

## **CHAPTER 5**

### **Pedagogical design framework for the study**

#### **5.1 Introduction**

This chapter sets the foundation for the design and development of a pedagogical framework for the web-based blended learning model envisaged in this study, by drawing concepts from a review of relevant learning theories (Chapter 2), instructional / pedagogical models (Chapter 3), and research methodologies (Chapter 4).

The initial stage of a research process of this kind is to formulate the pedagogical design principles and criteria. The pedagogies drawn from the literature review of learning theories, pedagogical models, and pedagogical affordances of ICT discussed in Chapters 2 and 3 were synthesised to form the design elements / principles which are then presented within a model.

The most important learning theories and instructional models that were identified for deriving the design principles were social constructivism, active theory, situated learning, multiple intelligences, cognitive flexibility theory, cognitive load theory, cognitive theory of multimedia learning, rapid prototyping, ICARE, ASSURE and constructivist principles for designing learning environments. The Researcher models his framework on the principles of 'community of practice' and learning as an outcome of a social system, making it possible for all students to actively participate and contribute in both face-to-face and online environments.

Subsequently, the six aspects of the LAPTEL model and how it could be facilitated using an appropriate mix of face-to-face and online sessions were then discussed. WebCT LMS was used as the technology platform. Two evaluation tools based on the design concepts were developed.

It is only natural to expect several challenges from a new model to both instructors and students because a blended learning environment is not necessarily familiar to most of them and it requires them to take new roles. As a result, issues around changing roles were discussed before implementing the model in Chapter 6.

The chapter begins with an overview of the pedagogies identified in the review of learning theories (Chapters 2) and pedagogical models (Chapter 3).

## **5.2 The pedagogies derived from learning theories**

This section categorises the pedagogies distilled from the review of learning theories undertaken in Chapter 2, and discusses the various essential pedagogical dimensions of learning and support mechanisms derived from these which were made available to learners while engaging in student-centred learning process.

The review of learning theories that was undertaken in Chapter 2 indicates that the characteristics of these theories varied from more individual and cognitively focused through to an emphasis on social and situative learning. These broad views of learning or schools of thought may be categorised as Behaviourist (learning as observable and measurable behaviour), Cognitive/Constructivist (learning as the construction of knowledge and meaning) and Situative (learning as social practice). All current approaches to learning, teaching and assessing can be located within these three broad perspectives. The essential difference is that behaviourist approaches rely on the notion that human behaviour is predictable, but the other two consider, according to (Winn and Snyder, 1996), the role of unobservable mental states and introspection, which are part of human behaviour. All these perspectives recognize the importance of learner motivation and prior experience, and have a place in this study.

### ***5.2.1 The Pedagogy Derived from the Behaviourist Perspective***

This pedagogy focuses particularly on tasks and its analysis, drill and practice:

*Common behavioural approaches to learning are as follows:*

- The learner takes passive and reactive role;
- Learning is mainly factual recall;
- Instruction is logically sequenced and is systematic;
- Instructional processes are aimed at learners in general and not on the individual learner; yet, learning is assumed to occur at a personal level, not socially;

- It assumes that a well-designed instruction can result in a desired learning outcome;
- Learning can be measured through learners' ability to reproduce;
- Approach to assessment is as scientific measurement at the level of the individual.

#### *Implications of behaviourism for practice<sup>1</sup>*

- List the learning outcomes (Bloom's Taxonomies show how these can be categorised);
- Assessment must be based on the learning outcomes and nothing else;
- Break the material down into small units;
- Carefully sequence the units according to the desired learning;
- Present the rules for learning the topic;
- Ensure that the learner actively responds (does things);
- Provide opportunities for frequent learner feedback;
- Reinforce correct behaviour with immediate rewards.

All these have strong influence over learners' attention, perception and memory. Gaining attention is the first step in Gagne's events of instruction. Therefore, it is crucial for educators to recognise and respond to the emotions and moods of their students in order to facilitate engagement and motivation.

#### ***5.2.2 The pedagogy derived from the cognitive / constructivist perspective:***

##### ***Constructivist learning environments***

Here the focus is on the learning design guidelines and goals that attempt to incorporate various views of social constructivism in the context of activity theory. Constructivist philosophy can work with a curriculum with the onus on student-centred, collaborative, reflective and resource-based learning. The constructivist view of learning can be summarised as below:

- learning is a personal / subjective interpretation of the world;

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<sup>1</sup> Source: Carlile et al. (2004:10)

- learning is an active process of constructing knowledge through understanding rather than acquiring knowledge;
- learning is a self-regulated process in which meaning is developed on the basis of experience and prior knowledge;
- conceptual growth comes from the negotiation of meaning, the sharing of multiple perspectives and the changing of our internal representations through collaborative learning;
- learning should be situated in realistic settings; testing should be integrated with the task and not be a separate activity.

Accordingly, two aspects that are very relevant for active construction of knowledge are:

- Interactions with the environment;
- Collaboration among learners which help them in their development of understanding;

The design principles for constructivist teaching and learning activities can be listed as follows:

- Ownership of the task / personal learning objectives;
- Coaching and modelling of thinking skills;
- Scaffolding;
- Guided discovery;
- Opportunity for reflection and metacognition;
- Cognitive puzzlement through ill-structured problems;
- Integrated assessment strategies.

Practical strategies for constructivist educators were discussed in sections 3.9.2 through 3.9.7.

*Implications of Constructivism for Practice* (Carlile, Jordan, and Stack, 2004; Jonassen, Davidson, Collins, Campbell, and Haag, 1995)

- Present an overview of the topic including purpose and objectives;
- Approach material from the learner's perspective and values;

- Acknowledge and accommodate student diversity (ability, age, gender, culture, nationality);
- Encourage reflection through the use of learning journals etc;
- Provide multiple representations of reality - avoid oversimplification of instruction by representing the natural complexity of the world;
- Present authentic tasks;
- Explain the relevance of the topic;
- Build on what is already known;
- Encourage active and discovery and independent learning;
- Give timely feedback on performance;
- Constructively align objectives, strategies and assessment;
- Support collaborative construction of knowledge through social negotiation not competition among learners for recognition.

### ***5.2.3 The pedagogy derived from the situative perspective: Communities of practice***

The situative perspective to learning represents a shift from cognitive view of learning (as if it were a process contained in the mind of the learner, decontextualised from the world) to a situational orientation to learning- the study of learning as in a specific time, place and social activity – as ‘situated learning’; in this view, ‘distributed’ among person, language, artefacts, activities and environment (Lave and Wenger, 1999).

The pedagogy of learning from a situative perspective focuses on intellectual development through the cycle of learning, moving through the phases of externalisation (of tacit knowledge), sharing, discussion, refinement and then internalisation (Goodyear, 2002). This can occur through ‘situatedness’ by participating in a community of practice, and learning groups whereby learners can have joint engagement in some activity and share ideas mediated through individual relationships (Mayes and de Freitas, 2004). According to situated learning (Tennant, 1997: 77):

- It makes no sense to talk of knowledge that is decontextualized, abstract or general;
- New knowledge and learning are properly conceived as being located in communities of practice. (This aspect is at the core of this study.)

The modern trend is towards more 'situative' approaches to curriculum design, teaching approaches and assessment strategies. Situative view to learning can be summarised as below:

- All learning is 'situated' in the practices of communities;
- Learners construct knowledge and understandings within a social and cultural context;
- A learner will always be influenced by the social and cultural setting in which the learning occurs;
- Shift from a focus on the individual learning to an emphasis on social and collaborative learning;
- Social interaction and collaboration are essential components of situated learning;
- New learning is shaped by prior knowledge and cultural perspectives;
- Construction of meaning is from authentic activity and experience; Tennant (1997) argues that there is an intimate connection between knowledge and activity.

Herrington (1997) identifies the following characteristics or elements of a situated learning model:

- authentic context that reflects the way knowledge will be used in real life;
- authentic activities and assessment;
- access to expert performances and modelling of processes;
- multiple roles and perspectives;
- collaborative construction of knowledge;
- coaching and scaffolding;
- articulation and reflection. (p. 44)

*Significant pointers for practice of situative learning (Smith, 1999):*

- Learning is in the relationships between people;
- People can become participants in communities of practice;
- There is an intimate connection between knowledge and activity. Problem solving and learning from experience become central processes.

Common strategies include problem-based learning, anchored instruction and cognitive apprenticeship.

### 5.3 Mapping pedagogies and technologies

Given below is a summary of important learning theories, the key characteristics they promoted, and some insight into how they might be realised in the context of online and blended learning.

Table 5.1: Mapping the main characteristics of learning theories and the affordances of new technology

Theories	Main Characteristics and Pedagogical Strategies	Potential online applications
<b>Behaviorist</b>	<ul style="list-style-type: none"> <li>➤ Focuses on stimulus-response and observable and measurable learning outcomes;</li> <li>➤ Trial and error learning;</li> <li>➤ Learning through association and reinforcement;</li> <li>➤ Focus on observable and measurable overt outcomes;</li> <li>➤ Learning is at a personal level, not social.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Presentation of appropriately sequenced content online in multiple media formats to convey information;</li> <li>➤ Online assessments to test individual learner's achievement level using e-assessment;</li> <li>➤ Teacher provides appropriate feedback so that students can monitor how they are doing and take corrective action if required;</li> <li>➤ Peer feedback.</li> </ul>

<b>Cognitive</b>	<ul style="list-style-type: none"> <li>➤ Focuses on the processes by which learners build their own mental structures when interacting with an environment or through engagement in hands-on, self-directed tasks;</li> <li>➤ Views learning as transformations in these cognitive structures;</li> <li>➤ Pedagogical focus is on the processing of information through communication, negotiations, and problem solving;</li> <li>➤ Emphasis on interpersonal relationships involving collaborative and cooperative construction of knowledge;</li> <li>➤ Useful for designing sequences of conceptual material which build on existing information structures;</li> <li>➤ Pedagogical focus is task-orientated, encourages hands-on, self-directed activities orientated towards discovery.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Interactive online materials;</li> <li>➤ Links to different resources at different difficulty levels in order to accommodate learners at different knowledge levels;</li> <li>➤ Technology-supported strategies to scaffold student's working memory, and to present content in multiple formats;</li> <li>➤ Provide prerequisite materials or pre-instructional strategies, such as advance organizers to help learners recall prior knowledge or to activate existing cognitive structures as part of the learning process (Ausubel, 1960);</li> <li>➤ Include various pedagogic strategies in online instruction to accommodate individual differences and learning styles (Cassidy, 2004);</li> <li>➤ Access to online resources and expertise offers the potential to develop more engaging and student-centred, active and authentic learning environments;</li> <li>➤ Different online communication tools - asynchronous and synchronous communication offer the potential for more diverse and richer forms of dialogue and interaction between students and tutors and amongst peers;</li> <li>➤ The potential for new forms of communities of practice or facilities to support and enhance collaborative knowledge construction;</li> <li>➤ Archive of materials, and different forms of communication and experiences provide ample opportunity for reflection anytime and to learn at one's own pace;</li> <li>➤ Microworlds and simulations.</li> </ul>
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<b>Situative</b>	<ul style="list-style-type: none"> <li>➤ All learning is 'situated' in the practices of communities;</li> <li>➤ A learner will always be influenced by the social and cultural setting in which the learning occurs;</li> <li>➤ Shift from a focus on the individual learning to an emphasis on social and collaborative learning;</li> <li>➤ Social interaction and collaboration are essential components of situated learning;</li> <li>➤ Construction of meaning from authentic activity and experience;</li> <li>➤ Common strategies include problem-based learning, anchored instruction and cognitive apprenticeship.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Access to resources and expertise offers the potential to develop more engaging and student-centred, active and authentic learning environments;</li> <li>➤ Different online communication tools - asynchronous and synchronous communication offer the potential for more diverse and richer forms of dialogue and interaction between students and tutors and amongst peers;</li> <li>➤ The potential for the development of new forms of communities of practice or facilities to support and enhance collaborative knowledge construction;</li> <li>➤ Application of Laurillard's conversation model to elearning highlights the importance of activities and dialogue, and the need for discursive tools, adaptability, interactivity and reflection.</li> <li>➤ Networking capabilities of the Web / Communication tools in WebCT enable more diverse access to different types of learning resources and the potential for the development of different types of communities.</li> </ul>
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The attributes summarised in the above table as well as many of the aforementioned concepts provide useful heuristics for creating online and blended learning environments.

