onlineresearch/oldonline/mod8team.htm>
- Thomas, G. 2010. *How to do your case study: A guide for students and researchers*. Sage.
- Thomas, R.M. 1998. *Conducting educational research: A comparative view*. Greenwood Publishing Group.
- Thompson, C.B. and Walker, B.L. 1998. Basics of research (Part 12): Qualitative research. *Air Medical Journal*. **17**(2), pp.65-70.
- Tongco, M.D.C. 2007. Purposive sampling as a tool for informant selection.
- Tu, C.-H. and Mclsaac, M. 2002. The relationship of social presence and interaction in online classes. *The American journal of distance education*. **16**(3), pp.131-150.

- Unluer, S. 2012. Being an Insider Researcher while Conducting Case Study Research. *Qualitative Report*. **17**, p58.
- Van der linden, J. et al. 2002. Collaborative learning. In: Simons, R.-J., et al. eds. *New Learning*. Dordrecht: Kluwer, pp.37-45.
- VanderStoep, S.W. and Johnston, D.D. 2008. *Research methods for everyday life: blending qualitative and quantitative approaches*. Jossey Bass Ltd.
- Vygotsky, L.S. 1978. *Mind in society: The development of higher psychological processes*. Harvard university press.
- Wagner, E.D. 1994. In support of a fuctional definition of interaction. *The American Journal of Distance Edcuation*. **8**(2), pp.6-29.
- Walker, S. and Fraser, B. 2005. Development and validation of an instrument for assessing distance education learning environments in higher education: The Distance Education Learning Environments Survey (DELES). *Learning Environments Research*. **8**(3), pp.289-308.
- Weitzman, E.A. 2000. software and qualitative research. In: Denzin, N.K. and Lincoln, Y. eds. *Qualitative research*. Thousand Oaks ua.
- Wilkinson, D. and Birmingham, P. 2003. *Using research instruments: A guide for researchers*. Psychology Press.
- Wilson, T. and Whitelock, D. 1989. What are the perceived benefits of participating in a computer-mediated communication (CMC) environment for distance learning computer science students? *Computers & Education*. **30**(3-4), pp.259-269.
- Wolcott, H.F. 1994. *Transforming qualitative data: Description, analysis, and interpretation*. Sage.
- Woltering, V. et al. 2009. Blended learning positively affects students' satisfaction and the role of the tutor in the problem-based learning process: results of a mixed-method evaluation. *Advances in health sciences education*. **14**(5), p725.
- Wong, L.-H. and Looi, C.-K. 2010. Online discussion and e-mentoring strategies in blended continuing education courses. *Comparative blended learning practices and environments*. pp.146-169.
- Wood, D. 2003. ABC of learning and teaching in medicine: problem based learning. *British Medical Journal*. **326**(7384), pp.328-330.

- Wood, D. 2008. Problem based learning: Time to stop arguing about the process and examine the outcomes. *BMJ-British Medical Journal-International Edition*. **336**(7651), pp.971-971.
- Wu, D. and Hiltz, S. 2004. Predicting learning from asynchronous online discussions. *Journal of Asynchronous Learning Networks*. **8**(2), pp.139-152.
- Yang, X. et al. 2007. Students' participation intention in an online discussion forum: Why is computer-mediated interaction attractive? *Information & Management*. **44**(5), pp.456-466.
- Yin, R.K. 2009. *Case Study Research: Design and Methods*. fourth ed. Sage Publications, Newbury Park, .
- Yin, R.K. 2011. *Applications of case study research*. Sage.
- Zaharias, P. and Poylymenakou, A. 2009. Developing a usability evaluation method for e-learning applications: Beyond functional usability. *Intl. Journal of Human-Computer Interaction*. **25**(1), pp.75-98.
- Zhang, W. et al. 2013. The structural features and the deliberative quality of online discussions. *Telematics and Informatics*. **30**(2), pp.74-86.
- Zheng, M. and Spires, H. 2012. Teachers' interactions in an online graduate course on moodle: A social network analysis perspective. *Meridian*. **14**(1).

Appendix 1: Qassim Medical School pre-clinical phase blocks' calendar 2011/2012

WK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Date	25\9	2\10	9\10	16\10	23\10	30\10	6\11	13\11	20\11	27\12	4\12	11\12	18\12	25\12	1\1	8\1	15\1	22\1	29\1	5\2
Y-1	Medical education				Man & his environment			Adha Vacation	Env & Metabolism					Growth and Development					mid year vacation	
Y-2	Endocrine and Reproductive system								E/R	Heme and Immune										
Y-3	Gastrointestinal System								GIT	Urinary				CNS						

Clinical Skills-1,2,3 Longitudinal Blocks

HIC-1,2,3 Longitudinal Blocks

In year 3, 1st semester : HIC-3 / 2nd semester : Clinical Skills-4

All End of block exams on the last Wednesday of the block

WK	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Date	12\2	19\2	26\2	5\3	12\3	19\3	26\3	2\4	9\4	16\4	23\4	30\4	7\5	14\5	21\5	28\5	4\6	11\6
Y-1	Principles of Diseases							MSK	Mid Term Vacation	Musculoskeletal								
Y-2	H&I	Cardiovascular System						CV		Respiratory System								
Y-3	CNS						IMS&T	IMS&T										

**Appendix 2: Search strategy for what has been done
in the topic: learning impact of inter-sessional
facilitated online discussions in problem-
based learning.**

Medline.

Search Key:

mp (multi propose)= Keyword/(title, original title, abstract, name of substance word, subject heading word, unique identifier)

*= the truncation symbol

exp= explode term

Applied to: Database Medline (OVID); 1980 to July 2014

NO.	<i>Search Term</i>
1	PBL.mp.
2	Problem based.mp.
3	Problem based curricul*.mp.
4	exp Problem-Based Learning/
5	Problem-based learning.mp.
6	1 or 2 or 3 or 4 or 5
7	Online learning.mp.
8	Internet forum*.mp.
9	online discussion*.mp.
10	Discussion forum*.mp.
11	Computer mediated discussion*.mp.
12	elearning.mp.
13	e-learning.mp.
14	exp Computer Communication Networks/
15	Message board*.mp.

16	exp Internet/
17	e-tutor*.mp.
18	e-moderator*.mp.
19	online tutor*.mp.
20	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19
21	6 and 20
22	limit 21 to yr="1980 - 2014"

Embase classic and embase.

Search Key:

mp (multi propose)= Keyword/ [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer]

*= the truncation symbol

exp= explode term

Applied to: Database EMBASE CLASSIC AND EMBASE (OVID); 1980 to May 2011

NO.	<i>Search Term</i>
1	PBL.mp.
2	Problem based.mp.
3	Problem based curricul*.mp.
4	exp Problem-Based Learning/
5	Problem-based learning.mp.
6	1 or 2 or 3 or 4 or 5
7	Online learning.mp.
8	Internet forum*.mp.
9	online discussion*.mp.
10	Discussion forum*.mp.
11	Computer mediated discussion*.mp.
12	Message board*.mp.

13	elearning.mp.
14	e-learning.mp.
15	exp computer network/
16	online tutor*.mp.
17	e-tutor*.mp.
18	e-moderator*.mp.
19	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18
20	12 and 13
21	limit 20 to yr="1980 - 2014"

PsycInfo.

Search Key:

mp (multi propose)= [mp=title, abstract, heading word, table of contents,
key concepts]

*= the truncation symbol

exp= explode term

Applied to: Database PsycInfo (OVID); 1980 to july 2014

NO.	<i>Search Term</i>
1	PBL.mp.
2	Problem based.mp.
3	Problem based curricul*.mp.
4	exp Problem-Based Learning/
5	Problem-based learning.mp.
6	1 or 2 or 3 or 4 or 5
7	Online learning.mp.
8	Internet forum*.mp.
9	Online discussion*.mp.
10	Discussion forum*.mp.
11	Computer mediated discussion*.mp.
12	Message board*.mp.
13	elearning.mp.
14	e-learning.mp.

15	exp Computer Mediated Communication/
16	exp Internet/
17	exp Computers/
18	e-tutor*.mp.
19	e-moderator.mp.
20	online tutor*.mp.
21	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 Or 19 Or 20
22	6 and 21
23	limit 22 to yr="1980 - 2014"

Web of Science

Search Key:

* = the truncation symbol (zero to many characters)

Applied to: Database Web of Science (ISI web of knowledge); 1980-july 2014

In addition to the following citation data bases:

- ✓ Science Citation Index Expanded (SCI-EXPANDED) -- 1899-present
- ✓ Social Sciences Citation Index (SSCI) --1898-present
- ✓ Arts & Humanities Citation Index (A&HCI) --1975-present
- ✓ Conference Proceedings Citation Index- Science (CPCI-S) - -1990-present
- ✓ Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH) --1990-present

This search resulted in a total of 248 references

Set	Search Term
# 1	Topic=(Problem-Based) <i>Timespan=1980-2014</i>
# 2	Topic=(PBL) <i>Timespan=1980-2014</i>
# 3	Topic=(Problem-Based curricul*) <i>Timespan=1980-2014</i>
# 4	Topic=(Problem-Based Learning) <i>Timespan=1980-2014</i>
# 5	#1 OR #2 OR #3 OR #4 <i>Timespan=1980-2014</i>
# 6	Title=(computer communication network*) <i>Timespan=1980-2014</i>
# 7	Topic=(e-learning) <i>Timespan=1980-2014</i>

# 8	Topic=(elearning) <i>Timespan=1980-2014</i>
# 9	Topic=(Message board*) <i>Timespan=1980-2014</i>
# 10	Topic=(Computer mediated discussion*) <i>Timespan=1980-2014</i>
# 11	Topic=(Discussion forum*) <i>Timespan=1980-2014</i>
# 12	Topic=(online discussion*) <i>Timespan=1980-2014</i>
# 13	Topic=(Internet forum*) <i>Timespan=1980-2014</i>
# 14	Topic=(Online learning) <i>Timespan=1980-2014</i>
# 15	Topic=(e-moderator) <i>Timespan=1980-2014</i>
# 16	Topic=(e-tutor) <i>Timespan=1980-2014</i>
# 17	Topic=(online tutor) <i>Timespan=1980-2014</i>
# 18	6 OR #7 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 <i>Timespan=1980-2014</i>
# 19	#5 AND #18 <i>Timespan=1980-2014</i>

Cinahl

Search Key:

""= Exact phrase

*= the truncation symbol

MH= Explode

MM= Major concept/focus

Applied to: Database CINAHL (EBSCO host); 1980 to July 2014

#	Search Term/ Query
S1	problem based or "problem based"
S2	(MM "Problem-Based Learning") OR "problem based learning"
S3	PBL
S4	S1 or S2 or S3
S5	Internet forum*
S6	online discussion*
S7	Discussion forum*
S8	Computer mediated discussion*
S9	Message board*
S10	(MM "Online Systems+") OR "ONLINE SYSTEM*"
S11	"online discussion*" OR (MM "Computer Communication Networks+") OR (MM "Electronic Data Interchange+")
S12	(MH "Internet+") OR (MH "Computer Communication Networks+") OR (MH "Electronic Bulletin Boards+")

S13	"online tutor" or online tutor
S14	e-tutor or "e-tutor"
S15	e-moderator or "e-moderator"
S16	S5 or S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14 or S15
S17	S4 and S16
S18	S13 and S14 Published Date from: 1980-2011

BEI.

Search Key:

ADJ= Adjusting terms (to find precise phrases. Using ADJ means that the two words must be found right next to each other and in the order that the searcher entered them.)

\$= the truncation symbol

DE=Subject heading

#= explode term

Applied to: Database BEI (Dialog DataStar); 1980 to July 2014

NO.	<i>Search Term</i>
1	PROBLEM ADJ BASED ADJ LEARNING
2	PROBLEM-BASED-LEARNING#.DE.
3	PBL
4	1 OR 2 OR 3
5	Online ADJ learning\$
6	Internet ADJ forum\$
7	Discussion ADJ forum\$
8	Computer ADJ mediated ADJ discussion\$
9	Message ADJ board\$
10	INTERNET
11	ELEARNING

12	COMPUTER-MEDIATED-COMMUNICATION
13	COMPUTER-MEDIATED-COMMUNICATION#.DE. OR COMPUTER-ASSISTED-LEARNING#.DE. OR COMPUTER-USES-IN-EDUCATION#.DE. OR SOCIAL-NETWORKS#.DE. OR EDUCATIONAL-TECHNOLOGY#.DE. OR INTERNET#.W..DE.
14	DISCUSSION
15	GROUP-DISCUSSION#.DE.
16	5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15
19	4 AND 16
20	limit set 18 YEAR > 1980

ASSIA

Search Key:

* = the truncation symbol

DE=Subject heading

Applied to: Database ASSIA (CSA Illumina); 1980 to July 2014

NO.	<i>Search Ter/Query</i>
1	KW=(PBL or (Problem based) or (Problem based curricul*))
	KW="problem based learning"
2	DE="problem based learning"
3	(KW=(PBL or (Problem based) or (Problem based curricul*))) or((KW="problem based learning") or(DE="problem based learning"))
4	KW= "online discussion**"
5	KW= "online learning"
6	KW= "Internet forum**"
7	KW= "Discussion forum**"
8	KW= "Computer mediated discussion**"
9	KW= "Message board**"
10	DE="computer assisted instruction"
11	(KW= "online discussion**") or(KW= "online learning") or(KW= "Internet forum**") or(KW= "Discussion forum**") or(KW= "Computer mediated discussion**") or(KW= "Message board**") or(DE="computer assisted instruction")
12	((KW=(PBL or (Problem based) or (Problem based curricul*))) or((KW="problem based learning") or(DE="problem based learning"))) and((KW= "online discussion**") or(KW= "online learning") or(KW= "Internet forum**") or(KW= "Discussion forum**") or(KW= "Computer mediated discussion**") or(KW= "Message board**") or(DE="computer assisted instruction"))

13	<p>((KW=(PBL or (Problem based) or (Problem based curricul*))) or((KW="problem based learning") or(DE="problem based learning"))) and((KW= "online discussion*") or(KW= "online learning") or(KW= "Internet forum*") or(KW= "Discussion forum*") or(KW= "Computer mediated discussion*") or(KW= "Message board*") or(DE="computer assisted instruction"))</p> <p>Date Range: 1980 to July 2014</p>
----	---

ERIC

Search Key:

*= the truncation symbol

DE=Subject heading

Applied to: Database ERIC (CSA Illumina); 1980 to July 2014

NO.	<i>Search Ter/Query</i>
1	KW=(PBL or (Problem based) or (Problem based curricular*))
2	DE="problem based learning" or KW=(problem based learning)
3	(KW=(PBL or (Problem based) or (problem based curricula*)) and((DE="problem based learning") or KW=(problem based learning)))
4	KW= (online discussion*)
5	KW= (online learning)
6	KW= (Internet forum*)
7	KW= (Discussion forum*)
8	KW= (Computer mediated discussion*)
9	KW= (Message board*)
10	DE=(electronic learning)
11	(DE="electronic learning" or(DE=("computer uses in education" or "online systems" or "discussion groups" or "virtual classrooms" or "web based instruction" or "asynchronous communication" or "internet" or "computer networks")) or("online discussion*") or("online learning") or("Internet forum*") or("Discussion forum*") or("Computer mediated discussion*") or("Message board*"))
12	((KW=(PBL or (Problem based) or (problem based curricula)) or KW=(problem based curriculum)) and((DE="problem based learning") or KW=(problem based learning))) and((DE="electronic learning" or(DE=("computer uses in education" or "online systems" or "discussion groups" or "virtual classrooms" or "web based instruction" or "asynchronous