#### **5.4 Pedagogical design framework and model: Overview**

This study aims to develop technology-supported blended learning environments and authentic tasks in order to facilitate the pedagogical strategies distilled from various learning theories and pedagogical models as discussed in Chapters 2 and 3. A pedagogical framework describes the broad principles that guide the application of theory to learning and teaching practice.

The three broad learning theories discussed in Chapter 2 emphasises learning at three levels: learning as change in behaviour (behaviourism), learning as the construction of knowledge and meaning (cognitivism), and learning as social practice (socially situated). Based on his own epistemological assumptions relevant to this study which is centred around student-centred blended learning, the Researcher wants to depict the learner in all these three levels or types of learning environments in an integrated fashion. To put it simply, both behaviourist and constructivist approaches to instructional design are utilised in a complementary manner (rather than oppositional) for learning to occur in its totality as learners need to be able to acquire declarative and procedural knowledge as well as solve complex problems. The aim is to ensure that learners eventually obtain all levels of knowledge and skills. The particular approach or a mix of approaches used will be based on the nature of the intended learning outcomes and the way in which they will be assessed. These will determine the pedagogical approaches to be adopted and will help develop the pedagogical principles in the design and development of learning environments. Subsequently, the Instructional Designer will translate the philosophy into actual practice through an appropriate pedagogic design model which can assist in developing learning interactions, activities and learning spaces to engage learners.

The pedagogical dimensions identified from the literature review (discussed in section 2.9) are: social presence, motivation, interactive and collaborative learning, cognitive strategies (authentic problem-based/project-based learning scenarios, scaffolding, strategies to reduce cognitive overload, cognitive flexibility, synchronous as well as asynchronous communication, just-in-time feedback, learner control, and customisation of learning artefact), learner-centredness, and authentic assessment. These dimensions are integrated into the concepts of communities of practice and learning as a social system which are at the core of the theoretical framework of this study. The motivation component is one of the significant ways for encouraging all students to actively participate and share ideas.

The first step in the traditional design process of a curriculum or a framework is to identify what really needs to be learned— the expected learning outcomes (rather than thinking in terms of content coverage). Next is to design the teaching and learning activities—what the students are actually going to do— in order to achieve these

learning outcomes. The feedback that learners will receive on their performance of these activities is an integral part of the activities themselves. Social constructivist approaches is at the centre of the feedback design. Feedback from tutors as well as engagement (interaction and collaboration) with peers is significant in this regard. Then there is the need to design assessment activities which will realistically test whether the learning outcome have been achieved.

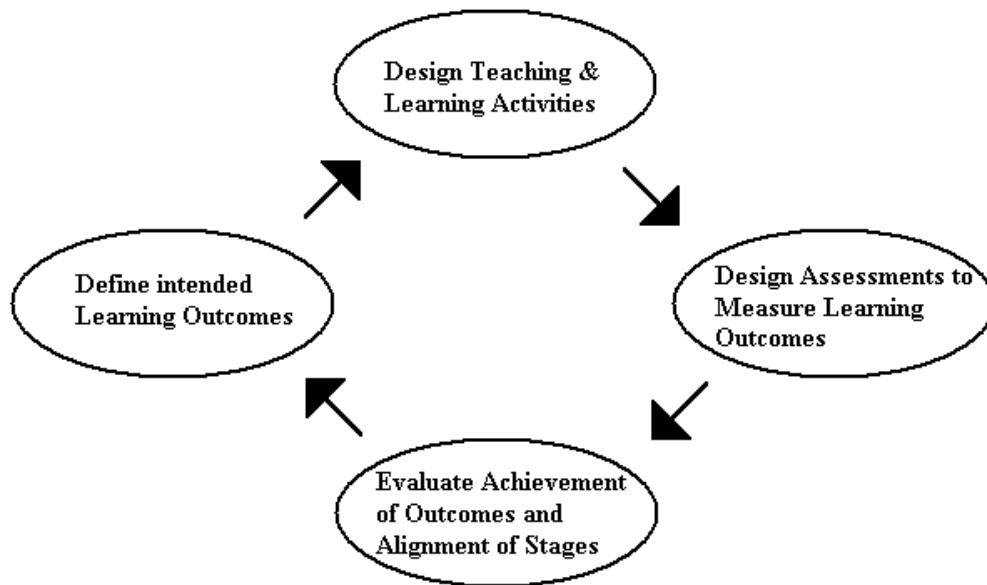


Figure 5.1: Curriculum design cycle

## **5.5 Pedagogic design: Defining learning outcomes**

Expectations about learning outcomes in particularly HE are varied, and are discussed in Section 2.7.13. Most employers are now looking for graduates who have undergone education with emphasis on more skills-based and real-life orientation, more group work and interdisciplinary collaboration, and with less emphasis on declarative knowledge. The expectations in the UB context have been discussed in Chapter 1, *Section 1.4.2.1: UB Graduate Attributes*. These attributes form the general framework for the learning objectives, subsequent assessment strategies and instructional materials. As a result, these attributes should be integrated into curriculum design. However, one should not expect that students will achieve all the skills corresponding to the 12 attributes from one topic or one course; it is meant to be acquired from an entire programme. In addition, the set of essential skills for the 21<sup>st</sup> century listed in the editorial section of the “eSchool News” Online Journal and highlighted in Chapter 2, Section 2.2.7 could also have some bearing on thinking about the expected learning outcome. In addition, reflection and metacognition are two intellectual skills that are often considered very important in HE. Reflection is a necessary pedagogical method as well as a learning outcome: students must learn to become reflective learners. Most often we need a range of sources of knowledge and skills that is unique to a particular situation. The teacher’s aim should be to ensure that the learner eventually acquires all the levels of knowledge and skills.

### ***5.5.1 Mapping learning theory to learning outcomes***

A review of the three theoretical perspectives of learning carried out in Chapter 2 indicates that they are not mutually exclusive, but each implies a different set of priorities for learning and teaching practice.

- (i) Behaviourist perspective emphasises memorising and recalling facts, learning as activity, and task analysis. It provides a set of objectives and logical sequencing of content.

- (ii) Cognitive/Constructivist perspective focuses on learning as achieving understanding, and conceptual development. This view also encourages the development of autonomous learners, with the ‘*learning how to learn*’ skills.
- (iii) Situative perspective takes learning as a social practice that is dependent on the establishment of collaborative learning outcomes, and on learning relationship with peers. This perspective also encourages us to formulate learning outcomes in terms of authentic practices of formulating and solving realistic problems.

*(Adapted from: Mayes and de Freitas (2005) JISC elearning Models Desk Study)*

The web-based blended approach in this study embraces all these three perspectives in an integrated, complementary manner.

Neither the blended approach nor the field of elearning has a theory of learning of its own. From the literature it is evident that an elearning pedagogy that focuses on activation of prior knowledge, learner-centredness and interactivity is emerging. The affordance of technology to facilitate social constructivist approaches, learner-centredness and virtual learning environments (VLE) is what accords the blended approach a constructivist perspective.

## **5.6 Pedagogical design: Designing the learning environment**

Based on the theoretical framework of this study, the emphasis is on creating a learning environment or a model that meets the needs of a community of learners based on identified pedagogical dimensions discussed in Section 2.9. In a blended learning environment, the educational potential of technology is utilised to transform instructivist events into student-centred activities using more authentic formats (e.g., simulations, video presentations, etc), discussions, collaborative group projects/presentations, online exercises, online feedback, etc. and to engage students cognitively active as indicated in Table 2.1 in Chapter 2. To address student – centredness, teaching and learning activities are to be designed to match the profile of the individual learner. Thus, technology helps maintain the overall orientation of the

study constructivist by reducing opportunities for transmissive learning in favour of transactive and transformational experiences, and by supporting good assessment strategies that are integrated into the learning tasks.

The term ‘learning environment’ is a constructivist construct and is discussed in detail in Section 3.9.1. For the purpose of this study, a learning environment is defined as a place where learners either individuals-in-context or learners in a community work together and support each other as they use a variety of tools and information resources in their pursuit of learning goals. It may include:

- face-to-face cognitive strategies;
- online learning activities;
- assessments that enhance learning;
- strategies that promote equal opportunity to access and participation, learning styles and beliefs;
- the use of writing journals or other approaches to represent and assess thinking processes;
- meta-cognitive strategies used by teachers and students; and
- both instructivist and constructivist epistemological models of learning in a complementary manner.

Use of students' reflections through writing journals or personal learning blogs serves to crystallize thinking. Further, environments that optimize learning have to be authentic, interactive, learner-centred, knowledge-centred, and assessment-centred. This definition of learning environment and its description are apt as the framework for this study is underpinned by ‘community of practice’ with adequate support for collaborative learning in order to contribute towards the quality of learning. An interactive and collaborative learning environment often support reflective learning and self-regulation through the promotion of skills and attitudes that enable learners to take increasing responsibility for their own learning.

The origin of ‘authentic learning’ is largely from the theoretical constructs of situated learning and cognitive apprenticeships. Authentic contexts and tasks are an integral component to situated learning environments. In authentic contexts, learners have the opportunity to engage in relevant activities that help them connect their academic

learning to real-life situations and problems; in the right context, the instructional goals evolve, as learning progresses. Authentic content means that learners engage in activities which represent the same type of cognitive challenges as those in the real world of work environment. The term ‘authentic’ can also simply mean personally relevant, interesting and challenging to learners in which case learners actively engage themselves and collaborate with others to solve real-life problems. The importance of authentic activities or tasks in a learning environment was highlighted by Brown, Collins and Duguid (1989) who described them as ‘the ordinary practices of the culture’. Authentic learning environments can be achieved by making use of real world problems and issues relevant to the learner (Khan, 1997:15).

The instructional design principles, implemented within the framework of the following strategies outlined by Lebow (1993) can lead to a wide variety of learning environments.

- i) Maintain a buffer between the learner and the potentially damaging effects of instructional practices;
- ii) Provide a context for learning that supports both autonomy and relatedness;
- iii) Embed the reasons for learning into the learning activity itself;
- iv) Support self-regulation through the promotion of skills and attitudes that enable learners to take increasing responsibility for their own developmental restructuring process;
- v) Strengthen the learner’s tendency to engage in intentional learning processes, especially by encouraging the strategic exploration of errors.

These strategies in conjunction with the six pedagogical dimensions discussed in Section 2.9 and affordances of WebCT are used in developing the blended learning environment envisaged in this study.

The development of online learning environments needs to draw upon the vast body of knowledge relating to the student characteristics (background, prior knowledge, motivation to learn, etc.), instructional design models and constructivist principles; these included Gagné’s nine events of instruction (Section 3.4.5), Dick and Carey instructional systems design model (Section 3.4.6), Rapid Prototyping (Section 3.4.4),

ICARE model (Section 3.5.3), ASSURE model (Section 3.5.4), The Seven Principles for Good Practice in Online Courses (Section 3.5.6) and Constructivist Principles (Section 3.9, 3.9.1 – 3.9.9) in general particularly Willis' R2D2 model (Section 3.10.1). It has also elements drawn from Keller's ARCS model (Section 3.5.2) to enhance motivation, and Merrill's Instructional Transaction Theory (Section 3.4.9.3) for simulations. All these models share three major processes: analysis, strategy development and evaluation. Overall the design and development of the framework utilised a of Project management approach (Section 4.11 and 4.11.1). It was further informed and guided by negotiations with the instructor and students rather than a design based on early interpretation of pedagogical needs and summative evaluation.

The following salient features of the rapid prototyping model in its approach to designing the hybrid instructional environment was central in this study:

- A *participatory* design through active collaboration of the designer, instructor, and learners in the design process;
- An *accelerated* development in an online design environment which made it practical to synthesize and modify instructional artefacts quickly;
- An *iterative* process through continual design, evaluation and improvement while instructional materials were being created; it helped to identify problems while they were still easy to fix, or otherwise it would be costly to correct.

A major advantage of using this approach is that it is not impossible to integrate this model with constructivist approaches. For example, the participatory and iterative design processes are important elements of Willis's Constructivist design principles (See Section 3.9.9).

The Dick and Carey model (See Section 3.4.6), is quite appropriate for this instructivist-constructivist based approach; it has ten components that are executed iteratively and in parallel rather than linearly. Further, it is a learner-centered model. Its most recent version (Dick et al., 2005) incorporates some constructivist aspects.

The ICARE model affords pedagogical approaches that are consistent with hybrid instruction. Switching strategies between the 'connect/content' and 'apply' and/or 'reflect' areas appropriately provides opportunities to apply instructivist as well as



constructivist approaches. Further, it specifies how an online module is organised or delivered defining such things as intended learning outcomes, choice of teaching and learning activities to attain the objectives, and assessment learning outcomes to see how well they match what was intended. The theory behind this approach is not strictly as prescriptive as some others. In this design, instead of predefining goals, the environment is designed in such a way that it starts with broad goals and assists the learner in becoming aware of specific objectives as they emerge. The focus is on grounded or theory-based design in a computer-based interactive learning environment, and it involves an iterative process which requires ongoing evaluation and feedback. This model affords pedagogical approaches that support teacher-learner and learner-learner interactions, and is beneficial in a new dualism-based learning environment described under the theoretical framework of this study.

The aforementioned concepts provide useful heuristics and the following guidelines that can serve as a framework for this study and online learning programs, in general.

- (a) Develop online learning environments built upon instructivist as well as constructivist principles in such a way that they complement each other, suit the nature of the problem at hand, foster learning activities using iterative design principles, and enhance the quality of instructional delivery;
- (b) Instructional materials should cater for individual needs while enabling collaborative forms of learning and so instructional designers typically must carry out needs or profile analysis of learners, in order to determine the prior knowledge, motives, background interests, attitudes and experiences of learners;
- (c) Instructors must recognize that the instructional designer's role is a prescriptive one, including advice and consultation and might amount to a broader usage of both instructivist and constructivist activities for online course design such that they complement each other to make the learning environment more effective and efficient. Designers develop learning environments rather than package instruction.

In this study, a kick-off meeting of the designer and instructor helped to clarify design principles, after which an iterative process of design and development was followed.

In addition to the above design strategies, several technology-based design principles identified from the literature and discussed in Section 3.12 were integrated to the design process.

The course was delivered through a mixture of lecture supplemented with Socratic dialogue, online tutorials, in-class discussions, role-based group assignments, online discussions, drill and practice, simulation, problem solving and project-based individual and collaborative learning activities. All these could be used to create quality learning experience. Though studies reveal that learners can process information more efficiently as readers than listeners, lectures are occasionally essential as learners would also like to hear rather than always reading.

### ***5.6.1 From theory to design principles<sup>2</sup>***

This section describes the most significant stage in the design process where, according to Mayes and deFreitas (2004), the learning theory is unpacked into a detailed pedagogical approach. It throws light on how the design principles derived from the underlying assumptions about the nature of learning could be mapped to appropriate learning outcomes, teaching methods, and methods of assessment.

(i) The *behaviourist* view emphasises:

In learning:

- Routines of structured activity;
- Clear learning goals and feedback;
- Individualised pathways and routines, matched to prior performance.

In teaching:

- Task analysis into component units;
- Sequencing of tasks based on their relative complexity, with simpler components as pre-requisites for more complex tasks;
- Clear instructional approach for each unit;
- Highly focused and clear objectives;

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<sup>2</sup> Adapted from Mayes and deFreitas (2004).

(ii) The *cognitive/ constructivist view* emphasises

In learning:

- Learning by doing through intellectual activities rather than by the absorption of information;
- Interactive environments for construction of understanding;
- Ill-structured tasks and problems;
- Ownership of the task.

In teaching:

- Provide interactive environments and appropriate challenges;
- Encourage experimentation and the discovery of broad principles;
- Coach and model thinking skills;
- Support for prior knowledge, reflection, feedback and motivation;
- Frame learning outcomes in meta-cognitive terms to encourage the development of autonomy.

(iii) The *situative view* emphasises

In learning:

- Participation in social practices of enquiry and learning;
- Development of identities as capable and confident learners;
- Development of learning relationships through dialogue.

In teaching:

- Creating safe environments for participation and authentic activity-based learning;
- Supporting development of identities;
- Facilitating learning dialogues and relationships.

According to the American Federation of Teachers as stated in *Distance Education: Guidelines for Good Practice* (2000), irrespective of the medium or mode of delivery, an effective and efficient learning environment should have the following characteristics:

- Learning occurs by building on previous knowledge, through interaction with the environment and others.
- Collaboration and discourse with other members of the community play a major role in learning.
- Learners participate in activities according to their needs, strengths, weaknesses, and aspirations.
- Teaching strategies focus on creating discourse among teachers, learners, and other members of the community.
- Teachers focus on interacting at a metacognitive level with the learners. They help students analyse their learning deficits through questioning.
- Assessment and evaluation are on-going processes taking place throughout instruction.
- Assessment of learning takes place by observing actual practice within the community.
- Assessment is paired with detailed, constructive feedback aimed at improving performance.
- Insufficient learning or failure is regarded as an opportunity and even desirable because it leads to the refinement of learning through discourse and practice. Corrective feedback is a standard part of the evaluation process.
- Instruction is successful if learners have reached the goals established at the beginning and have become enculturated into the community of practice.

### **5.7 Pedagogic design: Assessment**

Assessment is an important element of the curriculum design, and therefore, its inclusion is critical. It measures learner's depth of understanding of concepts and their ability to apply them in real world situations. One of the main focuses of instruction today is to instil in learners the skill of *learning how to learn*; for this, assessment has to be largely diagnostic and formative in order to assess learners while the learning is

actually taking place rather than after it has taken place as it is normally done in traditional settings.

Further, assessment instruments and activities should be congruent with learning objectives, enable learners to assess their progress, to identify areas for immediate review, and even fine tune learning objectives to accommodate the special needs, characteristics, and situation of individual learners. Laurillard (2002) argues that innovative learning and teaching must be matched by innovations in assessment. To implement UB's Curriculum Development Strategy for Graduate Employability (2009) and to be successful in achieving its goals the Researcher wants to argue that there must be explicit congruence among learning objectives, assessment strategies and graduate attributes discussed in 1.4.2.1.

The three pedagogical perspectives emphasise different aspects on what should be measured and how.

The *behaviourist* approach focuses on the assessment of accurate reproduction of knowledge and skills.

The *cognitive/ constructivist* view emphasises the assessment of broad conceptual understanding, participation, extended performance, and excellent performance through recognition. It also promotes the assessment of process as well as outcome through varied methods such as self and peer assessments.

*The situative* perspective emphasises assessing participation, and authenticity of practice. Both cognitive and situative perspectives advocate varied assessment methods, including teacher assessment, peer assessment, self-assessment, online portfolios of student work and reflection as discussed in 3.10.3.

Using new technology, students can obtain just-in-time rich feedback, make corrections to their work, and structure learning experiences around their individual needs; assessment can focus more on building feedback loops directly into the learning process. In a web-based blended approach, assessment can be easily administered more frequently, and it can be ongoing and cumulative.

## 5.8 Key aspects of the blended learning model

The focus of this work is to design and develop a model for creating student-centred interactive and collaborative learning environments using the affordances of technology in line with the research question, “How can a web-based blended learning environment be designed, developed and implemented at the University of Botswana?” Besides technology integration, the blended learning model proposed in this study also focuses on and describes a range of strategies based on both objectivist and constructivist design practices in order to optimize student learning.

Based on findings from the literature (e.g., Jonassen et al., 1995; Pierson, 2001; Yu, 2002; Kerres and De Witt, 2003; Tung, 2003; Garrison and Vaughan, 2008), the design of blended learning was modelled along the following six broad ‘dimensions’: context, content, pedagogy, technology, support and evaluation (See Section 3.12 for details).

In order to develop a coherent and comprehensive model, six key aspects – Digital Leadership, Equitable Access, Active Participation, Authentic Tasks, Intellectual Engagement and Learning— have been identified from these broad dimensions as depicted in the following table. Some of these aspects have attributes cut across more than one dimension listed above.