	<p>communication" or "internet" or "computer networks")) or("online discussion**") or("online learning") or("Internet forum**") or("Discussion forum**") or("Computer mediated discussion**") or("Message board**"))</p>
13	<p>((KW=(PBL or (Problem based) or (problem based curricula)) or KW=(problem based curriculum)) and((DE="problem based learning" or KW=(problem based learning))) and((DE="electronic learning" or DE=("computer uses in education" or "online systems" or "discussion groups" or "virtual classrooms" or "web based instruction" or "asynchronous communication" or "internet" or "computer networks")) or("online discussion**") or("online learning") or("Internet forum**") or("Discussion forum**") or("Computer mediated discussion**") or("Message board**"))</p> <p>Date Range: 1980 to July 2014</p>

UK Universities Thesis

Index to thesis

Search Key:

“”= Exact phrase

No.	Search Term
1	“ Problem Based”
23	"Online discussion"
3	“ blended learning”
4	“E-learning”
5	“Elearning”
6	“ discussion forum”
7	" online learning"
8	"Problem Based" AND " online"
9	"Problem Based" AND " online learning"
10	"Problem Based" AND " e-learning"
11	"Problem Based" AND " elearning"
12	"Problem Based" AND " Discussion forum"

ETHos (Electronic Thesis Online Service)

Search Key:

“”= Exact phrase

No.	Search Term
1	“ Problem Based”
2	"Online discussion"
3	“ blended learning”
4	“E-learning”
5	“Elearning”
6	“ discussion forum”
7	" online learning"
8	"Problem Based" AND " online"
9	"Problem Based" AND " online learning"
10	"Problem Based" AND " e-learning"
11	"Problem Based" AND " elearning"
12	"Problem Based" AND " Discussion forum"

Thesis from international institutions

Australian Digital Thesis (ADT)

Search Key:

“”= Exact phrase

No.	Search Term
1	“ Problem Based”
2	“ Problem Based learning”
3	"Online discussion"
4	“ blended learning”
5	“E-learning”
6	“Elearning”
7	“ discussion forum”
8	" online learning"
9	"Problem Based" AND " online"
10	"Problem Based" AND " online learning"
11	"Problem Based" AND " e-learning"
12	"Problem Based" AND " elearning"
	"Problem Based" AND " Discussion forum"

DART-Europe E-theses

Search Key:

" "= Exact phrase

No.	Search Term
1	" Problem Based"
2	"Online discussion"
3	" blended learning"
4	"E-learning"
5	"Elearning"
6	" discussion forum"
7	" online learning"
8	"Problem Based" AND " online"
9	"Problem Based" AND " online learning"
10	"Problem Based" AND " e-learning"
11	"Problem Based" AND " elearning"
12	"Problem Based" AND " Discussion forum"

Networked Digital Library of Theses and Dissertations (NDLTD)

Initiative funded by the US Department of Education, which aims to construct a global digital library of electronic theses and dissertations (ETD). Most of the participating universities are in the USA, though initiatives from other countries are now being included.

Search Key:

""= Exact phrase

1980-2014

No.	Search Term
1	" Problem Based learning"
2	"Online discussion"
3	" blended learning"
4	"E-learning"
5	"Elearning"
6	" discussion forum"
7	" online learning"
8	" Problem Based learning " AND " online"
9	"Problem Based learning " AND " online learning"
10	"Problem Based learning " AND " e-learning"
11	"Problem Based learning " AND " Discussion forum"

Appendix 3: **The four scenarios/problems given to students during course**

Problem 1:

Getting pregnant

Part I:

Salma a 24-year-old lady, married since four months, presented to the OPD of MCH complaining that her last period had been missed since three weeks. Salma said to the Obstetrician that she was having nausea especially in the early morning with occasional vomiting. Menstrual history revealed that she had menarche at the age of 12 years and her menstrual cycles were almost regular with normal duration and flow.

Part II:

Pregnancy test was positive. The Obstetrician examined her and requested some measurements and investigations and the results were:

Height: 155 cm

Body weight: 58 Kg.

Random blood sugar: 120 mg/dl.

ABO group: A

Rh factor: +ve

Urinalysis: Unremarkable.

The Obstetrician reassured her and gave her some advices.

Part III:

Six weeks later, Salma came back to the Obstetrician. She examined her and performed ultrasound which revealed intrauterine gestational sac with crown rump length equivalent to 8 weeks with positive cardiac pulsations. She gave her another appointment after two months.

Two months later, Salma came back to the clinic. She stated that she didn't have nausea and vomiting anymore. Ultrasound revealed normal amniotic sac and placenta with fetal bi-parietal diameter equivalent to 16 weeks gestation.

Problem 2:

Small for Gestational Age

Part I

Hajir, a 20-year-old female was delighted when she had her first pregnancy. The pregnancy proceeded without much trouble except that she became thin and weak. There was tension between her and her mother-in-law who was always telling her to eat more.

At 20 weeks an ultrasound was done and revealed that the fetal Biparietal diameter, Head circumference and femur length were all within normal limits and based on these measurements, the estimated fetal weight was normal for the gestational age at that time.

At 32 weeks of pregnancy, she noticed that the baby was not moving as much as it did before. Her husband took her to the MCH. On clinical examination, the doctor noticed that the height of the uterine fundus was below the expected level. The fetal heart rate was 130/minute.

Ultrasound revealed that the estimated fetal weight was below normal and that the amniotic fluid was reduced in amount. The baby was small for gestational age and its growth was disproportional, since the head circumference was relatively large compared with that of the abdomen.

Part II:

Hajir was very upset and felt a lot of guilt because she thought it was her poor eating that had led to her baby's defective growth. The doctor reassured her and told her it was no fault of hers.

The doctor told her husband that she needs close follow-up and recommended a special diet for Hajir. He strictly advised that Hajir must have her delivery in the hospital because the baby was expected to be born with a low birth weight and so there may be some complications.

At full term, Hajir gave birth to a male baby weighing 2.1 kgs. The baby was kept in an incubator in the neonatal intensive care unit to help maintain his body temperature.

Problem 3:

The crying baby

Part 1:

Rawan, a 25-year-old primigravida, was admitted to the MCH in labor pain. Few hours after admission, she gave birth to her first baby, Sami. Rawan and her baby received the required routine care. The baby was full term and normal, his birth weight was 3.0 kgs and length was 52 cm.

Rawan received the necessary counseling regarding the care for herself and her baby. She was advised not to take any medication. She was discharged back-home happily with her baby. Rawan noticed that her breasts became markedly enlarged and painful with a sense of warmth and heaviness. She noticed a yellowish fluid coming out from the nipples. This fluid appeared to increase spontaneously on attempts to breast-feed the baby.

Due to the marked enlargement and pain of Rawan's breasts, which was decreased after manual evacuation of the breast, it was difficult for the baby to obtain sufficient feeding and the baby kept crying all the time. To calm the baby, the mother used to give him herbal drinks available at home.

Part 2:

Three weeks later, Rawan, with her crying baby, visited the doctor to seek advice. On examination, Sami's weight was 2.5 kg and his length was 53 cm. Examination of Rawan's breasts revealed markedly enlarged, tender, warm breasts with nipples sunken in. Squeezing of her breasts ejected a good amount of whitish-colored milk.

The mother asked the doctor to prescribe formula milk for her baby because she felt that he is not getting enough milk. The doctor explained to her the importance of breast feeding over the formula milk. He also explained to her how to evert the nipples and continue breast-feed her baby.

Rawan was worried, unhappy and unconvinced with the doctor's opinion and kept asking why the physician did not prescribe a formula milk to satisfy the needs of the crying baby and why she was insisted on keeping with breast feeding.

Problem 4:

A shy boy

Part 1:

Ayoub a 15 year old boy had been referred to the counseling unit of his School by his teachers. The counselor had been informed that Ayoub was shy, had no friends, did not talk to anyone in his class and had been performing very badly in his studies since past 8 months. During the discussions with the counselor Ayoub revealed that he was very unhappy because his classmates always made fun of him because he was much smaller than them, did not have a beard or moustache and had a child-like voice. He also informed that he had tried to make friends with his classmates, he had tried to dress like them, talk like them and even smoked cigarettes but all that had not helped in winning friends. Instead he had developed the habit of smoking. After reassuring him

and providing support the counselor referred Ayoub to the doctor in the School Clinic.

Part 2:

In the School Clinic:

Past History: No chronic illness or surgery.

Family history: Father had separated from Ayoub's mother and lived with his second wife in Riyadh.

Parents were normal with no significant illnesses.

Physical examination showed:

Ayoub had a thin built.

He did not have any facial hair.

He had very little axillary and pubic hair.

There were no testicular abnormalities.

Systemic examination was unremarkable.

Lab reports: CBC – Hb: 12.2 gm/dL, TLC: 6800/cmm, Hormonal assays - TSH - 3µg/ml, Serum testosterone levels – 0.9 ng/ml.

Appendix 4: Example of a week timetable in Growth and Development block

SECOND WEEK		Contact Hours 16				
Time	Day	Saturday	Sunday	Monday	Tuesday	Wednesday
	Date(H)	29/1/33	30/1/33	1/2/33	2/2/33	3/2/33
	Date(G)	24/12/11	25/12/11	26/12/11	27/12/11	28/12/11
8.00 – 8.50	<u>Histology lecture</u>	Islamic study 101	<u>Anatomy lecture</u>	Student Presentation/seminar (SEM)	Histology Lab	
9.00 – 9.50	PANEL DISCUSSION		<u>Pharmacology lecture</u>			
10.00 – 10.50	<u>Anatomy lecture</u>	<u>Biochemistry lecture</u>	Self-directed learning (SDL)	SDL	PBL 2 Session 2	
11.00 – 11.50	Self-directed learning (SDL)	Group B <u>Anatomy lecture</u>	University Activities	Group B <u>Pathology lecture</u>		
12.00 – 1.00	SALAH BREAK					
1.00 – 1.50	PBL 2 Session 1	SDL	Clinical Skills Lab	Anatomy Lab	SDL	
2.00 – 2.50						

Appendix 5: Coding schema of the interaction analysis model (Gunawardena et al., 1997)

Phase	Operations which occur at this stage include:		
Phase I Sharing/ comparing of information <u>related to the learning issues</u>	A.	A statement of observation or opinion	[PhI/A]
	B.	A statement of agreement from one or more other participants	[PhI/B]
	C.	Corroborating examples provided by one or more participants	[PhI/C]
	D.	Asking and answering questions to clarify details of statements	[PhI/D]
	E.	Definition, description, or identification of a problem	[PhI/E]
Phase II The discovery and exploration of dissonance or inconsistency among ideas (<u>learning issues</u>), <u>concepts map of the weekly problem</u> or statements	A.	Identifying and stating areas of disagreement	[PhII/A]
	B.	Asking and answering questions to clarify the source and extent of disagreement	[PhII/B]
	C.	Restating the participant's position, and possibly advancing arguments or considerations in its support by references to the participant's experience, literature, formal data collected, or proposal of relevant metaphor or analogy to illustrate point of view	[PhII/C]
Phase III Negotiation of meaning/ co-construction of knowledge <u>around the learning issues</u>	A.	Negotiation or clarification of the meaning of terms	[PhIII/A]
	B.	Negotiation of the relative weight to be assigned to types of argument	[PhIII/B]
	C.	Identification of areas of agreement to overlap among conflicting concepts	[PhIII/C]
	D.	Proposal and negotiation of new statements embodying compromise, co-construction	[PhIII/D]
	E.	Proposal of integrating or accommodating metaphors or analogies	[PhIII/E]
Phase IV Testing Tentative Constructions	A.	Testing the proposed synthesis against "received fact" as shared by the participants and/or their culture	[PhIV/A]
	B.	Testing against existing cognitive schema	[PhIV/B]
	C.	Testing against personal experience	[PhIV/C]
	D.	Testing against formal data collected	[PhIV/D]
	E.	Testing against contradictory testimony in the literature	[PhIV/E]
Phase V Agreement statements(s)/ applications of newly constructed meaning	A.	Summarisation of agreement(s)	[PhV/A]
	B.	Applications of new knowledge	[PhV/B]
	C.	Metacognitive statements by participants illustrating their understanding that their knowledge or ways of thinking (cognitive schema) have changed as a result of the conference interaction	[PhV/C]

Appendix 6: Coding schema of the social presence analysis model

Categories	Indicators	
Affective	Expression of emotions	A1
	Self-disclosure	A2
	Use of humor	A3
Interactive	Asking questions	I1
	Complimenting, expressing appreciation	I2
	Expressing agreement	I3
	Quoting from others' messages.	I4
	Referring explicitly to others' messages.	I5
	Continuing a thread	I6
Cohesive	Addresses or refers to the group using inclusive pronouns	C1
	Phatics, salutations	C2
	Vocatives	C3

Appendix 7: **Students' questionnaire****Gender:**

Male/female

My PBL group is:

A B C D E Fetc.