Table 5:2: Deriving the key aspects of LAPTEL model from the broad dimensions

<b>Broad dimensions</b>	<b>Factors derived from the broad dimensions</b>	<b>Identified components of the model</b> <i>(The dominant factors that have control on learning and have been identified as key aspects/design elements of the Model)</i>
Context	<i>Leadership</i> , top-down, bottom-up and inside-out strategies for technology implementation, resources, teacher training, support, availability of appropriate technology infrastructure, conducive environment for change.	<ul style="list-style-type: none"> <li>➤ Digital LEADERSHIP</li> <li>➤ Equitable ACCESS</li> <li>➤ Relevant TASKS</li> </ul>
Curriculum/ Content	Curriculum decides what content and learning tasks should students engage in for varying learning outcomes. Technology can help expand the breadth and depth of the curriculum. For example, with the Internet, and the WWW, students can access information beyond the scope of their tutors and traditional textbooks. Curricula can be	<ul style="list-style-type: none"> <li>➤ TASKS</li> <li>➤ ACCESS</li> </ul>

	easily individualized and adapted to students' individual learning needs and preferences.	
Pedagogy	<ul style="list-style-type: none"> <li>➤ Refers to various instructional and learning strategies meant to enrich students' learning experience</li> <li>➤ The main purpose of technology in a blended learning environment is to encourage learners' <i>participation</i> in learning activities, and to enable and facilitate interaction with the teacher, collaboration among learners, learner-centredness, a sense of community (of learners) and virtual learning environments (VLE) that extend beyond the fixed teaching schedules.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Active PARTICIPATION in different interactive and collaborative activities;</li> <li>➤ ACCESS to tasks (learning possibilities) on a 24/7 basis</li> <li>➤ ENGAGEMENT</li> </ul>
Technology	<ul style="list-style-type: none"> <li>➤ Availability of reliable and adequate technology infrastructure (hardware, software and communication devices) and reliable technical support to enable all students to have easy <i>access</i> to digital resources from anywhere, on campus as well as off campus are factors that lead to active <i>participation</i> and <i>engagement</i> by the learners in the learning process.</li> <li>➤ Good connectivity, reliability and just-in-time technical support</li> </ul>	<ul style="list-style-type: none"> <li>➤ ACCESS to tasks (learning possibilities) on a 24/7 basis</li> <li>➤ Digital LEADERSHIP</li> </ul>
Support	<ul style="list-style-type: none"> <li>➤ Support to instructors and students in terms of training, technical support and management support.</li> </ul>	<ul style="list-style-type: none"> <li>➤ ACCESS</li> <li>➤ PARTICIPATION</li> <li>➤ ENGAGEMENT</li> <li>➤ LEADERSHIP</li> </ul>
Evaluation	The purpose of evaluation is to establish whether effective and efficient learning has taken place; it comprises formative, summative and confirmative strategies.	<ul style="list-style-type: none"> <li>➤ LEARNING</li> </ul>

A conceptual framework for a learning environment should include guidelines for selecting pedagogical strategies for the type of learning expected. The main models adopted in this study for pedagogical / instructional strategies are the ICARE model (Section 3.5.3) followed by the ASSURE model (Section 3.5.4). Both of them provide systematic, yet iterative approaches to the design and development of learning situations at a lesson level (micro level). The ICARE model is partly design based and partly pedagogical, and is particularly useful in blended learning environments to provide multiple learning opportunities.

### 5.8.1 *The LAPTEL Model*

A learning model depicts the essential instructional and learning activities and processes that comprise (i) the learner at the centre of educational environments, (ii) course development, (iii) opportunity for interaction and collaboration, (iv) student engagement with the tutor, rich learning resources, peers, and external experts, and (v) assessment and evaluation activities.

In the light of the afore-mentioned discussions, and the literature on factors influencing of technology adoption in HE institution, the Researcher has proposed a six-dimensional model of learning and teaching based on the principles of communities of practice and learning as a social system, making it possible for all students to actively participate and contribute in both face-to-face and online environments. These dimensions are: Digital Leadership, Equitable Access, Active Participation, Authentic Tasks, Intellectual Engagement and Learning (LAPTEL). The first five dimensions comprise the engines of the model under study and are the drivers that enable students progress towards successful learning and course completion. In practice, student learning is here modelled as a complex interplay between and progression through the three stages of active participation, authentic tasks and intellectual engagement in communities of practice. The fact that these three dimensions have got features of both face-to-face and online learning, and are integrated seamlessly, makes the LAPTEL a Web-based blended learning model.

The LAPTEL model depicts guidelines on how to ensure equitable *access* for students to educational opportunities and learning contexts, motivate and enable them *participate* in meaningful educational processes, design and develop effective online as well as face-to-face learning materials (*tasks*), and *engage* students in active 'communities of practice' in order to enable them construct their own knowledge (*learning*) collaboratively under proper *leadership*. The leadership referred to here is more than the traditional type of leadership which is a basic requisite (As it is shown in the model in Figure 5.2) and the enabler of all the other dimensions for successful implementation of the model, and hence, the model name begins with it.

Given below in Figure 5.2 is a diagrammatic representation of the LAPTEL Model.

The complex interplay of three significant constructs of blended learning –



curriculum/content, pedagogy and technology – as discussed in Chapter 2 is depicted by the three pillars of this model in the diagram and is at the core of this study. The *Content* comprises activities that can be of two types, either *learning activities* or *support activities*. Learning activities are tasks involving interactions with information and completion of a series of tasks in order to achieve intended learning outcomes (Beetham, 2004). The pedagogy (learning and teaching approaches) is based on Mayes and Frietas' (2005) three categories discussed earlier: associative, cognitive and situative. The availability of appropriate technology infrastructure and 24/7 support including adequate connectivity, reliability, training and post-training support is critical for success. Technology is not everything, but without its adequacy in quantity and quality, progress can be hampered or even any attempt to adopt technology can fail.

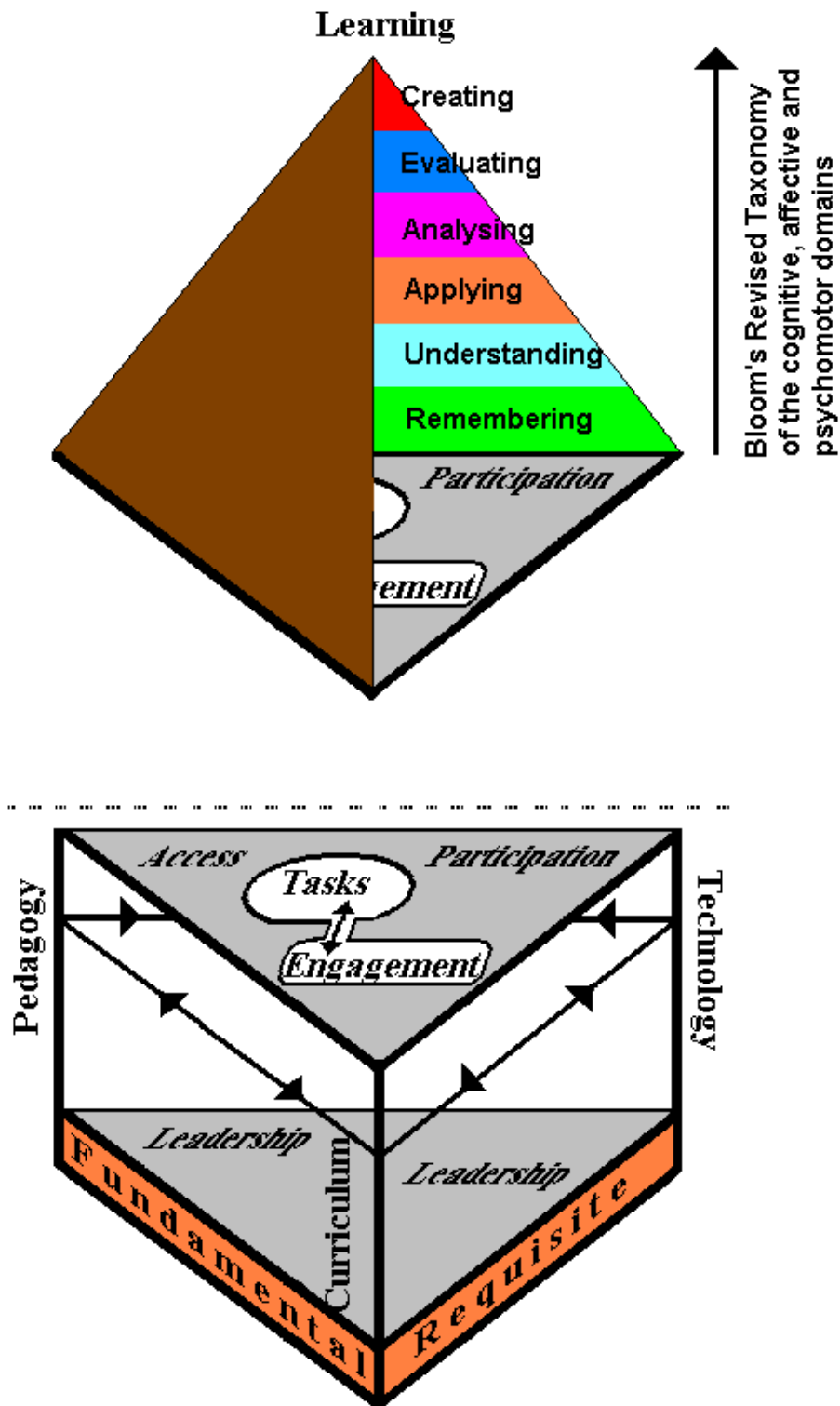


Figure 5.2: The LAPTEL Model

The ‘community of learners’ concept is a key driver in this study as discussed in the theoretical framework for this study. The Researcher considers it essential to have a complex interplay between the three components – ‘active participation’, ‘authentic tasks’ and ‘intellectual engagement’ to facilitate active, non-linear learning, which has to be accommodated during the development and delivery of courses based on the LAPTEL model. These three factors—the trio— have roots in Moore’s (1989, 1996) four types of interaction, social constructivism, situated learning and Laurillard’s Conversational Framework (that highlights the importance of activities, dialogue, adaptability [individualisation], interactivity and reflection). The trio also emphasises the important role of contexts for learning to occur. Greenhow, Robelia, and Hughes (2009) locate learning in the contexts and relationships, rather than merely in the minds of individuals.

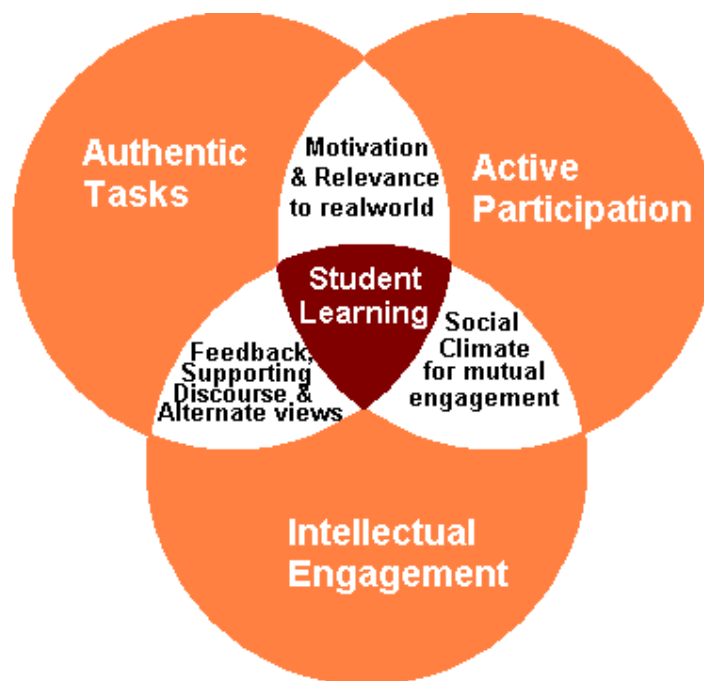


Figure 5.3: Impact of three partially overlapping factors on student learning

The influence of the trios on student learning is partially overlapping as shown in Fig. 5.3 and are very well tied to the ‘content’, ‘apply’, ‘reflect’ and ‘extend’ of the ICARE model. This means that the ICARE model has a place in the design and development of the LAPTEL model. All in all, learning is an emergent phenomenon

that takes place through learners' active participation, and synchronous and asynchronous interaction between students, teachers, and learning resources. Learning outcomes can be mapped to Bloom's taxonomy as shown in Figure 5.3.

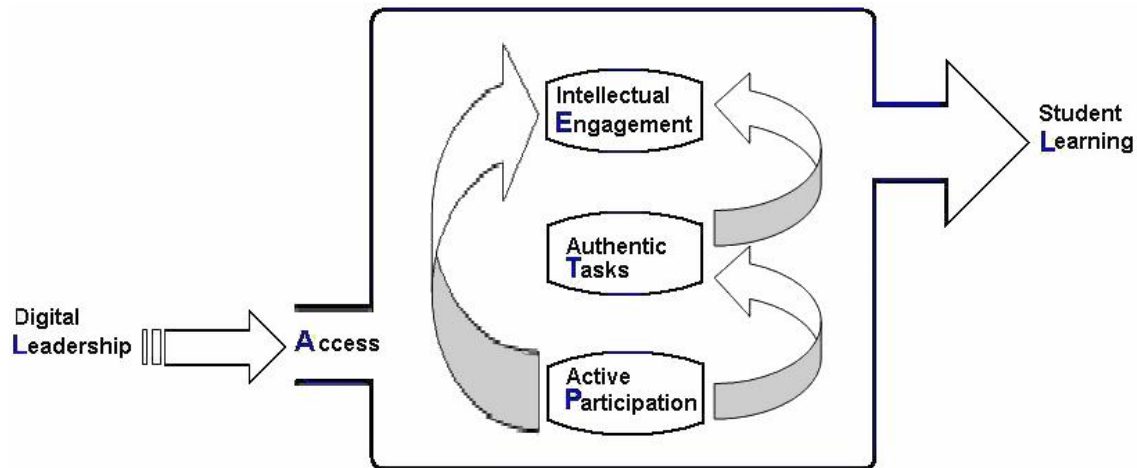


Figure 5.4: A simplified representation of the LAPTEL Model

Although it is not overtly included in the model, evaluation and revision followed by appropriate interventions at each stage is an integral part of the curriculum design cycle. It has to be borne in mind that all models are approximate and tentative initially; it will require modification during the development and implementation stages or as further data are collected and examined.

The six pedagogical dimensions of effective online learning environments discussed in Section 2.9 and technology design criteria discussed in Sections 3.12.1 through 3.12.5 are important design concepts for this study, and are factored into the different stages of the model for its successful implementation as described below. In fact, these dimensions are the “soul” of the LAPTEL Model. However, the impact of these dimensions on learning effectiveness largely depends on how well they are incorporated into the design of the programme. The rationales of the six dimensions of the LAPTEL model are further discussed below in section 5.8.1.1.

The LAPTEL model developed in this study is built on constructivist perspectives, and emphasizes the importance of “real world” scenarios. It represents new possibilities for increasing the quality and variety of teaching and learning within a

CoP context, as espoused by the “learning design”<sup>3</sup> concept which stands to offer a wide range of pedagogies to students in online learning. They also help to scaffold students in their learning process in many ways that are not possible in pure face-to-face classrooms or online learning. It has certain features similar to Schneider, Frété, and Synteta’s (2002a)<sup>4</sup> modular Community, Content and Collaboration Management Systems (C3MS) and Salmon’s (2002) e-tivities approach to instructional design, but with modifications to reflect constructivist as well as blended learning principles. The application, adaptation and extension of existing frameworks are quite characteristic of an emergent field. A set of systematic facilitation strategies for the successful implementation of the LAPTEL model was derived from the two case studies (the pilot and the final evaluation as discussed in Chapter 6) and ideas drawn from the literature, and is provided in Section 7.6.1.

#### 5.8.1.1 Components of the LAPTEL Model

##### (i) *Digital Leadership*

In addition to the instructional design and development aspects of the LAPTEL model, the Researcher has also factored administrative and support needs surrounding the teaching and learning processes by including leadership and access as critical dimensions of the model. These two dimensions refer to the organisational needs of the model, and are critical for inspiring and encouraging academics and students to own the need for technology transformation, and driving the associated change management. Thus the model addresses factors beyond instruction in order to consider other important aspects of the learning environment.

As discussed in Sections 3.14.1 and 7.5.1, leadership of an organisation has a significant role in leading and managing a planned transformation and change management programme. Aggressive intervention on the part of academic leaders and

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<sup>3</sup> There are three general ideas behind the concept of learning design. They are: (i) people learn better when are actively engaged in learning tasks and activities; (ii) learning activities may be sequenced or otherwise structured carefully and deliberately in a *learning workflow* to promote more effective learning; (iii) it would be useful to be able to record ‘learning designs’ for sharing and re-use in the future (Britain, 2004).

<sup>4</sup> According to them current e-learning systems focus mainly on content delivery as opposed to supporting students to solve more complex and open-ended tasks. They uphold the effectiveness of socio-constructivist pedagogies in education and argue that a large number of rich educational scenarios can be supported at reasonable cost by the emerging brand of modular Community, Content and Collaboration Management Systems (C3MS). It offers much functionality that teachers are keen to have (like news/comments, forums, simple CMS and others that we describe in our catalogue of “C3MS bricks for socio-constructivist scenarios”).

faculty members is critical to bring changes in curriculum and pedagogy (Bates, 2000, p. xiii), and assessment strategies. An enlightened and enthusiastic leadership is critical to ensure that a shared vision for technology adoption, availability of reliable technology infrastructure and support, relevant strategic elearning framework and policies, change management strategies suitable to the organisational structure and culture, and conducive climate for implementation are in place. The envisaged leadership for technology adoption should be visible in the forefront and is also responsible for creating awareness among teachers on the need for technology adoption, empowering them with necessary skills and other resources, and addressing issues related to intellectual property. Creating proper awareness of any new innovation across the academia is the first stage as advocated by the ADKAR<sup>5</sup> model of change management, and is critical in developing an intense desire among its prospective adopters and to change. The leadership should challenge all the stakeholders to explore innovative teaching and learning as a change management strategy, and to, subsequently, own an organisation-wide need for change as espoused by the LASO model (Uys, 2000).

Another major component of support from the leadership includes providing a reward structure for those engaging in the change process, and the creation of a strategic framework to guide the implementation process.

(ii) *Equitable Access*

One of the essential pre-requisites for all students to actively participate in an online course is that the content must be easily accessible anytime anywhere irrespective of whether they are on campus or off campus. Access refers to the availability of appropriate infrastructure including adequate connectivity, bandwidth, reliability, 24/7 technical support, and rich learning resources both online and print-based for all students without any barriers of time and place. Access based on its quality and reliability is an enabling or a disabling factor, and it is a critical element in the successful implementation of a blended learning model. The term 'Access' in the context of this study also refers to access to HE by more people across the Botswana

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<sup>5</sup> The term ADKAR is an acronym for Awareness, Desire, Knowledge, Ability and Reinforcement.

and even beyond its borders. 'Expanding access and participation' is one of the key strategic priority areas of UB and has been taken care of in the LAPTEL model.

Access is not a major issue in the current UB context. Blackboard LMS is available on a 24x7 basis, and it can be accessed by students anytime, anywhere. UB has computers installed for students' use in a few so called 'smart classrooms', faculty-based computer labs and the main library, and also has wireless access anywhere on campus. However, connectivity becomes a problem when students try to connect to the Blackboard from outside the campus.

(iii) *Active Participation*

Access to online courses alone does not guarantee active student participation in online courses. Active participation by students is at the very centre of individual and collective learning processes in online and blended learning. It is a prerequisite for students' interaction with peers which in turn is imperative for them to contribute towards and benefit from the synergy of a community of learners.

There are several factors that contribute towards student participation in online learning. The quality of the learner interface has a positive impact on learners' participation in the course. Another factor is the authenticity of the content and its appropriateness to meet students' individual needs. This is particularly true with adult learners; they actively participate, if the tasks are related to their life outside and to their workplace. From the literature review of Vaughan and MacVicar (2004, pp. 400–413) two most important motivators for elearning are content relevance to work and the utilization of easy-to-use technologies.

Other strategies include the need for social and emotional support to provide learners with an appealing social climate which is a critical motivating factor that encourages them to be actively ready and pay attention to the teacher for the new approach in a non-threatening environment. Social presence can be created by posting a welcome message, both in readable as well as audible formats, with encouraging words that would arouse student interest and promote student participation in the course. Further, learners may be given opportunity to establish their online identities, by sending an email of self-introduction to their peers. These strategies can promote and support

quality in communication and the interactions to become more collaborative, thus building trust and confidence among all learners.

In addition, teachers must establish clear learning and assessment expectations, and provide a weekly lesson plan so that students know how to pace their work on content, and other activities such as discussions postings, and assignments. Providing *advance organisers* also could encourage participation because it can bridge the gap between what they already know and what they need to know (pre-requisite) to engage in the current learning events. Subsequently, interactive activities including discussions and questions should be designed with the intention of sparking debates that result in learning through iterative reflective processes.

Technology integration is a complex phenomenon that involves both tutors and students. The participation dimension of the LAPTEL model also refers to participation by tutors. Technology adoption and active participation by tutors in technology innovation depend largely on their teaching philosophy, motivation, beliefs about educational technology, and preferred methods of delivery approaches. Only if tutors are motivated and have a positive perception about educational technology, they can motivate and encourage students to participate in online learning. In order to have their active participation, their concerns and perspectives on the new approach have to be surveyed, and addressed. This is crucial in order to help them with the change in practice, for them to make effective decisions about the use of technology and to make them buy in the new approach which in turn will be reflected in their extent of participation.

Another critical factor for active participation by both students and tutors is the support by way of training in the use of the LMS tools. Students need to be oriented to easily log on to the LMS, access the content, and use the communication tools that they will use in the online courses, and also, they should be given adequate time for practising the use of online communication tools. Students as well as teachers will fully participate only if technology is easily accessible whenever they want to make use of it, and they are comfortable with its use.

The professional development of tutors is inevitable for them to be adequately prepared and be comfortable with the new tools. The focus of these developmental



strategies must not only be on technology per se but also on its role in changing the teaching and learning process to be more learner-centred whereby the tutor takes the role of a facilitator of student learning and the student an active, collaborative learner. As the hybrid environment is unfamiliar to most teachers and more over, time-consuming, teachers have to pay closer attention to it than their face-to-face interaction. Once face-to-face contact time is reduced and everyone is more online, the need to continually monitor, moderate and manage interactions becomes critical.