On the scale from 1 to 6, choose the option which the closest to your opinion, where:

*1-Strongly disagree**2-Disagree**3-Neither agree nor disagree**4-Agree**5-Strongly agree***Training workshop**

1. The presentation (done by Dr.Ahmad Alamro) was useful
1 2 3 4 5
2. The information was presented effectively
1 2 3 4 5
3. After attending the training, I am able to use MOODLE (discussion forum) effectively
1 2 3 4 5
4. After attending the training, I am able to develop effective online discussions
1 2 3 4 5
5. After attending the training, I know what my role is.
1 2 3 4 5
6. My question/s that I wanted to ask was/were answered by the trainer.
1 2 3 4 5

Interaction/Collaboration:**student-students**

7. Using the Online discussion forum increased the contact time between me and my friends in the PBL group.
1 2 3 4 5
8. In the Online discussion forum, I shared my knowledge (information +resource) with my group members
1 2 3 4 5
9. In the Online discussion forum, I work together (collaborate) with other students in the PBL group.
1 2 3 4 5
10. In the Online discussion forum, most of my questions in the discussion board were answered by my colleagues.
1 2 3 4 5
11. Collaboration/cooperation with other group members on the Online discussion forum helped me to learn more
1 2 3 4 5

Student-tutor

12. Using the Online discussion forum increased the contact time between me and my tutor in the PBL group
1 2 3 4 5
13. In the Online discussion forum, the contact with my tutor became easier than using the face-to-face only
1 2 3 4 5
14. The tutor gave me feedback on my contribution in the discussion board.
1 2 3 4 5
15. My tutor motivated me to participate.
1 2 3 4 5

16. Contribution of my tutor in online discussion was one of the reasons for my participation

1 2 3 4 5

17. In the Online discussion forum, the tutor redirected the discussion when it is needed

1 2 3 4 5

18. The tutor stimulated the discussion between the group members

1 2 3 4 5

19. My questions, in the discussion forum were answered by the tutor, if not answered by my colleagues

1 2 3 4 5

E-learning (online) interface:

Feasibility and accessibility

20. It was easy to access my virtual PBL room

1 2 3 4 5

21. I could access to my virtual PBL room at any time

1 2 3 4 5

22. The Online discussion forum interface was enjoyable and easy to use

1 2 3 4 5

23. The Online discussion forum interface and tools were well organized

1 2 3 4 5

24. If I have problems with the interface / tools I know where to get help

1 2 3 4 5

25. If I have problems with the interface / tools I could get help quickly

1 2 3 4 5

Integration of facilitated online discussion forums with face-to-face PBL sessions

26. I consider the Virtual PBL room as a continuity of the face-to-face PBL room.

1 2 3 4 5

27. Use of online discussion forum helped me to understand the weekly problem.

1 2 3 4 5

28. Use of online discussion forum helped me to achieve the learning objectives effectively

1 2 3 4 5

29. Use of online discussion forum helped me to focus on the knowledge related to the learning objectives

1 2 3 4 5

30. Use of online discussion forum helped me to find the helpful resources

1 2 3 4 5

31. Use of online discussion forum provided an effective learning environment

1 2 3 4 5

32. Use of the online discussion forum gave me the chance to express my opinion

1 2 3 4 5

Improve different skills:

33. Using the Online discussion forum helped me to improve my computer skills

1 2 3 4 5

34. Using the online discussion forum helped me to improve my English writing

1 2 3 4 5

35. Use of online discussion forum enhanced my team work skills

1 2 3 4 5

Students' satisfaction

36. I was motivated to use the online discussion forum integrated with PBL

1 2 3 4 5

37. I enjoyed the online discussion forum

1 2 3 4 5

38. I prefer (integration of online discussion forum with PBL).

1 2 3 4 5

39. I am satisfied with using the online discussion forum integrated with PBL

1 2 3 4 5

40. I look forward to learn using online discussion forum integrated with PBL in the future blocks.

1 2 3 4 5

Any comment....

Appendix 8: tutors' questionnaire

Gender:

Male female

My PBL group is:

A B C D E Fetc

On the scale from 1 to 6, choose the option which the closest to your opinion, where:

1-Strongly disagree

2-Disagree

3-Neither agree nor disagree

4-Agree

5-Strongly agree

6-not observed

Training

1. The training workshop was useful
1 2 3 4 5 6
2. In the training workshop, the information was presented effectively
1 2 3 4 5 6
3. After attending the training workshop, I am able to use MOODLE (discussion forum) effectively
1 2 3 4 5 6
4. After attending the training workshop, I am able to develop effective online discussions
1 2 3 4 5 6
5. After attending the training workshop, I know what my role is.
1 2 3 4 5 6
6. My question/s that I wanted to ask was/were answered by the trainer.
1 2 3 4 5 6

Interaction/Collaboration:

student-students

7. Using the Online discussion forum increased the contact time between the students in the PBL group.
1 2 3 4 5 6
8. In the Online discussion forum, the students shared their knowledge (information +resource) with their group members
1 2 3 4 5 6
9. In the Online discussion forum, the students collaborated with other students in the PBL group.
1 2 3 4 5 6
10. In the Online discussion forum, most of the student's questions in the discussion board are answered by their colleagues.
1 2 3 4 5 6
11. Collaboration/cooperation with other group members on the online discussion forum helped the students to learn more
1 2 3 4 5 6

Student-tutor

12. Use of Online discussion forum increased the contact time between the student and his tutor in the PBL group
1 2 3 4 5 6

13. In the Online discussion forum, the contact with the students became easier than using the face-to-face only
1 2 3 4 5 6
14. I gave feedback on the student's contribution in the discussion board.
1 2 3 4 5 6
15. I motivated the students to participate.
1 2 3 4 5 6
16. My contribution in online discussion was one of the reasons for the student's participation
1 2 3 4 5 6
17. In the Online discussion forum, I redirected the discussion when it was needed
1 2 3 4 5 6
18. I stimulated the discussion between the group members
1 2 3 4 5 6
19. I answered the student's questions, in the discussion forum, if not answered by his colleagues
1 2 3 4 5 6

E-learning (online) interface:

Feasibility and accessibility

20. It was easy to access my group's virtual PBL room
1 2 3 4 5 6
21. I could access to my group's discussion forum at any time
1 2 3 4 5 6
22. The E-learning interface was enjoyable and easy to use
1 2 3 4 5 6
23. The E-learning interface and tools were well organized
1 2 3 4 5 6
24. If I have problems with the interface / tools I know where to get help
1 2 3 4 5 6
25. If I have problems with the interface / tools I could get help quickly
1 2 3 4 5 6

Integration of facilitated online discussion forums with face-to-face PBL sessions

26. I consider the online discussion forum as a continuity of the face-to-face PBL tutorial.
1 2 3 4 5 6
27. Use of the online discussion forum helped students to understand the weekly problem.
1 2 3 4 5 6
28. Use of the online discussion forum helped students to achieve the learning objectives effectively
1 2 3 4 5 6
29. Use of online discussion forum helped the students to focus on the knowledge related to the learning objectives
1 2 3 4 5 6
30. Use of online discussion forum helps students to find the helpful resources
1 2 3 4 5 6
31. Use online discussion forum provided an effective learning environment
1 2 3 4 5 6

32. Use of the discussion forum gave the students the chance to express their opinion

1 2 3 4 5 6

Improve different skills:

33. In my opinion, use of the online discussion forum helped the students to improve their computer skills

1 2 3 4 5 6

34. use of the online discussion forum helped the students to improve their English writing

1 2 3 4 5 6

35. use of the online discussion forum enhanced students' team work skills

1 2 3 4 5 6

Tutors' satisfaction

36. I was motivated to use the use of the online discussion forum integrated to the Face-to-face PBL

1 2 3 4 5 6

37. I enjoyed use of the online discussion forum

1 2 3 4 5 6

38. I prefer the integration of online discussion forums with PBL rather than using face to face only.

1 2 3 4 5 6

39. I am satisfied with using the use of the online discussion forums.

1 2 3 4 5 6

40. I look forward to tutor using the online discussion forum in the future blocks.

1 2 3 4 5 6

Any comment:

Appendix 9: Individual Interview Questions Schedule

First, I am going to ask you some questions about your general thoughts of the use of an online discussion forum with your PBL course?

1. What do you think about the idea of integrating an online discussion forum with the PBL course?

I am now going to ask you some questions about the training workshop

2. How useful was the presentation (given by dr alamro) helpful? Why did you find it helpful (or not helpful)?

I am now going to ask you some questions about your experiences of using an online discussion forum with the PBL course?

3. What do you find most useful about the integration of online discussion forum with PBL?
4. What were the advantages and disadvantages of integration of online discussion forum with PBL?
5. How do you think that integration of online discussion forum with PBL is effective/helpful for the students?
6. Do you think it solved the PBL problems that students complained about?
7. What do you think has been the effect of online forums on students understanding of the weekly problem?
8. What do you think has been the effect of online discussion forums on the students' collaborative learning?

The probe questions will be, as needed, for instance:

1. Would you give me an example?
2. Can you elaborate on that idea?
3. Would you explain that further?
4. Is there anything else?

Appendix 10: Focus Group Questions Schedule

First, I am going to ask you a question about your general thoughts of the use of an online discussion forum with your PBL course?

1. What do you think about the idea of integrating an online discussion forum with your PBL course?

I am now going to ask you some questions about the training workshop

1. How useful was the training workshop?

I am now going to ask you some questions about your experiences of using an online discussion forum with your PBL course?

1. What was your overall experience of using an online discussion forum with your PBL course?
2. What was the effect of the online discussion forum on your understanding of the weekly problem?
3. What was the effect of the online discussion forum on solving the PBL problems?
4. What was the effect of the online discussion forum on your collaborative learning?

The probe questions will be, as needed, for instance:

1. Would you give me an example?
2. Can you elaborate on that idea?
3. Would you explain that further?
4. Is there anything else?

Appendix 11: Vice dean's email encouraging tutors to participate

mohamed saleh <noursaleh518@yahoo.com> 13/12/2011 ☆

to: essam, gamalhamra, ezz, Hisham, ghaus, Mohammed, elmuataz, nader, saad, y.alwabli, nmbayoumy, Dr, ghaus, Hesha

Qassim University
College of Medicine

Date: Muharram, 18, 1433 (December, 13th, 2011)
To: Tutors of the Growth and Development block

Through: Vice Dean for Academic Affairs
From: Prof M Nour-El-Din
Head of Phase II Coordination Committee

Subject: Blended PBL approach

Dear Drs

You have been chosen as one of the tutors who will participate in the blended Problem Base Learning (BPBL) approach that will be applied in the Growth and Development Block. BPBL is a part of curriculum innovation process of the college and is led by Dr Ahmad Alamro.

Dr Ahmad Almro will be holding an introductory presentation to the project with the rationale behind the project and the results of the pilot study of the same study that was conducted on 2010.

The presentation will be on Wednesday; Muharam 19th (December 14th) at the E-learning Unit (on the 2nd floor, in front of Dr Hani's office) at 12:00 noon for 30 minutes. Participant's cooperation will be highly appreciated.

Best regards

Dr Nour

Cc to:

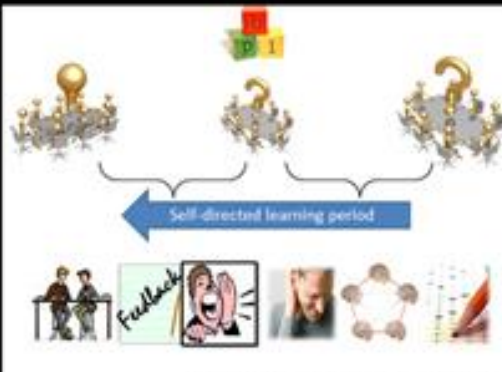
- Vice dean for Academic Affairs
- First year coordinator
- Block Organizer
- Dr Ahmad AlAmro

Appendix 12: Tutor training slides




Use of technology to assist PBL

Ahmad S. Alawro



Self-directed learning period

(Hamed et al. 2014, Al-Rolawi et al. 2008, Shamsan and Syed 2008)

How would BL help..

1. Student?
2. Tutor/Facilitator?
3. institution?



Student

1. Flexibility
2. Feedback
3. Enhance collaborative learning (S-S and T-S interaction)
4. Knowledge share
5. It would give students equal opportunity of contribution.
6. Accommodate different learning styles.
7. Content permanency
8. Writing and computer skills

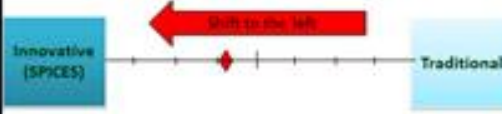


Tutor/Facilitator

1. Flexibility
2. Overcome the time constraint
3. Follow up the students (SDI period)
4. Making sure all students cover the learning objectives
5. Student assessment



institution




Whole the Week

Your colleagues and tutors' experience

Participants	Views	Posts/ Replies
Students	28,553	2,624
Tutors	3,508	171
Total	27,461	2,795

Interaction / collaboration (students)

Student-Tutor	Agree	N	Disagree
Using the E-learning < contact time between me and tutor in my PBL group	64%	21%	15%
In the E-learning, the contact with my tutor became easier than using f2f only	60%	19%	21%
The tutor gave me feedback on my contribution in the discussion board	61%	22%	17%
My tutor motivated me to participate	80%	14%	6%
In the E-learning, the tutor redirected the discussion when it is needed	66%	20%	14%
The tutor stimulated the discussion between the group members	66%	20%	15%
My questions in the discussion forum were answered by the tutor if not answered by my colleagues	63%	21%	16%

Interaction / collaboration (tutors)

Student-Tutor	Agree	N	Disagree
Using the E-learning < contact time between the student and tutor in my PBL group	86%	7%	7%
I gave feedback on the students' contributions in the discussion board	86%	0%	14%
I motivated the students to participate	93%	0%	7%
In the E-learning, I redirected the discussion when it is needed	86%	14%	0%
I answered the students' questions in the discussion forum if not answered by his / her colleagues	86%	0%	14%

Interaction / collaboration (students)

Student-Student	Agree	N	Disagree
Using the E-learning increased the contact time between me and my friends in the PBL group	86%	9%	5%
In the E-learning, I shared my knowledge (information +resource) with my group members	85%	10%	5%
In the E-learning, most of my questions in the discussion board were answered by my colleagues.	71%	22%	8%
Collaboration with other group members on the virtual PBL room helped me to learn more	71%	19%	10%

Blending online discussion with conventional PBL (students)

Students	Agree	N	Disagree
I consider the virtual PBL room as a continuity of the f2f PBL room	65%	23%	13%
Use of blended learning helped me to understand the weekly problem	76%	14%	10%
Use of blended learning helped me to achieve the learning objectives effectively	77%	11%	12%
Use of blended learning helped me to focus on the knowledge related to the learning objectives	75%	16%	9%
Use of blended learning helped me to find helpful resources	75%	17%	8%
Use of blended learning provided an effective learning environment	74%	20%	7%

Interaction / collaboration (tutors)

Student-Tutor	Agree	N	Disagree
Using the E-learning < contact time between the student and tutor in my PBL group	86%	7%	7%
I gave feedback on the students' contributions in the discussion board	86%	0%	14%
I motivated the students to participate	93%	0%	7%
In the E-learning, I redirected the discussion when it is needed	86%	14%	0%
I answered the students' questions in the discussion forum if not answered by his / her colleagues	86%	0%	14%

Blending online discussion with conventional PBL (tutors)

Tutors	Agree	N	Disagree
I consider the virtual PBL room as a continuity of the f2f PBL room	93%	7%	0%
Use of blended learning helped students to understand the weekly problem	86%	7%	7%
Use of blended learning helped students achieve the learning objectives effectively	86%	7%	7%
Use of blended learning helped students focus on knowledge related to learning objectives	86%	7%	7%
Use of blended learning helped students find helpful resources	93%	0%	7%
Use of blended learning provided an effective learning environment	57%	21%	14%*

Flexibility

Students	Agree	N	Disagree
I could access my virtual PBL room at any time	74%	10%	16%
Use of the discussion board / forum gave me the chance to express my opinion	89%	9%	2%
Tutors	Agree	N	Disagree
I could access my group's virtual PBL room at any time	79%	14%	7%
Use of the discussion board / forum gave the students the chance to express their opinion	71%	7%	0%*

*21% of tutors did not answer last question

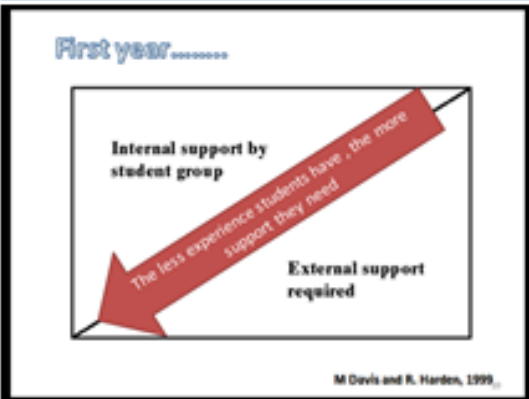
Using e-learning to improve skills

Students	Agree	N	Disagree
Using e-learning helped me to improve my computer skills	67%	19%	15%
Using the discussion board / forum helped me to improve my English writing	85%	10%	5%
Use of the virtual PBL room enhanced my teamwork skills	77%	16%	7%
Tutors	Agree	N	Disagree
Using e-learning helped the students to improve my computer skills	43%	29%	7%*
Using the discussion board / forum helped the students to improve their English writing	93%	0%	7%
Use of the virtual PBL room enhanced students' teamwork skills	86%	7%	7%

Participants' satisfaction			
Students	Agree	N	Disagree
I was motivated to use the blended learning (integration of elearning with PBL) approach	67%	24%	9%
I am satisfied with using blended PBL	67%	22%	11%
I look forward to using blended learning in future blocks	76%	22%	12%
Tutors	Agree	N	Disagree
I was motivated to use the blended learning (integration of elearning with PBL) approach	79%	21%	0%
I am satisfied with using blended PBL	93%	0%	7%
I look forward to using blended learning in future blocks	79%	14%	7%

"Using e-learning with PBL:
1. Increased the reliability of the PBL assessment.
2. I observed that some silent students in the PBL sessions participated effectively in the e-learning"

PBL Tutor



Role Description !

Students

- Assign a scribe/ note taker.
- On Saturday/1st session:
 - *At the last 10 minutes, learning team should be written in the forum, if not, by 6-8pm is a deadline.

Tutor/Facilitator

1. Kindly, log in, at least, 2 hours weekly that are allocated for the E-learning (Sunday, Monday, and Tuesday); the more they are scattered is the better for students.

Tutor/Facilitator..Cont

2. Follow up:
 - Leading questions, hints, raising issues that need to be considered.
 - Redirect the discussion and prevent sidetracking
 - Ensure that the group achieves appropriate learning issues
 - Check understanding by propping questions

Diana F Wood, 2003; M Davis and R. Harden, 1999

The evaluation

1. Content analysis
2. An online questionnaire
3. Individual interviews





Inquiry

asalamro@gmail.com

Mobile: 0555133800

Appendix 13: students training slides

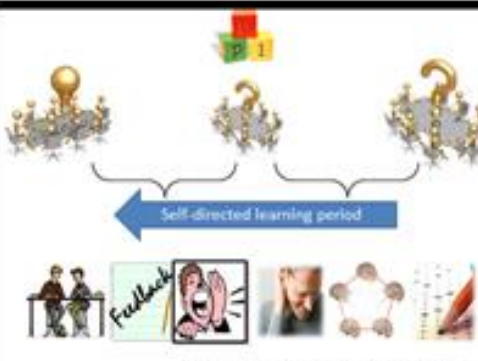



Support Problem-Based Learning

Dr. Ahmad S. Alamro

What are the issues do you face in PBL?





Self-directed learning period

(Hemati et al. 2004, Al-Robaa et al. 2009, Sherman and Syed 2009)



How can we overcome the issues?




All the Week

Your colleagues and tutors' experience

Participants	Views	Posts/ Replies
Students	28,953	2,624
Tutors	3,508	171
Total	27,461	2,795

Interaction / collaboration (students)

Student-Student	Agree	N	Disagree
Using the E-learning increased the contact time between me and my friends in the PBL group	86%	9%	5%
In the E-learning, I shared my knowledge (information +resource) with my group members	85%	10%	5%
In the E-learning, most of my questions in the discussion board were answered by my colleagues.	71%	22%	8%
Collaboration with other group members on the virtual PBL room helped me to learn more	71%	19%	10%

Interaction / collaboration (students)

Student-Tutor	Agree	N	Disagree
Using the E-learning < contact time between me and tutor in my PBL group	64%	21%	15%
In the E-learning, the contact with my tutor became easier than using f2f only	60%	19%	21%
The tutor gave me feedback on my contribution in the discussion board	61%	22%	17%
My tutor motivated me to participate	80%	14%	6%
In the E-learning, the tutor redirected the discussion when it is needed	66%	20%	14%
The tutor stimulated the discussion between the group members	66%	20%	15%
My questions in the discussion forum were answered by the tutor if not answered by my colleagues	63%	21%	16%

Interaction / collaboration (tutors)

Student-Tutor	Agree	N	Disagree
Using the E-learning < contact time between the student and tutor in my PBL group	86%	7%	7%
I gave feedback on the students' contributions in the discussion board	86%	0%	14%
I motivated the students to participate	93%	0%	7%
In the E-learning, I redirected the discussion when it is needed	86%	14%	0%
I answered the students' questions in the discussion forum if not answered by his / her colleagues	86%	0%	14%

Interaction / collaboration (tutors)

Student-Tutor	Agree	N	Disagree
Using the E-learning < contact time between the student and tutor in my PBL group	86%	7%	7%
I gave feedback on the students' contributions in the discussion board	86%	0%	14%
I motivated the students to participate	93%	0%	7%
In the E-learning, I redirected the discussion when it is needed	86%	14%	0%
I answered the students' questions in the discussion forum if not answered by his / her colleagues	86%	0%	14%

Blending online discussion with conventional PBL (students)

Students	Agree	N	Disagree
I consider the virtual PBL room as a continuity of the f2f PBL room	65%	23%	13%
Use of blended learning helped me to understand the weekly problem	76%	14%	10%
Use of blended learning helped me to achieve the learning objectives effectively	77%	11%	12%
Use of blended learning helped me to focus on the knowledge related to the learning objectives	75%	16%	9%
Use of blended learning helped me to find helpful resources	75%	17%	8%
Use of blended learning provided an effective learning environment	74%	20%	7%

Blending online discussion with conventional PBL (tutors)

Tutors	Agree	N	Disagree
I consider the virtual PBL room as a continuity of the f2f PBL room	93%	7%	0%
Use of blended learning helped students to understand the weekly problem	86%	7%	7%
Use of blended learning helped students achieve the learning objectives effectively	86%	7%	7%
Use of blended learning helped students focus on knowledge related to learning objectives	86%	7%	7%
Use of blended learning helped students find helpful resources	93%	0%	7%
Use of blended learning provided an effective learning environment	57%	21%	14%*

Flexibility

Students	Agree	N	Disagree
I could access my virtual PBL room at any time	74%	10%	16%
Use of the discussion board / forum gave me the chance to express my opinion	89%	9%	2%
Tutors	Agree	N	Disagree
I could access my group's virtual PBL room at any time	79%	14%	7%
Use of the discussion board / forum gave the students the chance to express their opinion	71%	7%	0%*

*21% of tutors did not answer last question

Using e-learning to improve skills

Students	Agree	N	Disagree
Using e-learning helped me to improve my computer skills	67%	19%	15%
Using the discussion board / forum helped me to improve my English writing	85%	10%	5%
Use of the virtual PBL room enhanced my teamwork skills	77%	16%	7%
Tutors	Agree	N	Disagree
Using e-learning helped the students to improve my computer skills	43%	29%	7%*
Using the discussion board / forum helped the students to improve their English writing	93%	0%	7%
Use of the virtual PBL room enhanced students' teamwork skills	86%	7%	7%

Participants' satisfaction

Students	Agree	N	Disagree
I was motivated to use the blended learning (integration of elearning with PBL) approach	67%	24%	9%
I am satisfied with using blended PBL	67%	22%	11%
I look forward to using blended learning in future blocks	76%	22%	12%
Tutors	Agree	N	Disagree
I was motivated to use the blended learning (integration of elearning with PBL) approach	79%	21%	0%
I am satisfied with using blended PBL	93%	0%	7%
I look forward to using blended learning in future blocks	79%	14%	7%

"Using e-learning with PBL:

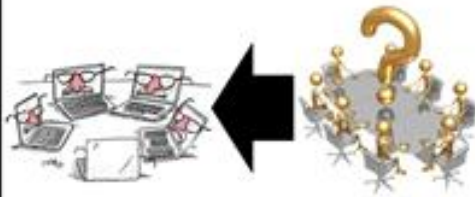
1. Increased the reliability of the PBL assessment.
2. I observed that some silent students in the PBL sessions participated effectively in the e-learning"

PBL Tutor

Implementation



PBL Groups



What is my role?

*Assigned scribe/ note taker responsible to post the learning issues.

*On Saturday/1st session:

*At the last 10 minutes, learning team should be written in the forum, if not, by 4-8 pm is a deadline.

What is my role?..(cont)

What do you expect from your tutor?

*S/he is only facilitator the tutor's questions are not a task.

*S/he will give you continuous feedback.

*S/he will direct and redirect the discussion.

*s/he will answer questions that have not been answered by a colleague.

Evaluation of the course

Excellent
 Very good
 Good
 Average
 Poor

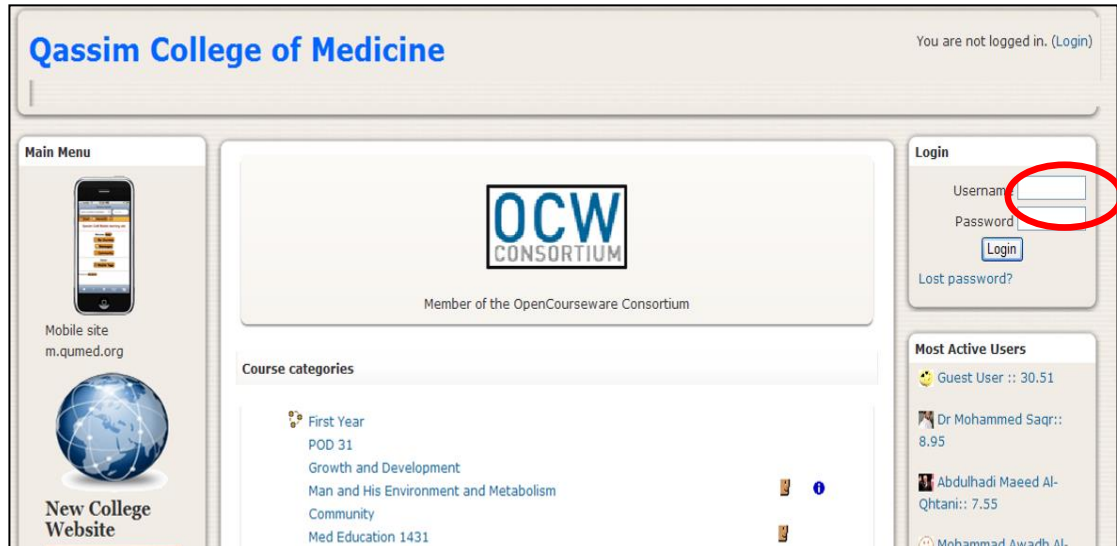
Inquiry

asalamro@gmail.com

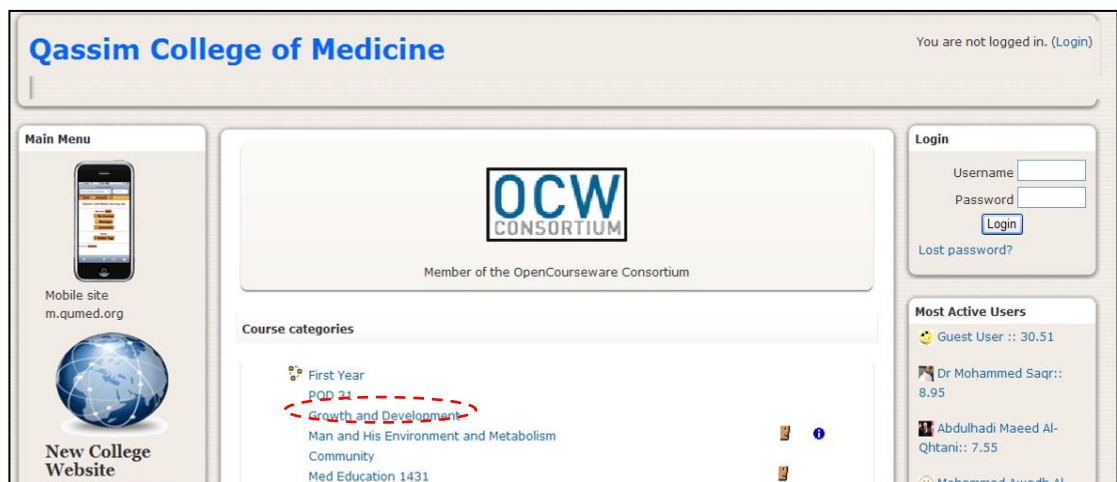
Mobile: 0555133800

Appendix 14: steps of how to access the discussin forums

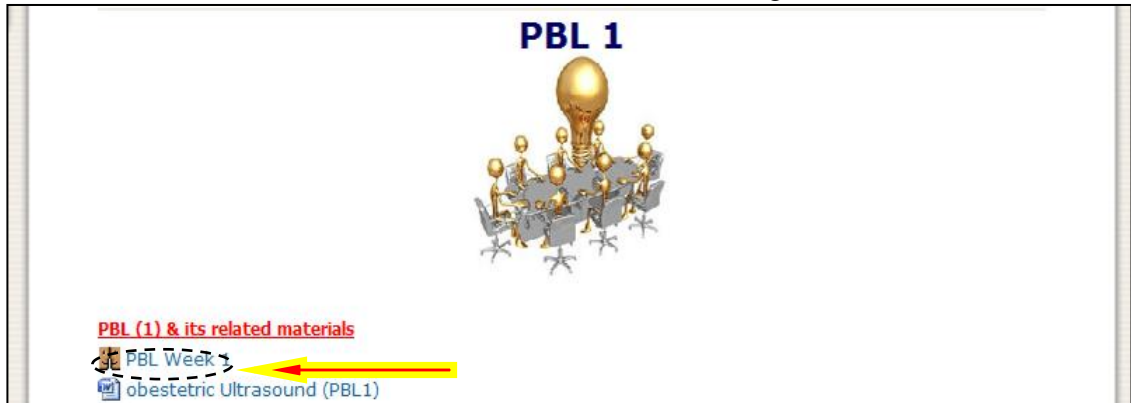
1. Log in, by inserting your user name and password



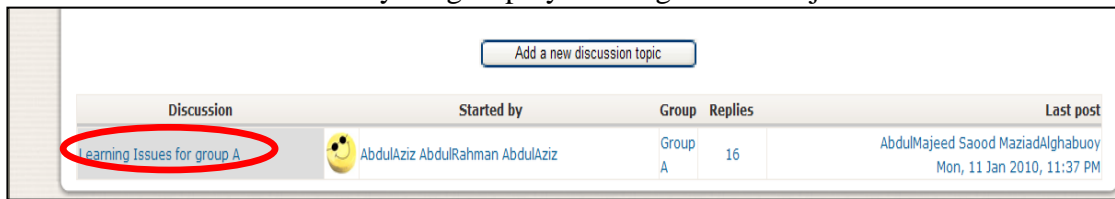
2. Then, click on Growth and Development