(iv) *Authentic Tasks*

According to Beetham (2007) in a formal educational setting, tasks are required of learners by the demands of the curriculum. A learning activity is carried out by learners to respond to the demands of a task<sup>6</sup> and to achieve an intended learning outcome. There may be a series of tasks for learners to complete in a course. Beetham (2007) defines a learning activity as a specific interaction of learner(s) with other(s) using specific tools and resources, orientated towards specific outcomes. For students to learn well it is crucial for them to engage in learning activities. Activities may include key elements of practice such as solving problems, comparing and evaluating arguments, presenting facts or negotiating goals, as well as techniques used to support the tasks such as just-in-time feedback; further, these activities should be carefully aligned with the learning outcomes and with the processes of assessment and review.

Tasks must be authentic and be presented in such a way that they support the needs of all types of learners. These tasks may be problem-based and activity-based. Content may include readable text materials, visual simulations to demonstrate processes, digital images, videos, audio narrations, etc. Authentic tasks require students to draw from real life experiences to complete them.

Tasks must be such that they are interactive and engaging to stimulate negotiation between learners, and that they allow learners to apply new understanding in authentic situations and reflect upon it (features of the ICARE model as discussed in section

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<sup>6</sup> According to Jones (2007) tasks are what designers set, they are prescriptions for the work students are expected to do, activity is what people actually do. Because students constitute their own learning context it should be expected that students' activity will often differ from the task that initiated it.

3.5.3). Learning activities themselves should be interesting, relevant to their interests such as career goals, motivating and be capable of arousing students' intellectual curiosity. They may be focussed on the level of the individual learner or a group of learners. The aim is to help learners to complete tasks on their own. Corresponding assessment component could be diagnostic, formative or summative in nature with the individual learner as the centre of attention.

Different varieties of contextualised simple as well as complex, ill-structured, authentic problems that reflect the complexity of the learners' environment are critical for effective learner engagement, to promote higher order thinking, and to sense the complexity of real life problems. According to Merrill (2002), effective learning can happen when the learner is given the right task (problem-centred tasks and real-world problems) to accomplish by informing them of the right method (such as activation, demonstration, application, and integration) to use.

Learning activities are structured using an incremental design format from simple to complex; they relate directly to the topic at hand and may also involve previously learnt concepts. They are all aligned with expected learning outcomes, and arranged in a hierarchy. Traditional face-to-face courses have to be redesigned through step-by-step processes to transform to blended delivery format by including various cognitive strategies discussed in Sections 2.9.5 and 5.8.2. Teachers must encourage learners to carry out online activities at a pace that they are comfortable with requiring everyone to become fully engaged.

One of the key things that must be borne in mind when designing courses is the human memory limitations; every effort must be made to minimise the cognitive load by presenting material in small chunks, allowing enough time for learners to organise and help the learner relax and feel confident (as discussed in Sections 2.7.2 and 2.7.10). Content presented in multiple formats aim to hold new information longer in short-term memory for active engagement. The content in the form of online tutorials must provide ample opportunities for deep intellectual learner-content interaction that will trigger other forms of interactions. Multiple formats may provide learners with study paths that allow them to learn at their own pace with minimal amount of interaction with the teacher and peers (*without degrading the educational experience*);

also, teachers must provide clear instructions and scaffolding as well as monitor the learning process.

Even if a learner is personally motivated to learn a topic, if the learning content does not have the above mentioned attributes, the learner's brain will tend to do everything possible to look for something more interesting. This applies to both *arousing* and *sustaining* learners' interest and attention.

The student can receive content or learning resources from a large variety of sources that include the tutor, peers, external experts and relevant online sources as shown below. However, students must be capable to filter, critique, and manage external information.

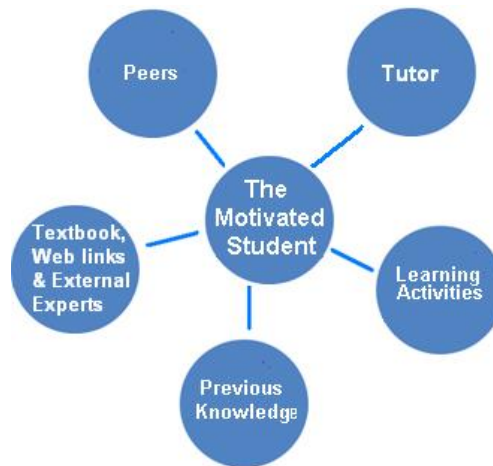


Figure 5.5: Student learning through interaction with different sources

Enrichment and remedial activities should be provided for students who are above average and below average ability students based on the 'extend' element of the ICARE model. This may be done through links to appropriate materials and the use of the 'selective' tool of the WebCT. An important element of 'extend' element is the process of evaluation to decide who needs enrichment resources or remediation exercises. Evaluation involves assessment of students and evaluation of the course itself for design, navigation, and content to see if it can be made better for the current use as well as for the future.

A variety of student assessment strategies should be incorporated as part of the tasks in order to measure the progress in learning while it is taking place rather than after it has occurred, and this is critical to foster quality online instruction and learning. One strategy to enhance learning is the provision of interactive self-tests; it should be included in each lesson to stimulate learners' thoughts and actions, encourage them to ask questions, motivate them to learn and help them to know whether they understand the concepts in the lesson or not. Thus it allows learners to revise specific parts of the lesson again. Self-tests may include carefully designed 'multiple-choice', 'true-false' and 'filling the blanks' formats. The LMS handles the delivery of the content and tests in different formats.

Assessment strategies may also include weekly online quizzes to assess whether students had carried out the assigned tasks/reading, regular online discussions in which students evaluate and respond to the opinions of others, and one online summative exam<sup>7</sup>. There should be a mix of individual student assignments, team work, multimedia, discussion and storytelling. Individual student assignments alone will not teach students the critical skills of teamwork, leadership, and conflict management they will need to succeed as professionals; also, team assignments alone will not promote the equally important trait of independent learning. Combining learning and assessment into single activities is at the core of the concept of *blended learning*.

#### Typical tips for assessments

- Link assessments with the stated learning outcomes to prove student understanding of the concept being evaluated;
- Provide clear directions on how to complete the assessment and even how to submit the assessment for grading;
- Encourage students to take online self-tests;
- Create assessments that encourage students to think critically, not just to use rote memorization;

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<sup>7</sup> It should be evident from these assessment strategies that the blended course incorporates more assessable exercises than the original face-to-face version of the course.

- Assessments should focus on the application of concepts and skills they have learned;
- Clearly communicate the assessment expectations with a timeframe and access information about receiving feedback and grades;
- Use built-in quiz features that are tied to course objectives.

A modular approach as described in Chapter 3, section 3.12.3 was used in this study to organise the content. Further, a microlevel organisation can be done using the course design template given in section 5.5.2, Table 5.2. A good summary, glossary and FAQ section can support students of all ability levels.

Here is a summary of the salient points discussed above:

At the design and development levels,

- Write objectives/learning outcomes at the appropriate language level, and clearly convey them to the learners;
- Make assessment strategies and expectations clear to the students early in the course;
- Ensure to make content available in manageable segments (modules) such that it aligns with a learning objective;
- Present the content in a logical, sequential manner in manageable chunks and in different formats: print, audio (recorded narration), simulations, video clips, etc. in order to reduce cognitive overload and also to accommodate all learners with linear as well as non-linear learning styles.
- Break down the tasks corresponding to each objective into a series of assignments;
- Create assignments that encourage students to think critically, not just to use rote memorization;
- Clearly communicate the assignments with very specific length requirements, formatting style, etc.
- Provide the opportunity for self-assessment on a weekly basis;
- Provide opportunities for students to apply concepts and skills they have learned in collaborative activities –team projects, discussion and storytelling;

- Make content available on a CD-ROM also;
- Provide further reading / learning materials for remedial as well as above average students;
- Direct students to specific web sites to use;
- Create a use for external resources such as printed materials and the Internet;
- Post a summary of the lesson / module;
- Encourage students to take formative and summative course evaluation;
- Address accessibility and usability issues from the start, colour choices for example—not everyone can see all colours you use in course materials;
- Provide a soft copy of content and individual student’s work (ePortfolio) on a CD.

(v) *Intellectual Engagement*

This section describes various opportunities for interactivity and collaborative work that can intellectually engage learners in the learning process. Palloff and Pratt (2005) argue that interaction and collaborative learning experiences are more congruent with achieving higher-order learning outcomes. Deep and meaningful learning experiences as well as higher-order skills are best supported by actively engaged learners. The traditional face-to-face classroom has limited opportunity for the required level of interaction and collaboration, and as a result, most often its possibilities are limited only to acquiring facts and achieving low level skills. Therefore, the need to provide more engaged, meaningful learning experiences, to equip learners with various skills ranging from lower to higher levels (Bloom, 1956).

Intellectual engagement that emanate from interaction and collaboration with the teacher and among students respectively is the backbone of the ‘community of learners’ concept which is at the core of this study. The social and interpersonal skills acquired by from such learning communities are essentially transferable to wider outside communities outside on completion of their courses and programmes. Instructional designers and course developers are required to ensure a high level of engagement for a variety of learners by organising the content based on a conversational approach.

Complex topics require more interactive and collaborative engagement for students to construct meaning than what is possible in a typical lecture. This view follows Bloom's Taxonomy in that most current instructional theories seek to move beyond the lower-level objectives to the higher ones, referred to as higher-order thinking skills (Dewald, 2003). The more actively engaged the learner is in the process of thinking and manipulating information, the deeper the processing and the more meaningful the learning (Jonassen, Peck, and Wilson, 2000). Besides helping students to learn collaboratively and cooperatively, group work will prepare them with certain critical skills for real life work situations and help them in their career later.

Moore's four types of interaction become critical here; for learning to occur, students must interact with each other and the instructor in order to arrive at shared meaning and to make sense of what they are learning. Learner-learner interaction is a powerful way of helping students to think about their own learning, and to develop alternative pedagogical strategies through metacognition. During interaction with peers, students collaboratively analyze, synthesize, summarize, describe, build hypotheses, and solve problems. In the process, they not only share information, but also interpret, evaluate, critique other's comments and ideas, and filter and cognitively process content to fit into their logical frameworks. When students engage through inquiry and reflection they become eager to seek and gain additional insights and perspectives; they ask thought-provoking questions that help take them all beyond their current understanding; in such a context of intellectual engagement, learning takes place in an iterative process where students consider the points made by classmates and reflect on them. They also evaluate their own progress and support their peers. Thus a "spiral experience model" enhance engagement in the learning process by everyone.

According to Laurillard (1993), learning is an iterative process, involving discursive, adaptive, interactive, and reflexive qualities; discursive interaction (between the tutor and student) is the key and is a valuable tool for blended learning.

Learner-content interaction is at the core of student learning. Knowledge construction happens when the learner interacts with the instructional content in order to accommodate new information into pre-existing cognitive structures, which then results in changes in understanding (Moore, 1996, pp. 128-129). Other critical interactions are student-tutor and student-computer interface.