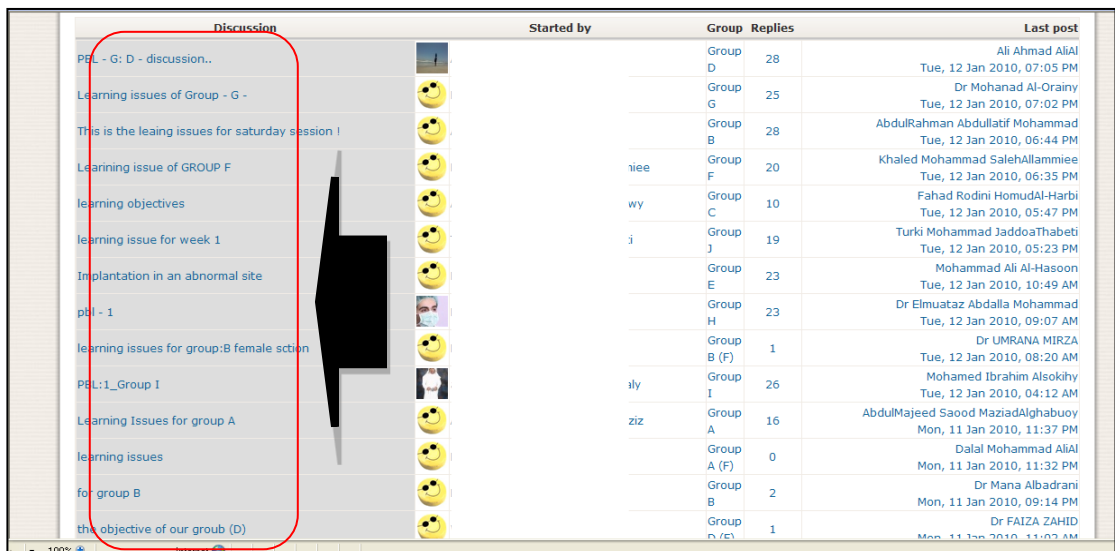
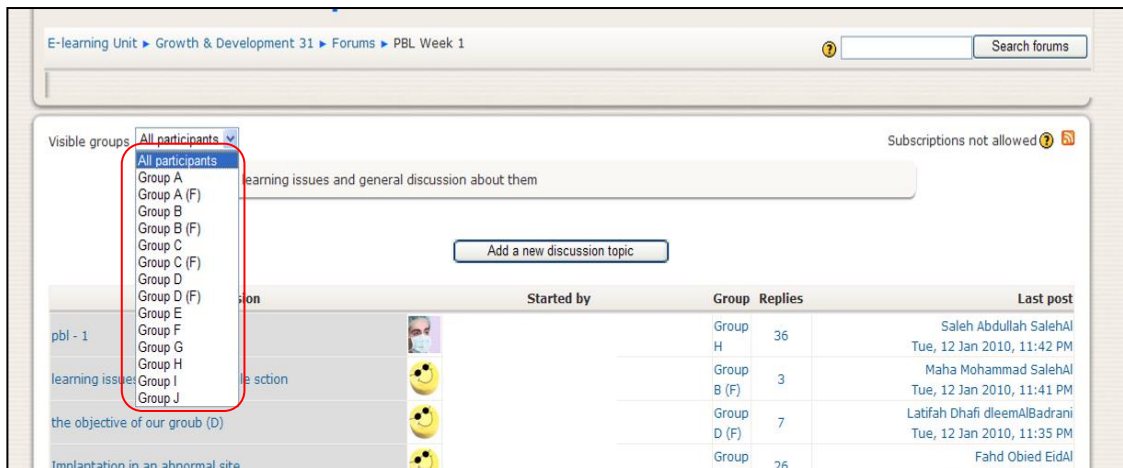
3. Then, click on the PBL of the week exists, e.g. PBL week 1



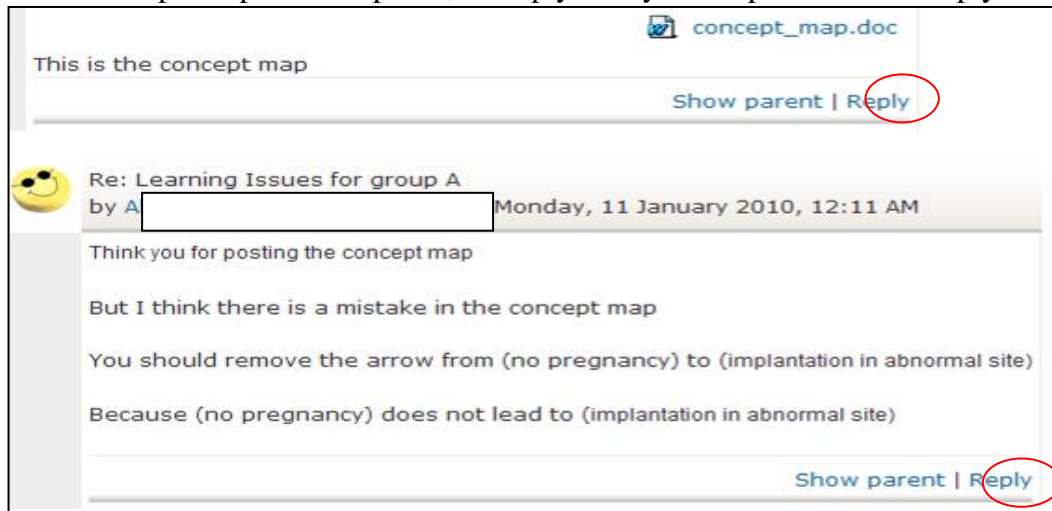
4. Select the forum of your group by clicking on the subject of the forum



Or select it out of the whole list if it is visible!



5. To participate or response, or reply to any of the posts click on reply



The screenshot shows a forum interface. At the top, there is a post titled "This is the concept map" with a document icon labeled "concept_map.doc". Below the title, there are two buttons: "Show parent" and "Reply", with the "Reply" button circled in red. Below this is a reply from a user with a yellow smiley face icon. The reply is titled "Re: Learning Issues for group A" and is dated "Monday, 11 January 2010, 12:11 AM". The reply text reads: "Think you for posting the concept map", "But I think there is a mistake in the concept map", "You should remove the arrow from (no pregnancy) to (implantation in abnormal site)", and "Because (no pregnancy) does not lead to (implantation in abnormal site)". At the bottom of the reply, there are two buttons: "Show parent" and "Reply", with the "Reply" button circled in red.

If you have any inquiries, please contact:




saqr@qumed.org





Mob: 0555133800

Wishing you the best

Dr. Ahmad Alamro

Appendix 15: **Reminder from the vice dean encouraging them to contribute**

Blended Problem-based learning Gassim staff email x   

 **Dr Hani Al-Shobaili** <hani@qumed.edu.sa> 20/12/2011   
to college, college ▾

FROM : Vice Dean For Academic Affairs

TO : All tutors who are assigned to PBL tutorials in the Growth and development block.

Appendix 16: example of text was coded using Microsoft Word


<p>(Fs3)*: إلا برضو نفس النقطة إللي ذكرها الدكتور إنه في بنات ما كانوا يدخلون في البي بي إيل بالأي لهرنقى ... يعني ما نعرف كيف نسوي بوست ما نعرف كيف نسوي ريبلاي ...</p>	<p>Training: do not know :[Comment [u19]</p>
<p>(fs8)*: بالنسبة لي خرجت من البرزنتيشن بصورة واضحة جداً عن إللي أنا أبسويه و كيف أبسويه</p>	<p>Training: clarity :[Comment [u20]</p>
<p>interviewer- فيه أحد عنده نقطة إضافية، تنغلة معينة، حتى إذا ما أحد عنده أي سلبية أو إيجابية كيف أطور البرزنتيشن!؟</p>	
<p>fs6*: بالنسبة لي أنا طلعت من البرزنتيشن بصورة واضحة و كاملة عن طبيعته! لكن إللي ما كنت توي فيه إن التيوبتر راح تكون موجودة بشكل يومي ...</p>	<p>Training: clarity :[Comment [u21]</p>

Appendix 17: Sample of quotes translation table (focus group analysis)

translation	Training	Student Name	
"The idea was clear and its usefulness but implementation was not clear enough."	يعني تقريباً أخذنا تصور كامل عن إلهي ما كنا عارفينه بالضبط أنا كيف راح أطبق !! و إلا نفس التصور عن نفس طرح حل المشكلات إنه هذا حل ما كان فيه اختلاف	(fs2)	Training: clarity : [Comment [u17]
"There were some students was not contribution because they do not know."	إنه في بنت ما كانوا يدخلون في اللي بي إل بالإي ليرتفق .. يعني ما تعرف كيف نسوي بوست, ما تعرف كيف نسوي ريبليتي..	(Fs3)	Training: clarity : [Comment [u18]
"For me it was very clear what to do and how to do it."	بالنسبة لي خرجت من البرزنتيشن بصورة واضحة جداً عن اللي أنا أنسويه وكيف أنسويه	(fs8)	Training: clarity : [Comment [u19]
"It was very clear for me, but I was not sure if the tutor will be available daily"	بالنسبة لي أنا طلعت من البرزنتيشن بصورة واضحة وكاملة عن طبيعتها لكن اللي ما كنت شوي فيه إن التيوتر راح تكون موجودة بشكل يومي ...	(fs6)	Training: clear : [Comment [u20]
"The presentation was more than enough and I left the room with clear picture."	بالنسبة لي كان البرزنتيشن بالنسبة لي more than enough و كنت جداً استقدت و طالعة بصورة واضحة	(FS1)	Training: clear : [Comment [u21]
"Some students did not realise the importance of the online discussion, they might understand the idea but did not see how it would help in exam."	لكن كان فيه مشكلة إن نفس الطالبات ما استوصوا أهمية هذا الشيء و إنه راح يفيدهم بعينين, ما أترى صراحة مصدر المشكلة .. ممكن فاهمين الفكرة لكن أبداً ما اقتنعوا بأهميته و إنه راح يفيدهم بالإكزام بغيري	(fs2)	Expectations: they do : [Comment [u22] not use it
"Presentation was clear, in which you used pictures and showed us how to do it."	إنكلم عن البرزنتيشن نفسه, استخدامك للبرزنتيشن في إحدى وسائل العرض البصري, يعني مثلاً سويت كابتشر للإي ليرتفق, وو وضحت بتكيب مو كلام كلام سرد يعني كتسيكست, وضحت بالصورة كيف نتخل من البداية حتى النهاية. هذا كان جداً جداً مفيد	(fs9)	Training: clear : [Comment [u23]

Appendix 18: Ethical approval by Medical Research Ethics Committee, Qassim Medical School.

Page 1 of 2



College of Medicine
لجنة أخلاقيات البحوث الطبية

Application for Approval of the Medical Ethics Committee

(Please attach filled in consent form; if required)

Title of the research: The development and evaluation of integration of inter-sessional facilitated online discussion in problem-based learning in undergraduate medical school curriculum

Name of PI: Ahmad Alamro

Summary of the research proposal

A. Sample size.
The study will be conducted in first year medical students. Number of students will be determined according to the intake of the new academic year. The research will be conducted in one teaching block (4-8 weeks) Students PBL groups and their tutors (PBL facilitators) will be involved.

B. The research encompasses four phases: 1) Need analysis, 2) Development of the e-learning model, 3) Implementing of the model, and 4) Evaluating the model

- 1. Development of the e-learning model**
 1. An open source virtual learning environment (VLE) called MOODLE will be used.
 2. Student will be divided according to their division in the face-to-face, thus there will be no change the group dynamic in VLE.
 3. Each PBL room will be facilitated by a PC and internet network.
 4. Each student and tutor will have an access to the system.
 5. Before start of the course, a workshop will be given to students and tutors to show how MOODLE is used, and how to develop effective online discussions
- 2. Implementing of the model and blend it.**
 - 1) Groups will be meeting in 1st session (Saturday) (face-to-face) accessing to the system and using the facilities.
 - 2) Students will start the discussion (1st five seven jumps), then they will be asked to post the learning objectives on the discussion board that should be achieved in the last session.
 - 3) During the self-directed period, students will engage in all activities and tutors will be asked to attend an hour daily providing feedback, hints, redirecting students and review the content uploaded by students.
- 3. Evaluating the model**
 - 1) At the end of the course, a likert scale and open ended question questionnaire will be given to students evaluating the discussion forums' usefulness and usability.
 - 2) Another questionnaire will be given to the tutors evaluating the discussion forums' usefulness and usability.

Page 2 of 2

- 3) The students' discourse transcript analysed using Henri's model (1992) for evaluation critical thinking in online discussion; Gunawardena, Lowe and Anderson's model (1997) for knowledge construction; and Henri's model (1992) to evaluate the online interaction. The tutors' posts/replies will be evaluated on the level of the learning assistance they provide to the students using Kirkey, Savery and Grabner-Hagen's model (1998). Semi-structured individual interview to be conducted with tutors
- 4) Focus group to be conducted with group of students
- 5) End of block exam result to be compared with the previous cohort that did not have the online discussion.


This Proposal is funded []; please give name of funding body MOH, KSA
 This proposal is not funded by anybody [] Please tick appropriate

This research has been approved by the Medical Ethics Committee on its Meeting number ...11/10/1.....
 date...5/10/2011.....

Dean of the College and Chairman of the Committee: Dr A. A. Al-Ghasham

Signature  Date Oct. 5, 2011

**Appendix 19: Ethical approval by The Medicine and
Dentistry Educational Research Ethics Committee
(EdREC) of the University of Leeds, UK**

<p>Faculty of Medicine and Health Research Office</p> <p>Room 10.110, Level 10 Worsley Building Clarendon Way Leeds LS2 9NL</p> <p>T (General Enquiries) +44 (0) 113 343 4361 F +44 (0) 113 343 4373</p> <p>Dr Ahmed Alamro LIME Room 7.09, Worsley Building University of Leeds LS2 9NL</p> <p>09 February 2012</p> <p>Dear Ahmed</p> <p>Ref no: EDREC/11/003</p> <p>Title: The development and evaluation of integration of inter-sessional facilitated online discussion in problem-based learning (PBL) in undergraduate medical school curriculum</p> <p>I am pleased to inform you that the above research application has been reviewed by the EdREC committee and following receipt of the amendments requested, I can confirm a favourable ethical opinion on the basis described in the application form, protocol and supporting documentation as submitted at date of this letter.</p> <p>Please notify the committee if you intend to make any amendments to the original research as submitted at date of this approval. This includes recruitment methodology and all changes must be ethically approved prior to implementation. Please contact the Faculty Research Ethics and Governance Administrator for further information (fmhuniethics@leeds.ac.uk)</p> <p>Ethical approval does not infer you have the right of access to any member of staff or student or documents and the premises of the University of Leeds. Nor does it imply any right of access to the premises of any other organisation, including clinical areas. The committee takes no responsibility for you gaining access to staff, students and/or premises prior to, during or following your research activities.</p> <p><i>Please note:</i> You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, and other documents relating to the study. This should be kept in your study file, which should be readily available for audit purposes. You will be given a two week notice period if your project is to be audited.</p> <p>It is our policy to remind everyone that it is your responsibility to comply with Health and Safety, Data Protection and any other legal and/or professional guidelines there may be.</p> <p>I wish you every success with the project.</p> <p>Yours sincerely</p>	 <p>UNIVERSITY OF LEEDS</p>
 <p>Dr John Sandars Chair, EdREC</p>	

Faculty of Medicine and Health
Research Office

Room 10.110, Level 10
Worsley Building
Clarendon Way
Leeds LS2 9NL

T (General Enquiries) +44 (0) 113 343 4361
F +44 (0) 113 343 4373



UNIVERSITY OF LEEDS

07 August 2012

Dr Ahmed Alamro
LIME
Room 7.09, Worsley Building
University of Leeds
LS2 9NL

Dear Ahmed

Re ref no: EDREC/11/003 – AMENDMENT_001

Title: **The development and evaluation of integration of inter-sessional facilitated online discussion in problem-based learning (PBL) in undergraduate medical school curriculum**

I am pleased to inform you that the amendment to the above research application has been reviewed by the Medicine and Dentistry Educational Research Ethics Committee (EdREC) and I can confirm a favourable ethical opinion on the basis described in the substantial amendment form and supporting documentation as submitted at the date of this letter. However I do ask that you have a look again at the information sheet and the comments that I have attached to this letter. Not all comments are written as definite changes but I would ask that you think about my comments and consider some of my points.

Please notify the committee if you intend to make any further amendments to the original research as submitted and approved to date. This includes recruitment methodology; all changes must receive ethical approval prior to implementation. Please contact the Faculty Research Ethics and Governance Administrator for further information (fmhuniethics@leeds.ac.uk)

Ethical approval does not infer you have the right of access to any member of staff or student or documents and the premises of the University of Leeds. Nor does it imply any right of access to the premises of any other organisation, including clinical areas. The committee takes no responsibility for you gaining access to staff, students and/or premises prior to, during or following your research activities.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, and other documents relating to the study. This should be kept in your study file, which should be readily available for audit purposes. You will be given a two week notice period if your project is to be audited.

It is our policy to remind everyone that it is your responsibility to comply with Health and Safety, Data Protection and any other legal and/or professional guidelines there may be.

I wish you every success with the project.
Yours sincerely

Professor Michael Manogue
Acting Chair, EdREC

Appendix 20: **Participant's information sheet (content analysis-tutors and students)**

Study title: Evaluation of the educational benefits of the integration of online discussion forums with problem-based learning.

Researchers: Dr Ahmad Alamro

You are invited to take part in an evaluation of the school's new teaching and learning method- using online discussion with PBL. Before you decide, it is important for you to understand why the research is being carried out and what it will involve. Please take time to read the following information carefully, and ask if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part. Thank you for reading this.

1. What is the purpose of this study?

The aim is to evaluate the educational benefits of the integration of online discussion forums with PBL. I would like to evaluate your posts and participation online by looking at your online discussions and participation, particularly whether it is helpful and able to increase your knowledge around PBL problems or not.

2. Do I have to take part?

Since it is a curriculum innovation, all students should participate.

3. Will my taking part in this study be kept confidential?

All the information that we collect about you from the online discussion forums will be kept strictly confidential. You will not be able to be identified in any reports or publications. Meanwhile, all data will be stored in a secure file that can only be accessed by the researcher.

The researcher has no part in the teaching or assessment related to your studies at the Medical School.

4. What's in it for me?

Taking part in the study will help the researcher and the school to find out if the integration of online discussion is an effective way of teaching and learning.

5. What will happen to the results of the study?

The results of the research will be published in a PhD thesis; they might be published in a conference and/or in a journal. However, they will not be identified by any way in any report or publication.

6. Who has reviewed the study?

The research has been reviewed and ethically approved by the Research ethics committee at Qassim Medical School and by the Medicine and Dentistry Educational Research Ethics Committee (EdREC) of Leeds University

Contact details for further information:

The researcher: Dr Ahmad Alamro

Email: asalamro@gmail.com

Mobile No.: 0555133800

**Appendix 21: Student's and tutor's consent form
(content analysis)**

Title of Research Project: Evaluation of the education benefits of integration of online discussion **forums** with problem-based learning.

Name of Researcher: Dr Ahmad Alamro

Initial the box if you agree with the statement to the left

- | | | |
|---|--|---|
| 1 | I confirm that I have read and understand the information explaining the above research project and I have had the opportunity to ask questions about the project. | <input style="width: 20px; height: 20px;" type="checkbox"/> |
| 2 | I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. | <input style="width: 20px; height: 20px;" type="checkbox"/> |
| 3 | I understand that my marks will be kept strictly confidential. I give permission for members of the research team to have access to my marks. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. | <input style="width: 20px; height: 20px;" type="checkbox"/> |
| 4 | I agree for the data collected from the discussion forums to be used in future research. | <input style="width: 20px; height: 20px;" type="checkbox"/> |

Name of participant <i>(or legal representative)</i>	Date	Signature
---	------	-----------

Lead researcher	Date	Signature
-----------------	------	-----------

To be signed and dated in presence of the participant

Appendix 22: **Participant's information sheet (marks analysis-students)**

Study title: Evaluation of the educational benefits of the integration of online discussion forums with problem-based learning.

Researchers: Dr Ahmad Alamro

You are being invited to allow the researcher to look at the end of block marks of the last three blocks of the first year: Medical Education, Man and his Environment, and Growth and Development. The marks are part of the evaluation of the School's new teaching and learning method- using online discussion with PBL. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to allow the researcher to look at the marks.

7. What is the purpose of this study?

The aim is to evaluate the educational benefits of the integration of online discussion forums with PBL. I would like to evaluate the impact of online discussion on your performance by looking at your end of block marks of the last three blocks as noted above

8. Do I have to take part?

It is up to you to decide whether or not to allow the researcher to look at your marks. If you do decide to allow him, please read the following information and sign the consent form. In addition, you can withdraw at any time even after you signed the consent form.

9. Will my taking part in this study be kept confidential?

All marks will be handled in a strictly confidential way. You will not be able to be identified in any reports or publications. Meanwhile, all data will be stored in a secure file that can only be accessed by the researcher.

The researcher has no part in your teaching or assessment and is not related in any way to your studies at Medical School.

10. What's in it for me?

Allowing the researcher to look at your marks will help the school to find if the integration of online discussion is an effective method of education. There will be no risk for you to allow/approve the researcher.

11. What will happen to the results of the study?

The results of the research will be published in a PhD thesis; they might be published in a conference and/or in a journal. However, they will not be identified

12. Who has reviewed the study?

The research has been reviewed and ethically approved by Research ethics committee at Qassim Medical School and by Medicine and Dentistry Educational Research Ethics Committee (EdREC) of Leeds University.

Contact details for further information:

The researcher: Dr Ahmad Alamro

Email: asalamro@gmail.com

Mobile No.: 0555133800

Appendix 23: **Student's consent form (marks analysis)**

Title of Research Project: Evaluation of the education benefits of integration of online discussion **forums** with problem-based learning.

Name of Researcher: Dr Ahmad Alamro

Initial the box if you agree with the statement to the left

- | | | |
|---|--|---|
| 1 | I confirm that I have read and understand the information explaining the above research project and I have had the opportunity to ask questions about the project. | <input style="width: 20px; height: 30px;" type="checkbox"/> |
| 2 | I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. | <input style="width: 20px; height: 30px;" type="checkbox"/> |
| 3 | I understand that my marks will be kept strictly confidential. I give permission for members of the research team to have access to my marks. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. | <input style="width: 20px; height: 30px;" type="checkbox"/> |
| 4 | I agree for my marks to be analysed by the research team | <input style="width: 20px; height: 30px;" type="checkbox"/> |
| 5 | I agree for the data collected from me to be used in future research. | <input style="width: 20px; height: 30px;" type="checkbox"/> |
| 6 | I agree to allow the researcher to analyse my marks and will inform the principal investigator should my contact details change. | <input style="width: 20px; height: 30px;" type="checkbox"/> |

Name of participant	Date	Signature
<i>(or legal representative)</i>		

Lead researcher	Date	Signature
-----------------	------	-----------

To be signed and dated in presence of the participant

Appendix 24: **Participant's information sheet** **(questionnaires)**

Study title: Evaluation of the educational benefits of the integration of online discussion forums with problem-based learning.

Researchers: Dr Ahmad Alamro

You are invited to take part in an evaluation of the school's new teaching and learning method- using online discussion with PBL. Before you decide, it is important for you to understand why the research is being carried out and what it will involve. Please take time to read the following information carefully, and ask if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part. Thank you for reading this.

13. What is the purpose of this study?

The aim is to evaluate the educational benefits from the integration of online discussion forums with PBL. I will be delighted to receive your opinions on the use of online discussion forums which will be obtained by completing the following questionnaire.

14. Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, please read the following information and complete the questionnaire.

15. Will my taking part in this study be kept confidential?

All the information that is collected from you throughout the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. Meanwhile, all data will be stored in a file that can only be accessed by the researcher.

16. What's in it for me?

Taking part and filling out the questionnaire will help the researcher and the school to gain your opinion on the integration of online discussion forums with PBL, and whether is it useful, helpful and so on. There will be no risk from you participating.

17. What will happen to the results of the study?

The results of the research will be published in a PhD thesis; they might be published in a conference and/or in a journal. However, they will not be

identified in any report or publication.

18. Who has reviewed the study?

The research has been reviewed and ethically approved by the Research ethics committee at Qassim Medical School and by the Medicine and Dentistry Educational Research Ethics Committee (EdREC) of the University of Leeds, UK

COMPLETION OF THE QUESTIONNAIRE AND RETURN OF THE QUESTIONANIRE WILL BE REGARDED AS AGREEMENT TO TAKE PART IN THE STUDY.

Contact details for further information:

The researcher: Dr Ahmad Alamro

Email: asalamro@gmail.com

Mobile No.: 0555133800

Appendix 25: Tutor's information sheet (individual interview)

Study title: Evaluation of the educational benefits of the integration of online discussion forums with problem-based learning.

Researchers: Dr Ahmad Alamro

You are invited to take part in an evaluation of the school's new teaching and learning method- using online discussion with PBL. Before you decide, it is important for you to understand why the research is being carried out and what it will involve. Please take time to read the following information carefully, and ask if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part. Thank you for reading this.

19. What is the purpose of this study?

The aim is to evaluate the educational benefits from the integration of online discussion forums with PBL. I will be delighted to receive your opinions on the use of online discussion forums and these will be obtained through an individual interview. The questions will focus on the discussion forums' advantages and disadvantages, and whether it is helpful and can overcome PBL problems or not?

20. Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, please read the following information and sign the consent form. In addition, you can withdraw at any time even after you have signed the consent form.

21. Will my taking part in this study be kept confidential?

All the information that is collected about you in the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. Meanwhile, all data will be stored in a file that can only be accessed by the researcher.

22. What's in it for me?

Taking part in the interview will help the researcher and the school to find out whether the integration of online discussion is an effective way of teaching and learning. There will be no risk from you participating.

23. What will happen to the results of the study?

The results of the research will be published in a PhD thesis; they might be published in a conference and/or in a journal. However, you will not be identified in any way in any report or publication.

24. Who has reviewed the study?

The research has been reviewed and ethically approved by the Research ethics committee at Qassim Medical School and by the Medicine and Dentistry Educational Research Ethics Committee (EdREC) of the University of Leeds, UK

25. Will I be recorded, and how will the recorded media be used?

The audio recordings made during the interview will be used only for analysis. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the original recordings. Immediately after the data has been analysed, the recordings will be destroyed.

Contact details for further information:

The researcher: Dr Ahmad Alamro

Email: asalamro@gmail.com

Mobile No.: 0555133800

Appendix 26: Tutor consent form (interview)

Title of Research Project: Evaluation of the education benefits of integration of online discussion **forums** with problem-based learning.

Name of Researcher: Dr Ahmad Alamro

Tick the box if you agree with the statement to the left

- | | | |
|---|---|--------------------------|
| 1 | I confirm that I have read and understand the information explaining the above research project and I have had the opportunity to ask questions about the project. | <input type="checkbox"/> |
| 2 | I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. | <input type="checkbox"/> |
| 3 | I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. | <input type="checkbox"/> |
| 4 | I agree for my interview data to be analysed by the research team | <input type="checkbox"/> |
| 5 | I agree for the data collected from me to be used in future research. | <input type="checkbox"/> |
| 6 | I agree to take part in the individual interview and will inform the principal investigator should my contact details change. | <input type="checkbox"/> |

Name of participant	Date	Signature
---------------------	------	-----------

(or legal representative)

Lead researcher	Date	Signature
-----------------	------	-----------

To be signed and dated in presence of the participant

Appendix 27: **student information sheet (focus group)**

Study title: Evaluation of the educational benefits of the integration of online discussion forums with problem-based learning.

Researchers: Dr Ahmad Alamro

You are invited to take part in an evaluation of the school's new teaching and learning method- using online discussion with PBL. Before you decide, it is important for you to understand why the research is being carried out and what it will involve. Please take time to read the following information carefully, and ask if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part. Thank you for reading this.

1. What is the purpose of this study?

The aim is to evaluate the educational benefits of the integration of online discussion forums with PBL. I would like to invite you to join a focus group (in Arabic). The discussion forums' advantages and disadvantages will be discussed, particularly whether it is helpful and able to overcome PBL problems or not.

2. Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, please read the following information and sign the consent form. In addition, you can withdraw at any time even after you have signed the consent form.

3. Will my taking part in this study be kept confidential?

All the information that we collect about you from the focus group and discussion group will be kept strictly confidential. You will not be able to be identified in any reports or publications. Meanwhile, all data will be stored in a secure file that can only be accessed by the researcher.

The researcher has no part in the teaching or assessment related to your studies at the Medical School.

4. What's in it for me?

Taking part in the study will help the researcher and the school to find out if the integration of online discussion is an effective way of teaching and learning. There will be no risk from you participating.

5. What will happen to the results of the study?

The results of the research will be published in a PhD thesis; they might be published in a conference and/or in a journal. However, they will not be identified by any way in any report or publication.

6. Who has reviewed the study?

The research has been reviewed and ethically approved by the Research ethics committee at Qassim Medical School and by the Medicine and Dentistry Educational Research Ethics Committee (EdREC) of the University of Leeds, UK

7. Will I be recorded, and how will the recorded media be used?

The audio recordings of your activities during the focus group discussion will be used only for analysis. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the original recordings. Immediately after the data has been analysed, the recording will be destroyed.

Contact details for further information:

The researcher: Dr Ahmad Alamro

Email: asalamro@gmail.com

Mobile No.: 0555133800

Appendix 28: **student consent form (focus group)**

Title of Research Project: Evaluation of the education benefits of integration of online discussion **forums** with problem-based learning.