Students must be given opportunity to utilise relevant technology affordances to interact with the content, the teacher and their peers. The single most important benefit of new technology in education is that it provides many possibilities for social engagement through different forms of interaction with the instructor and among learners; it also helps learners to make connections with experts outside the virtual classroom. Other strong points of technology include opportunities for reflective thought prior to participating in a discussion and post-participation review/access to written discussions (through the use of asynchronous communication tools). These and other recent social networking tools allow students to deeply engage in worthwhile tasks, and critical discourse and reflection; in the process, they become more collaborative and supportive to each other; and they have the freedom to learn in their own way at their own pace, rather than in the way a designer prescribes.

However, a positive social climate is critical in developing and sustaining collaborative learning environment in an atmosphere of intellectual openness. Through social engagement, learners collaboratively work with each other to achieve a high level of performance (Donato, 2000; Kern and Warschauer, 2000). Students can also interact with experts using the Internet with its various communication channels like email, discussion, chat, forums etc. At this stage, teachers have important roles of building, supporting and maintaining student engagement.

The LAPTEL model provides a framework for the greatest possible degree of dialogue, strong community of practice perspective, and good practice in engaging learners in online collaboration. Individual learners become self-reflective, attempt to apply new knowledge to their individual contexts, and further, take control of their own learning. To encourage active engagement, learners should be adequately supported and be provided with opportunity for metacognition by encouraging interaction and dialogue with teachers and peers. According to Salmon (2000), facilitation (i.e., getting students to interact with each other and the content) is probably the most important strategy that online teachers need to employ in order to engage them deeply in the learning process. The attributes of this stage is of utmost importance to students as it helps them develop certain critical skills required in their preparation for the 21<sup>st</sup> century workplace.



### Typical tips for interaction /collaboration

- Clearly clarify expectations of student participation;
- Indicate instructor response time on personal messages and grading assignments;
- Use collaborative tools such as discussion boards, chat rooms, instant messenger, Email, student web pages, etc. Participation in these areas should be evaluated in some way (number of posts, attendance in chat, comments made, etc. *WebCT* has a tracking tool for this.);
- Deliberately attempt to make an active learning community with the use of group projects and activities through the use of group assignments to be completed online, and peer assessments;
- Teachers should stimulate discussion by asking the “right” question in the discussion forum in order to help students to think critically about a concept, to reflect on what they have learnt, and to share their reflections with their teachers and peers;
- Participation in these areas may be evaluated in some way (number of posts, attendance in chat, quality of comments made, etc. *WebCT* has a tracking tool for this.);
- Scheduled “Virtual office” hours can help enhance learner-instructor interactions;
- Regular self tests require learners to assess their progress related to the content, thereby increasing learner-content interaction.

#### (vi) *Learning (knowledge construction)*

Construction of knowledge occurs through learners’ *active participation* and intellectual *engagement* in various *authentic tasks* (meant to provide different level of learning) through interaction and collaboration with peers, teachers and experts. Thus, learning is not passively acquired, but through some combination of:

- thinking and reflection

- conversation and interaction
- experience and activity
- evidence and demonstration (Dyke, Conole, Ravenscroft, and de Freitas, 2007).

In the process, learners build on their existing knowledge which acts as a basis for exploration, discussion, reflection upon individual practices, individual interpretation and manipulation of the content and new ideas, all occurring in a student-centred collaborative learning environment. It is hoped that effective implementation of the above mentioned scenarios and strategies will stimulate cognitive puzzlement and the required variation, as proposed by Oliver and Trigwell (2005), resulting in all levels of learning outcomes primarily cognitive, affective, psychomotor skill, interpersonal and intrapersonal skills.

It has to be borne in mind that not every topic or course can equip learners with all these levels of knowledge; again, what level of knowledge is acquired by the learners and its success largely depends on a number of parameters such as the learning objectives and activities, opportunity for sustained discourse and critical reflection, and availability as well as accessibility of resources. In the diagrammatic representation of the Model, the learning outcomes— what learners should now, or be able to do, after completing a learning activity – were mapped to Bloom's taxonomy of learning outcomes and grouped into three types: cognitive, affective and psychomotor.

Based on the above discussions, the following important tips have been identified for developing and implementing the LAPTEL model effectively:

- The learning environment must be learner-centred;
- Students should have adequate time to reflect, they should not be overloaded with information which is likely possible in online learning;
- The course should be delivered through a mix of lectures supplemented with Socratic dialogue, online tutorials, in-class discussions, role-based group assignments, online discussions, drill and practice, chat, simulation, individual

and collaborative problem solving and project-based learning activities, and just-in-time personalised feedback;

- Lectures can also be made interactive by incorporating problem-oriented activities or aspects relevant to real-world issues that require collaboration among learners and student-tutor interactions;
- Assignments and assessments should be integrated into the learning tasks; thus, they are not separate activities. They serve as means of assessing learners' progress continually;
- Self-assessments must be provided for self monitoring of and directions for progress in learning.
- All the learning materials (e.g., lectures, readings, textbook, timetable, assignments, and exercises) are made available to students as fully online and also in print format. Though this duplication brings redundancy, it allows students to choose their preferred mode of learning for each section in the course and to navigate freely between the text and the online environment.
- WebCT serves as the major learning environment in which most of the collaborative work takes place, the face-to-face meeting summaries are posted, and assignments and tasks are submitted, making the content and the online learning processes inseparable.
- All online elements and presentations will strictly adhere to the learner-interface design standard discussed in Section 3.12.2.

The next chapter discusses the design and development of a media prototype of the model based on iterative learner-centred and WebCT-based design principles. The pedagogical design of the course adheres mainly to a constructivist approach whereby the focus is on students' active cognitive engagement in a learner-centred environment in an academic context.

An assumption made in the development of this model is that it addresses generic characteristics to enable development of elearning environments over the widest possible spectrum of subject material. This means that it should be usable for designing instruction in any teaching subject. Thus, any content developer should be

able to use the model to develop a learning environment in his / her own subject area, no matter whether it is theory-based (e.g., law or linguistics) or practical-based (e.g., physics or chemistry).

All the important points from the above discussions are summarised in the following table.

Table 5.3: Components of LAPTEL model and their descriptions

Components of LAPTEL	Description and supporting factors	Literature basis
(i) Digital Leadership	<p>To ensure:</p> <ul style="list-style-type: none"> <li>- a shared vision for technology adoption;</li> <li>- availability of reliable infrastructure and support;</li> <li>- relevant strategic elearning framework and policies;</li> <li>- change management strategies suitable to the organisational structure and culture, and to overcome resistance and barriers to innovation;</li> <li>- conducive climate for implementation;</li> <li>- top-to-bottom initiatives with push and pull strategies;</li> <li>- Providing a reward structure for those engaging in the change process.</li> </ul>	<p>LASO model (Uys, 2000);            LaBonte (2008);            Fullan (2003);            Leithwood and Riel (2003);            Leithwood and Jantzi (2005);            Tesone et al. (2002);            Mulford, Silins and Leithwood, 2004            Rantz (2002);            Creighton (2003);            Bates (2000);            Byrom and Bingham (2001);            Klein and Sorra (1996).</p>
(ii) Active Access	<ul style="list-style-type: none"> <li>- Refers to increased access to technology as well as higher education;</li> <li>- Robust and reliable access to current and emerging technologies and digital resources;</li> <li>- Adequate connectivity to students anywhere;</li> <li>- Reliability and 24/7 technical support;</li> <li>- Flexibility to access content anytime anywhere;</li> <li>- Orientation in the use of technology;</li> </ul>	<p>Blackboard / WebCT;            Salinas (2008);            Bon (2007).</p>

	<ul style="list-style-type: none"> <li>- Availability of rich resources and just-in-time support;</li> <li>- Availability of the course in offline format in case of poor connectivity, technology failure or power outage such that everyone has equal opportunity to learn at anytime, anywhere;</li> </ul>	
(iii) Active Participation	<ul style="list-style-type: none"> <li>- Refers to participation of teachers and students in technology innovation and associated educational activities such that their active participation initiates and sustains inside-out and bottom-up change management strategies;</li> <li>- Social climate (Jonasson, 1998; Stacey, 2000; Crawford, 1999; Volery, 2001; Benbunan-Fich, Hiltz and Harasim, 2005);</li> <li>- Appealing learner interface; (Moore, 1992);</li> <li>- Opportunity for interpersonal interaction;</li> <li>- Activities with relevance on real world and learners' backgrounds;</li> <li>- Teacher's online presence as a "guide on the side" rather than a "sage on the stage";</li> <li>- Involves also teachers' initiative and participation in technology adoption;</li> <li>- Bottom-up and inside-out strategies.</li> </ul>	<p>ARCS model of Motivational Design (Keller, 1983; 1987); Wlodkowski (1999); Spohrer (1996); Stoney and Wild (1998); Learner-content interaction, learner-instructor, and learner-learner interaction (Moore, 1989, 1996); Social constructivism; Gagné's nine events of instruction</p> <p>Learner-interface interactivity / Usability of the online course</p>
(iv) Authentic Tasks	<ul style="list-style-type: none"> <li>- Content with relevance to students' real life situations, and motives for learning;</li> <li>- Content in different formats – text, graphs, multimedia presentations or interactive Java simulations— without losing information to reach and engage students with various learning styles within the activities that denote the</li> </ul>	<p>Learner-content interaction (Moore, 1989, 1996); student-centred learning environment supported by technology (Salinas, 2008); Merrill's (2002) comprehensive set of design principles incorporating behaviourist, cognitivist, and constructivist conceptions;</p> <p>Gagné's nine events of</p>

	<p>learning landscape;</p> <ul style="list-style-type: none"> <li>- all components are designed to match with the broad objectives derived from the course outline;</li> <li>- Content materials in print or electronic formats, audio, interactive multimedia to enable students to see, hear and work with the content;</li> <li>- Tasks include facts, skills, essential concepts, problems to solve, interactive self-tests, assignments and assessments that foster critical thinking and promote meaningful learning, etc.</li> <li>- Content carefully sequenced according to the desired learning and organised into lessons / modules;</li> <li>- Offline materials – assigned readings and related activities- on CDs/DVDs.</li> </ul>	<p>instruction Bloom’s Taxonomy (Section 3.5.1)</p> <p>The ICARE model (Section 3.5.3)</p> <p>The ASSURE model (Section 3.5.4)</p> <p>The Seven Principles for Good Practice in Undergraduate Education (Section 3.5.6)</p>
(v) Intellectual Engagement	<ul style="list-style-type: none"> <li>- Multiple perspectives and flexible methods for students to engage, interpret, evaluate, adapt, process and filter own and others ideas into their own logical frameworks, resulting in co-creation of knowledge;</li> <li>- Provide students enough time to read and understand- asynchronous communication;</li> <li>- Discussion, chat, group work, and mail, thus helping to develop social skills and readiness to engage effectively with outside communities;</li> <li>- Class discussion, and classroom activities.</li> <li>- Teachers’ active online presence and engagement to facilitate and monitor collaborative learning activities, to keep records, to track student progress as well</li> </ul>	<p>Learner-content, learner-instructor, and learner-learner interaction (Moore, 1989, 1996); Benbunan-Fich, Hiltz and Harasim, 2005); Dougiamas (2004); Weigel (2002); McGreal, (2004); Barbara Gross Davis (2002); Maur (1999); Vygotsky (1978); Driscoll (2000); Ally (2004); Pelgrum and Law (2003); Salinas (2008).</p>

	as to provide timely feedback to the students; - Continuous just-in-time feedback by teachers.	Eberbach et al. (2006) Langie et al. (2006)
(vi) Learning	Learning emerges through learners' interaction with the tasks / content, peers, the teacher as well as experts beyond the class-based community, and the subsequent construction of knowledge.	Constructivism and social constructivism; Situating Learning Theory; Activity theory; Learner-interface interactivity/ Usability of online courses; Bloom's Taxonomy (Bloom et al., 1956; Anderson and Krathwohl, 2001).