Name of Researcher: Dr Ahmad Alamro

Tick the box if you agree with the statement to the left

- | | | |
|---|---|--------------------------|
| 1 | I confirm that I have read and understand the information explaining the above research project and I have had the opportunity to ask questions about the project. | <input type="checkbox"/> |
| 2 | I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. | <input type="checkbox"/> |
| 3 | I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. | <input type="checkbox"/> |
| 4 | I agree for the data collected from me to be used in future research. | <input type="checkbox"/> |
| 5 | I agree to take part in the individual interview and will inform the principal investigator should my contact details change. | <input type="checkbox"/> |

Name of participant
(or legal representative)

Date

Signature

Lead researcher

Date

Signature

To be signed and dated in presence of the participant

**Appendix 30: Part of a transcript of students'
discourse in the discussion forum in one of the
weeks**

Delayed Puberty

by - Saturday, 7 January 2012, 2:18 PM

Alslamo Alycom :)

Hi girls ,,

You are soo active today ma sha Allah ()

Stay like that ~

Ok ..

gaps ..

1- blood test .. (Hb, TLC, TSH and serum testosterone level)

* just the definitions and the normal values .

Objectives ..

1- Hormones that are relating to puberty in males.

- list them and give a short definition of every one.

- normal affect.

- abnormal.

2- Puberty characters (physiological changes)

3- Affect of psychological problems on puberty.

5- Teenagers behaviors during puberty.

6- Smooking and its affects on puberty.

That's all ()..

Let's Gooooooooo .

I am sorry because I am gonna to bother you again an say :

One by one ;)

You will enjoy and cover everything this week in sha Allah.

I promise you and I trust you that you will share and give information.

[Edit](#) | [Delete](#) | [Reply](#)

Re: Delayed Puberty

by - Saturday, 7 January 2012, 2:28 PM

Ok ..

Now, before we start the discussion we have to know a little thing.

Yaaaah, you are correct.

Gaps Time ()

..

1- blood test .. (Hb, TLC, TSH and serum testosterone level)

* just the definitions and the normal values .

#We need one beautiful girl for every one#

1- Hb.

2- TLC.

3- TSH.

4- Serum testosterone level.

Go ahead.

* I am sorry for the black color because I use ipad ()

Re: Delayed Puberty

by - Saturday, 7 January 2012, 9:18 PM

hello girls

i have definition and normal value about Hb:

Hemoglobin normal values: **Hemoglobin** is the oxygen-carrying pigment in the blood, the predominant **protein** in the **red blood cells**. In the

routine laboratory test for hemoglobin (Hb), it is usually measured as total hemoglobin and the result is expressed as the amount of hemoglobin in grams (gm) per deciliter (dl) of whole blood, a deciliter being 100 milliliters.

The normal ranges for hemoglobin depend on the age and, beginning in adolescence, the sex of the person. The normal ranges are:

Newborns: 17-22 gm/dl

One (1) week of age: 15-20 gm/dl

One (1) month of age: 11-15gm/dl

Children: 11-13 gm/dl

Adult males: 14-18 gm/dl

Adult women: 12-16 gm/dl

Men after middle age: 12.4-14.9 gm/dl

Women after middle age: 11.7-13.8 gm/dl

All of these values may vary slightly between laboratories. Some laboratories do not differentiate between adult and "after middle age" hemoglobin values.

Re: Delayed Puberty

by - Saturday, 7 January 2012, 9:22 PM

Hi ya 3slat

this def & N.V about (TSH):

Stimulating hormone of the thyroid gland (TSH - Thyroid Stimulating Hormone): Secretes the hormone of the anterior lobe of the pituitary gland (Anterior Pituitary Gland) in the bottom of the brain after the arrival of a reference to it Alhaaboethelams (Hypothalamus) (as under the bed Basri - in the midbrain) and works of this hormone to stimulate the entry of iodine for the thyroid to manufacture hormones T3 and T4 The purpose of this analysis is to determine the location and type of the disease, which affects the thyroid gland.

The normal range of stimulating hormone of the thyroid gland (TSH) is as follows:

- hormone level ranges between 5.0 to 5 ml and IU / L

Re: Delayed Puberty

by - Saturday, 7 January 2012, 9:49 PM

Hi ()

You did a great work lovely friend ()

Take rest now ()

Who is the next girl?

the next girl will tell us about TLC or the last one (serum..)

As she wants :)

Re: Delayed Puberty

by - Saturday, 7 January 2012, 10:23 PM

alسلام 3lykom

how r u Girls ?

this is about testosterone ..

A testosterone test measures the amount of the male hormone, testosterone, in the blood.

This test may be done if you have symptoms of abnormal male hormone (androgen) production.

In males, the testes produce most of the circulating testosterone. The hormone LH from the pituitary gland stimulates the Leydig cells in the testicles to produce testosterone.

Normal Results

Male: 300 -1,200 ng/dL

Decreased production of testosterone:

Chronic illness
 Delayed puberty
 Hypopituitarism
 Prolactinoma
 Testicular failure

Re: Delayed Puberty

by - Saturday, 7 January 2012, 10:35 PM

Hiii

I love you sweetie ()

Thanks dear you did a great work.

I love your last post ()

Stay with me here ()

.

who is the next smart girl?

Now, We just have TLC.

We will move after that to the next beautiful objective ()

Re: Delayed Puberty

by - Saturday, 7 January 2012, 11:02 PM

good evening

the another thing and the most important the benefit that we gonna

learn it from this beautiful discussion ,,

so,the definition of TLC:

Lymphocyte Counts

Lymphocytes (monomorphonuclear lymphocytes) are cells present in the blood and lymphatic tissue.

Lymphocytes are derived from the stem cells from which all blood cells arise. They are the main means of

providing the body with immune capability.

The normal values of lymphocytes are :

20 to 40 percent of total leukocyte count (relative value) or 10,000-4,000/mm³.

Re: Delayed Puberty

by - Saturday, 7 January 2012, 11:19 PM

..... ,

I am always with you

Dear

also ,

the TLC test result is used to show how the immune system is working. When the

white blood cell count (total leukocyte count) is low the body

may not be able to fight off infection and illness.

Re: Delayed Puberty

by - Saturday, 7 January 2012, 11:46 PM

..... and

Do you mean that TLC = Total lemphocyte counts = total leukocyte count?

Re: Delayed Puberty

by - Saturday, 7 January 2012, 11:22 PM

Total lymphocyte count

Re: Delayed Puberty

by - Sunday, 8 January 2012, 12:26 AM

aha thanx .

TLC = Total Lemphocyte Count.= Total Leukocyte Counts

Lymphocyte is the other name of the leukocyte.

...
 Thanx lovely friends and ()
 Good work ~

''
 Now, I am gonna to summarize what we have done until now.
 In our problem of Ayoub, 17 -year-old
 #Hb = 12.2 gm/dL(normal) if we suppose that he is child because the normal value
 of the child is 11- 13gm/dL.
 or(decreased) if we suppose that he is adult because the norma value of adult is
 14-18 gm / mL.
 #TLC = 6800 cmm (normal) because the normal value is 4000 - 10.000 mm³.
 * cmm = mm³
 # TSH = 3 (Normal) because the normal value is 0.5 - 5
 # serum testosterone level = 0.9 ng/ml (too decreased) because the normal value in
 male is 300 - 1200 ng/ml.

''''
 If I said anything wrong, correct it please.
 If you have any addition to the first objective , add it please.

Re: Delayed Puberty

by - Saturday, 7 January 2012, 11:41 PM
*i think it's similar cuz' when i search about TLC,it show me
 the total leukocyte count & total lymphocyte count
 it's look like to each other in definition & normal range
 if any girl has an idea about the TLC ,, can she shear it*

Re: Delayed Puberty

by - Saturday, 7 January 2012, 11:56 PM
 ^^

Thanx
 I think that you are correct :)

..
 Girls .
 I have a question !!
 Do you think that we have to suppose that Ayoub is child or adult to know if the
 value of Hb is normal or not ?
 If he is child (normal)
 If he is adult (decreased)

Re: Delayed Puberty

by - Sunday, 8 January 2012, 12:15 AM
 hi
 i think that ayoub is child <<< so is normal Hb

Re: Delayed Puberty

by - Sunday, 8 January 2012, 12:22 AM
 yes,i was wondering about that <<..... do you read my thoughts
*Dr.ahamad said the boy is considered a young child from 11 to 19
 but, i think we have to put him under the adult category*

Re: Delayed Puberty

by - Sunday, 8 January 2012, 1:18 AM
 Hi girls
 In my opinion,he has 17 years old so we have to suppose him as adult..
 If I have any mistake correct it PLZ

Re: Delayed Puberty

by - Sunday, 8 January 2012, 6:36 AM

hello girls ,

i hope to be interesting topic .

okay , i saw some confusion for

[the total leukocyte count & total lymphocyte count]

[Do you mean that TLC = Total lemphocyte counts = total leukocyte count]

leukocyte is another name of white blood cell

The leuko means = white ,and cyte means = cell

there are many type of WBCs [leukocyte] ,

one of them lymphocyte

I hope to be clear now

if any one not understand tell me .

Re: Delayed Puberty

by - Sunday, 8 January 2012, 6:43 AM

..... ,

you may search for normal total leukocytes count in blood ,

i think

Re: Delayed Puberty

by - Sunday, 8 January 2012, 7:01 AM

In my opinion,he has 17 years old so we have to suppose him as adult.

i agree with you ...

because the testosterone is begin to reproduce from age 13 or 14 at puberty .

when said from 11 to 19 ages are young child ,

i think may be in this period the boys still grow ,and enlarge.

Re: Delayed Puberty

by - Sunday, 8 January 2012, 9:33 AM

good going ,EXCELLENT carry on.My best wishes to u.

Re: Delayed Puberty

by - Sunday, 8 January 2012, 10:23 AM

dear girls, find out is there any connection for delayed puberty and stress.In our

problem AYOUB 17yrs ,he is away from father as he is

staying in Riyadh with second wife.

Re: Delayed Puberty

by - Sunday, 8 January 2012, 9:49 AM

dear good carry on

Re: Delayed Puberty

by - Sunday, 8 January 2012, 11:42 AM

Ok girls .

We have to suppose him as adult as many of you said.

So, the Hb (decreased)

”

.... ,, thank you dear.

You are correct , we are sorry for the mistake

So TLC= total lemphocyte count

We measure it from the total leukocyte count .

Lymphocyte is a type from WBC.

Thank you again Jihan.

”

Dr.

Thank you in sha Allah we will reach to what you said

We are in the begining .

Re: Delayed Puberty

by - Sunday, 8 January 2012, 12:27 PM

Girls,

We have taken enough time in the Gaps.

We havt to move now to the first objective.

1- Hormones that are relating to puberty .

- list them and give a short definition of every one.

- normal affect.

- abnormal.

.....

in the begining who can list the male hormones that are relating to puberty and give us a short definition of every one?

Re: Delayed Puberty

by - Sunday, 8 January 2012, 4:41 PM

hello girls <3

this is just a small definition for puberty in general

Puberty:

is the period of sexual m aturity when sexual organs m ature and secondary sexual characteristics dev elop.

Puberty is also the second m ajor growth period of life—the first being infancy . A

num ber of **horm ones** under the

control of the hy pothalam us, pituitary , ov aries, and testes regulate this period of sexual growth, which begins for

m ost boy s and girls between the ages of nine and 15.

Re: Delayed Puberty

by - Sunday, 8 January 2012, 5:13 PM

Hi Girls ^ :)

~ great job my friends and thanx

i'm gunna start with male hormones that are relating to puberty just list and short def.

later i think we will complete it.

male hormones at puberty are:

androsterone

an androgenic hormone, C₁₉H₃₀O₂, endocrinology male sex hormone, derived from progesterone, which has 15% the strength of testosterone

., found in male and female plasma and urine

Responsible of linear growth and pubic hair growth

Testosterone

Male hormone produced by the testes and (in small amounts) in the ovaries.

Testosterone is responsible for some masculine secondary sex characteristics .

. Responsible of enlargement of the scrotum , testes and penis, hair growth, increased muscle mass, Voice changes

~ .p.s.

Androgen

A natural or artificial steroid that acts as a male sex hormone. Androgens are responsible for the development of male sex organs and

secondary sexual characteristics. Testosterone and androsterone are androgens .

:) i will BaCk

Re: Delayed Puberty

by - Sunday, 8 January 2012, 8:37 PM

I am sorry girls.

I can't do anything and I can't complete the discussion here because I have waited for the result .

I think you also same.

I will come after I come back normal after the result in sha Allah.

Re: Delayed Puberty

by - Sunday, 8 January 2012, 8:44 PM

hi girls .. sorry - I'm late

in fact :

Ayup in adolscence stage , it's 5-10 years after puperty : if we assume that the age of puperty is 10 - 12 yrs (dr.faten's lecture)

but Ayup : has delay puperty .. so, I think we Should consider to be a child

^^ it is just (thinking)

I WILL BACK ..

Re: Delayed Puberty

by - Sunday, 8 January 2012, 10:24 PM

asslam 3alycom

thanks girls you are did terrible job..

our great leader >>> what is the next objective !!

Re: Delayed Puberty

by - Sunday, 8 January 2012, 11:46 PM

^^

hi

....

Thanx You have just opened the door for us to the first objective.

...

.... ,, thanx dear ()

What we can do without you ()

So we have 2 hormones.

Let's start with the first and important one.

...

What is the normal affect of testosterone hormone?

.... () Can you tell us about that? Or any girl no problem

....

....

Dear ()

Hmmm listen to what I think :

if we suppose Ayoup is child, we will have no problem because the male hormone is normal compare to the children.

I think we shoudn't bother our self with that.

If we see during our discussion that there is a relationship between Hb value and our problem, we will discuss it again.

Thanx.

Re: Delayed Puberty

by - Sunday, 8 January 2012, 10:48 PM

puberty :

A stage of human development when sexual maturation and growth are completed and result in ability to reproduce.

Accelerated *somatic growth* Maturation of *primary sexual characteristics* (gonads and genitals) Appearance of *secondary sexual*

characteristics (pubic and axillary hair, female breast development, male voice changes,...) *Menstruation and spermatogenesis* begin

I WILL BACK ..

Re: Delayed Puberty

by - Sunday, 8 January 2012, 10:58 PM

HORMONAL CHANGES :

Hormonal changes precede physical changes

Increased stimulation of hypothalamo-pituitary-gonadal axis

- gradual activation of the GnRH (LHRH)
- increases frequency and amplitude of LH pulses.
- gonadotropins stimulate secretion of sexual steroids (estrogens and androgens)

Re: Delayed Puberty

by - Sunday, 8 January 2012, 11:57 PM

^^

thank you to this addition.

You add a helpful information that we have primary and secondary characters of puberty .

That's good .

....

Girls.

Now, we have to start with ..

What is the normal affect of testosterone hormone?

Goooo .

Re: Delayed Puberty

by - Monday, 9 January 2012, 12:29 AM

ok,, i will answer :)

*What is the normal affect of testosterone hormone?

Testosterone is recognized as the hormone of puberty:

- it makes muscles for boys and turns them into sexually functional men. But as men age, testosterone's effect regulates muscle development and skin and penile turgor.

The decreases in testosterone experienced with time can have profound effects on a man's health.

that's all..

Re: Delayed Puberty

by - Monday, 9 January 2012, 12:39 AM

^^

so good dear

....

I want to add this information.

'''

Secretion of testosterone increases sharply at puberty and is responsible for the development of the so-called secondary sexual characteristics (e.g., beard) of men.

Testosterone is also essential for the production of sperm.

Production of testosterone is controlled by the release of luteinizing hormone (LH) from the anterior lobe of the pituitary gland, which is in turn controlled by the release of GnRH from the hypothalamus. LH is also called interstitial cell stimulating hormone (ICSH).

Hypothalamus ? GnRH ? Pituitary ? LH ? Testes ? Testosterone

The level of testosterone is under negative-feedback control: a rising level of testosterone suppresses the release of GnRH from the hypothalamus.

''

Is there anyone have any addition to the normal testosterone affect ?

Re: Delayed Puberty

by - Monday, 9 January 2012, 12:54 AM

This is the mechanism of testosterone secretion ..

http://thepainsource.com/wp-content/uploads/2010/09/testosterone-production-bioscience.org_.jpg

And this the affects of testosterone ..

http://lh3.ggpht.com/_XNVS6Bkyaac/TSY9263tsHI/AAAAAAAAABUA/Hn_ICD_gBXI/s1600-h/testosterone_influence%5B3%5D.gif

..

Do you want to add anything ? or we will move to the abnormal (decrease of testosterone) .

Re: Delayed Puberty

by - Monday, 9 January 2012, 12:56 AM

yah.. i would add this intersting picture

Re: Delayed Puberty

by - Monday, 9 January 2012, 1:01 AM

^^

soo good.

I love it ()

,, can you also add the 2 pictures that I added them as links to be clear to the other girls ()

Because I can't do that : /

Thank you lovely friend ()

Re: Delayed Puberty

by - Monday, 9 January 2012, 1:08 AM

ok,, This is the mechanism of testosterone secretion ..

And this the affects of testosterone ..

miss >>

do we will start the next objective now or tomorrow !!

Re: Delayed Puberty

by - Monday, 9 January 2012, 1:29 AM

^^

as you like dear.

Thanx sooo much for the pictures.

Thanx () ~

If you don't have any thing to add, we will move.

But i think that we have to take about the affect of testosteron in more detalis like in Guyton book page 1004 and 1005 in the second objective

(physiological change) but not now !!

Let's take now an over view and complete.

....

Ok girls.

After we have known the normal affect of testosterone, we have to know if we have low testosterone what will happen?

...

Abnormal ..

low testosterone

who can tell us about that ?

Re: Delayed Puberty

by - Monday, 9 January 2012, 1:52 AM

What is low testosterone?

Low testosterone is defined as less than 300 nanograms per deciliter of blood.

What are the causes of low testosterone?

Some common causes of primary hypogonadism or failure of the gonads may include the following:

- Undescended testicles
- Injury to the scrotum
- Cancer therapy: Chemotherapy and radiation therapy can damage the interstitial cells in the testes responsible for testosterone production.
- Aging
- Mumps orchitis: The mumps virus can cause inflammation of the testes in males, and if the illness occurs in puberty or adulthood, the damage to the testes may lead to low testosterone production.
- Chromosomal abnormalities
- Illegal use of anabolic steroids.

**It should be noted that obesity also can be a cause of low testosterone.

Re: Delayed Puberty

by - Monday, 9 January 2012, 2:00 AM

Low testosterone symptoms in males

In males,

If low testosterone occurs before or during puberty, there may be a lack of sexual maturation.

Signs may include failure to develop muscle mass, failure of the voice to deepen, poor growth of body hair, enlarged breasts (gynecomastia), and failure of the penis and testes to enlarge.

In adulthood, low testosterone may lead to decreased sexual function and desire, infertility, and erectile dysfunction.

Loss of hair, decreased muscle mass, and osteoporosis or decreased bone density may occur.

Re: Delayed Puberty

by - Monday, 9 January 2012, 1:56 AM

ready to Gooo

What is the normal affect of testosterone hormone?

The testosterone is effect on development of adult you know in sexual characteristics we have primary and secondary in addition, sexual organs .

at puberty , [normal adult] increasing amount of testosterone the secreted by interstitial cell leydig .

effects of testosterone

1- primary sexual characteristics;
causing penis, scrotum and testes become enlarge .

2-secondary sexual characteristics;
causing to develop beginning at puberty and end at maturity

3- effect on voice

secretion of testosterone causes hypertrophy of laryngeal mucosa and enlargement of larynx that causing the voice becomes masculine voice .

4-effect on increase thickness of skin and can contribute to development of acne .

5- effect on increase formation of protein and muscle development.

6- effect on increase bone.

7- effect on increase basal metabolism.

8- effect on red blood cells [RBCs].

Re: Delayed Puberty

by - Monday, 9 January 2012, 1:59 AM

next objective leader rab3ah ,,

Re: Delayed Puberty

by - Monday, 9 January 2012, 2:03 AM

before we move to the next objective,, see this curve:

Re: Delayed Puberty

by - Monday, 9 January 2012, 2:53 AM

Ok ..

Just a minute

I will come to till you the next.

Re: Delayed Puberty

by - Monday, 9 January 2012, 2:36 AM

good night my friends

i will complete with u tomorrow in sha allah..

see u

Re: Delayed Puberty

by - Monday, 9 January 2012, 2:55 AM

Good night ()

Have a beautiful dream ~

see you.

.....

Ok girls we have finished now from testosterone (normal and abnormal)

Hummmmm..

We have to move to the other hormones and talk about them and finish this objective.

....

Today after the university we will move in sha Allah to the second objective (physiological changes).

As I tell you before, that we will take it from Guyton .. Page 1004 and 1005

...

Ok let's come back to our take..

The other male sex hormones as I read in Guyton :

1- Dihydrotestosterone.

2- androstenedione.

Also there is a little amount of Estrogen .

And we have what Hana told us about it (androSterone)

...

Take one of them and tell us about its normal affect or its secretion mechanism.

Re: Delayed Puberty

by - Monday, 9 January 2012, 5:42 AM

Dihydrotestosterone performs multiple functions in the body. These include:

1. The levels of dihydrotestosterone in the womb determine the sex of the fetus.
2. Dihydrotestosterone is largely responsible for the development of male secondary and sexual characteristics. For instance, facial hair, male patterns on the body, deepening of vocal chords, oily skin on reaching puberty, male sexual drive and sexual functioning of the male body.

Dihydrotestosterone does not always perform positive function in the body. It also has a role to play in the development of certain negative bodily conditions, like benign prostatic hyperplasia, prostate cancer, enlarged prostate, male pattern baldness and hair loss .

Re: Delayed Puberty

by - Monday, 9 January 2012, 2:27 PM

small additions:

Dihydrotestosterone: is a hormone that stimulates the development of male characteristics (an androgen).

It is made through conversion of the more commonly known androgen, testosterone. Almost 10% of the testosterone produced by an adult each day is converted by the testes and prostate (in men)

**Dihydrotestosterone (5 α -Dihydrotestosterone, commonly abbreviated to DHT).

The enzyme 5 α -reductase synthesises DHT in the prostate, testes, hair follicles, and adrenal glands.

This enzyme reduces the 4,5 double-bond of the hormone testosterone.

Re: Delayed Puberty

by - Monday, 9 January 2012, 2:40 PM

DHT:-

in both sexes, the hair loss results from a complex chemical reaction when the enzyme

5-alpha-reductase converts the testosterone in the system into DHT or dihydrotestosterone.

The hair follicles are genetically predisposed to be oversensitive to the DHT and become smaller and smaller with time, leading to the eventual hair loss.

** scientific tests have now proven that Dihydrotestosterone (DHT) is :

the principal causative aspect in douleur pattern baldness and is to blame for up to 95% of hair loss.

SUB7AN ALLAH ..

Re: Delayed Puberty

by - Monday, 9 January 2012, 7:19 PM

Hi girls.

Your leader is here :)

.... and

So great work!

Honestly, I love your posts ()

..

Ok I am gonna to take about Estrogen.

'''

In addition to testosterone, small amount of estrogen are formed in the male (about one fifth the amount in the nonpregnant female), and a reasonable quantity of estrogen can be recovered from man's urine. The exact source of estrogens in male is unclear, but the following are known:

(1) The concentration of estrogens in the fluid of the seminiferous tubules is quite high and probably plays an important role in spermiogenesis. This estrogen is believed to be formed by the Sertoli cells by converting testosterone to estradiol.

(2) Much larger amounts of estrogens are formed from testosterone and androstenediol in other tissues of the body, especially the liver, probably accounting for as much as 80 per cent of the total male estrogen production.

'''

See this picture :)

http://www.antibodyreview.com/article_images/12904263/Reprod%20Biol%20Endocrinol/1-_p52-179885/1477-7827-1-52-2.jpg

That's all ()

''

Ok.

Now we have just this 2 hormones.

- androstenedione.

- And we have what Hana told us about it (androsterone)

Tell us about them quickly because we have to move to the next enjoyable objective.

Again and again, Guyton is so helpful.

Re: Delayed Puberty

by - Monday, 9 January 2012, 7:30 PM

§ ... § and § §

Where are you lovely friends ?

I miss you so much.

Come on ()

Re: Delayed Puberty

by Shrouq Saud Sa'ad Al-Harbi - Monday, 9 January 2012, 7:35 PM

GOOD EVENING ,every one

i have addition about Androstenedione hormone

Androstenedione is the common **precursor** of male and female **sex hormones**. Some androstenedione is also secreted into the **plasma**, and may be converted in peripheral tissues to testosterone and estrogens.

Androstenedione can be synthesized in one of two ways. The primary pathway involves conversion of **17-hydroxypregnenolone** to

dehydroepiandrosterone by way of **17,20-lyase**, with subsequent conversion of **dehydroepiandrosterone** to androstenedione via the enzyme **3-?**

-hydroxysteroid dehydrogenase. The secondary pathway involves conversion of **17-hydroxyprogesterone**, most often a precursor to **cortisol**, to

androstenedione directly by way of **17,20-lyase**. Thus, 17,20-lyase is required for the synthesis of androstenedione, whether immediately or one step removed.

Androstenedione is further converted to either **testosterone** or **estrogen**. Conversion of androstenedione to testosterone requires the enzyme

17?-hydroxysteroid dehydrogenase, whereas conversion of androstenedione to estrogen (e.g., **estrone** and **estradiol**) requires the enzyme **aromatase**.

Re: Delayed Puberty

by Shrouq Saud Sa'ad Al-Harbi - Monday, 9 January 2012, 7:38 PM

i miss u 2

GREAT JUP GIRLS

Re: Delayed Puberty

by - Monday, 9 January 2012, 7:50 PM

Welcome Shrouq.

I am happy now because you share us your beautiful information :)

...

We have just:

- what told us about it (androsterone).

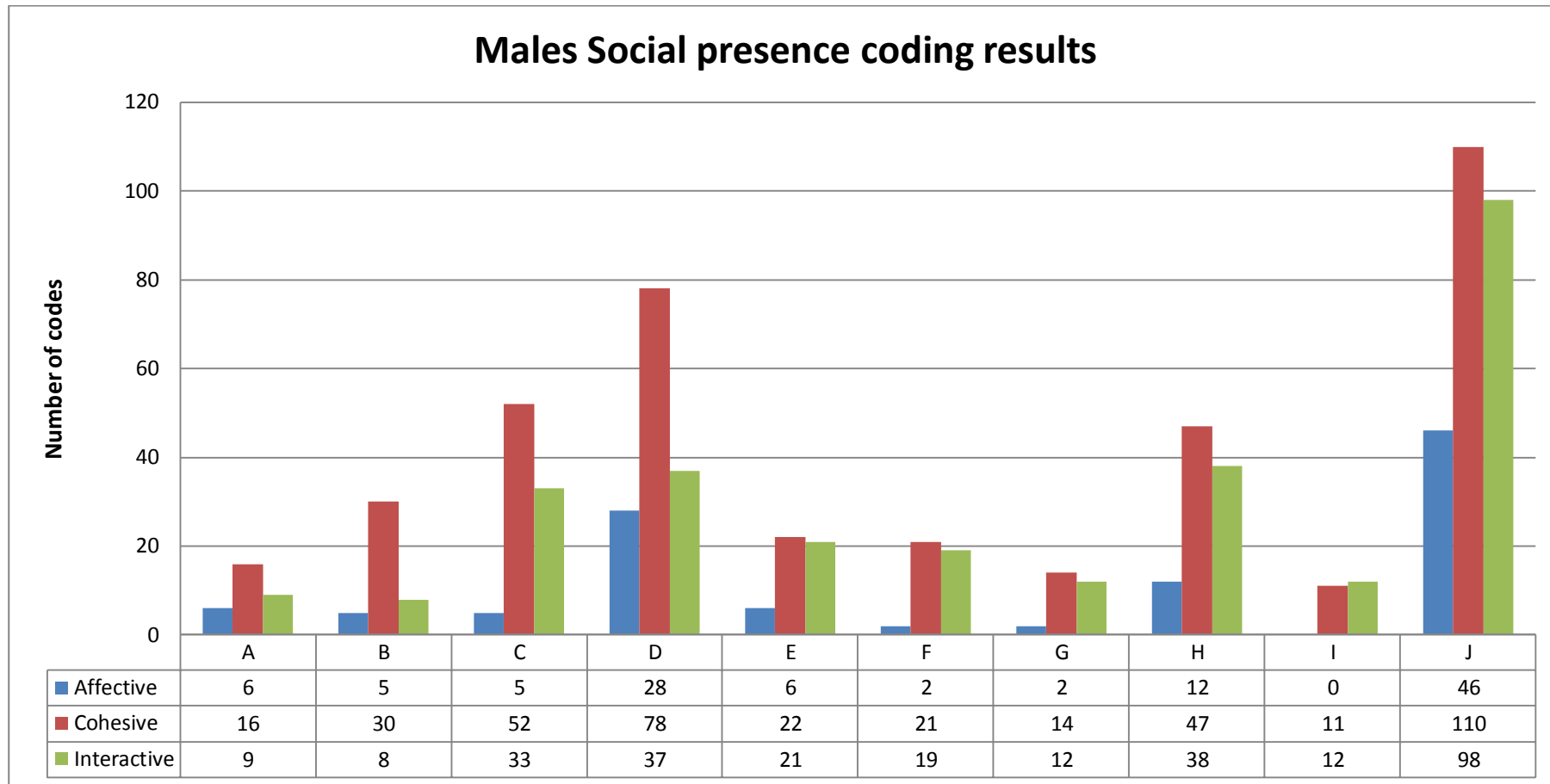
Quickly, we have to move.

...

Anyone can search about ? << it is a difficult objective : /

Is she okey?

Appendix 31: Male groups (A-J) Social presence coding results



Appendix 32: Female groups (AF-EF) Social presence coding results