### 5.8.2 *The LAPTEL Model: Design considerations*

The LAPTEL model provides strategies for translating classroom-based courses into effective online/blended learning environment. Thus it addresses the research question, "How can a web-based blended learning environment be designed, developed and implemented at the University of Botswana?"

As discussed in Section 3.12, the development of an online/blended learning environment requires the design and integration of six main components that work together to enhance students' engagement in the learning activities and their performance. These components are: Hall et al.'s (2003) directionality, course tutorial, course management, interactivity, learner support, and assessment and evaluation components. In addition to these, an important aspect considered in the design process is the learner-interface interaction. An intuitive and appealing interface is essential for establishing the social presence that encourages students to engage in collaborative learning (discussed in Section 3.12.2).

Based on specific learner characteristics, broad learning objectives, and learning tasks teachers may choose a range of possible pedagogical choices; for example, lecturers can supplement with Socratic dialogue, collaborative instructional tasks, laboratory sessions, small group sessions, multimedia tutorials, online resources and interaction in an integrated manner; the correct choice of strategies and the appropriate use of technology depend largely on the creativity of the designers and course tutors; whatever may be the choice, it should result in a transformative process out of

synergy from the two delivery approaches with increased interactivity, engagement and flexibility such that students get meaningful learning experience.

The LAPTEL model was designed and developed with all the above mentioned dimensions and discussions in mind. The prototype developed based on the LAPTEL model was implemented through face-to-face as well as online modes in such a way they complement and reinforce each other as discussed in Section 7.6.1.

#### 5.8.2.1 The design of a blended learning environment based on the LAPTEL model

The LAPTEL model provides a systematic, yet recursive or iterative (and parallel rather than linearly) design approach to development of learning situations in a web-based interactive learning environment in the UB context. The emphasis on the provision of learning context (situations) and authentic content in this model is meant to present students with relevant motivational material as advocated by Keller (2001) and is to provide learners with different possibilities for learning.

The model espouses a ‘community of learners’ approach, continual evaluation and subsequent modifications while instructional materials are being created. By recursion, it means that the same issue such as learner analysis or instructional objectives is iteratively carried out throughout the design and development process, and at many levels.

As the first step in the shift process, a situational analysis or Hall et al.’s directionality analysis was discussed in Section 3.12 may be carried out. According to Teo, Chang, and Leng, (2006), such an analysis comprises:

- (i) *Feasibility Analysis*: This includes feasibility survey and its analysis in order to justify the creation of the course;
- (ii) *Course Profile Analysis* to identify the overall goal and to determine the scope, context, and performance augmentation;
- (iii) *Pedagogy Analysis* to establish the type of instructional strategy is done through a survey;
- (iv) *Learner Profile Analysis* to identify the target audience and their learning needs.



In this study context, the first two analyses -*feasibility analysis* and *Course Profile Analysis* – are not essential as the course used in this study is an existing one. *Learner Profile* refers to the learner characteristics, in terms of their prior knowledge, learning styles, learning preferences, and computing/ WebCT skills, etc, the gaps between their existing knowledge and skills, and the desired broad outcomes as a result of intervention. Learner profile analysis was to be done in order to ascertain whether blended learning could be used for the given learners in terms of the type of learning outcomes and the features of the available elearning infrastructure and support.

Traditionally, the next step in the design phase is concerned with the specific learning outcomes (the type of knowledge, skills and values), assessment criteria, subject matter analysis, lesson planning and media selection. However, in this study specific outcomes evolve as the study progresses to reflect a constructivist perspective.

According to Winn and Snyder (1996) and Winn (1997) decisions regarding the design of instruction and learning strategies should occur at the time the student is working with the instructional material, not ahead of time. Thus, the LAPTEL model is far less prescriptive than other traditional ID models. However, a broad framework of objectives is the 12 graduate attributes discussed in Section 1.5.2.1.

Once the learning outcomes have been identified, a pedagogic *design document* (also called a *course plan*) has to be developed to serve as guidelines to translate classroom courses into effective online/ blended learning courses, and to help students to achieve these learning outcomes. The purpose of a design document is to put all the decisions taken around the course design into one place. Although it is not a mandatory part of an instructional design, a design document helps as a guide in the development of the course. A typical design template for micro level course organisation is given below:

Table 5.4: Pedagogic design template

Pre-determined Content Topic	Specific learning objectives / outcomes	Assessment Criteria/ methods	Instructional Activities/ Strategies/ Resources	
			Online	Face-to-face
	(i) .....			
	(ii) .....			

A design document should include, but not be limited to, both students' and teacher's needs and expected performance outcomes, assessment criteria, course materials for students' knowledge construction, and learning activities— discussion topics, projects, and tests as shown in Section 6.2.1. The lesson planning (based on the design document) focuses on how to design the instructional approaches to help learners achieve the desired learning outcomes and on how to determine the extent the learners have achieved those outcomes.

Assessment criteria specify the required level of student achievement in terms of knowledge, skills and attitudes for each specific outcome. Test items are developed using the criteria created for each learning outcome, in order to determine whether or not the learner can perform the skill. The content is developed after it has been decided what skills are to be expected of the learners, and after test criteria (and even the test items in certain situations) have been developed.

The course content drives the course development process, and it starts with organisation of the course to suit the blended environment. According to Hall (1997), the subject matter will assist the instructional designer to list the main concepts, in order to determine sub-steps and their relevant detail. Subsequently, the integrated design considerations that include the pedagogical dimensions identified in the literature (Section 2.9) and evaluation of student feedback are then aligned with appropriate technological affordances as depicted in Table 5.1. All these are then integrated into the different stages of the LAPTEL model in its design process. Thus the model embraces all the most important dimensions of learning.

Media selection refers to the appropriate selection of media tools appropriate to the nature of the content theme. Each approach /medium has its own strengths and weaknesses. Some of the materials will work well in Web-based courses but others will not because they may need face-to-face interaction in order to be effective or they may be focussing on memorizing and regurgitating pre-packaged information. Abstract concepts and certain activities requiring hands on practices can be better addressed in face-to-face classrooms. Although face-to-face approach is more beneficial to address materials that are simply didactic, in a blended approach it is

better to replace them with equivalent alternative materials that are interactive, problem oriented, relevant to real-world issues, and that evoke student motivation.

A modular approach as discussed in Section 3.12.3 is recommended for this study. Further, for the design to match with the realities of practice, this study does not support the idea of giving novices ill-structured learning environments (as required by radical constructivists) until after the learners have reached an advance stage in the topic. The above view supports a suggestion by Cognitive load theorists (e.g., Renkl, Atkinson, Maier, and Staley, 2002; Sweller, 2003) that learners start with worked examples initially, with a gradual introduction of problem solving scenarios. However, the Researcher does not eliminate PBL and ill-structured learning tasks completely, but to be given as *extended activities* to match with the learning outcomes of the highest levels of achievement (*Evaluating* and *Creating*) as per Bloom's taxonomies.

At UB, courses are a semester long; a semester has 14 teaching weeks; online courses should have roughly 10-14 sessions. Sessions are equivalent to a week's worth of work for students. The different modules / topics of a course therefore should be broken down into sessions which should add up to between 12 to 14 sessions fitting into 14 week semester.

#### 5.8.2.2 Stages of the Online Course Development Process

As stated in Section 4.11 this study takes a project management approach. Thus, it makes use of an ongoing collaboration between instructional designer, course developer, content reviewer, course tutor, graphic designer, media developers, technologists, and the students. The course developer, content reviewer, and course tutor are all subject matter experts. In most cases, the course tutor will be the course developer as it has been the case in this study.

Table 5.5: Stages of the Online Course Development Process

Stage	Process	Who?
1	Development of design document and course map	Course developer/ Course tutor and Instructional designer.
	Checking of design document and course map	Course tutor and Instructional designer
	Discussion of course map with students	Course tutor
2	Development of content module, session by session as per the recommended course map <ul style="list-style-type: none"> <li>✓ learning activities and assessment strategies</li> <li>✓ Selection/development of other media (e.g. graphics, video) as per the design statement.</li> <li>✓ Instructional design review</li> </ul>	Course developer with support from ID, librarian, and Instructional designer
3	Content review Stage 1 <ul style="list-style-type: none"> <li>- Check for accuracy, depth, breadth, currency, logical arrangement, interactivity in each session and compliance with the house style.</li> </ul>	Content Reviewer
4	Upload content to WebCT LMS: development and integration of media elements, graphics, creation of appropriate links, etc. <ul style="list-style-type: none"> <li>- Welcome message</li> <li>- Information pages <ul style="list-style-type: none"> <li>✓ <i>A course outline that points to any prerequisites for the course, the objectives, a brief listing of topics to be covered, the required materials such as text, grading criteria for the course, participation requirements in the course content, tasks and activities and further reading list.</i></li> <li>✓ <i>Provide clear directions on how to complete the assessment and how to submit assignments and assessments for grading.</i></li> <li>✓ <i>Provide students with information on 'virtual' office hours if they need to consult the course tutor.</i></li> <li>✓ <i>Course schedule to provide students with a time frame and access information about receiving feedback and grades. Course schedule helps to keep students together as they work through the course, but without jeopardising flexibility (of anytime, anywhere and learner's own pace).</i></li> </ul> </li> <li>- Pre-instructional Activities (prerequisites and objectives)</li> <li>- Content Summary</li> </ul>	Course developer, Graphic designer, and Online media developer  Course tutor
5	i) Content review Stage 2 Check for interactivity and appropriate use of tools and	Content Reviewer, and

	media elements for a rich learning experience in each session	Instructional Designer
	ii) Overall instructional design review and testing - Review and testing according to agreed checklist - Test run / Piloting with selected students - Test navigation, links, etc.	Instructional designer, Online media developer, and Course tutor
6	Vetting	Programme Coordinator
7	Implementation: In this phase, the instruction is implemented in the actual learning setting with real learners. - Student enrolment - Tutoring: interactive and collaborative activities - discussion groups, email, chat, etc. - Learning journals - Self tests, assignments and assessments - Course formative evaluation	Course Tutor supported by all stakeholders
8	Course formative and summative evaluation	Course Tutor supported by all stakeholders

Computer-based tutorials can present new concepts and skills through text, illustrations, descriptions, questions and problems. They are used to introduce new content to learners in much the same way that a human teacher might do (Lehman, n.d.: [online]). They can engage students in active learning by allowing them to proceed at their own pace (Daku and Jeffrey, 2001: [online]). Further, one of their unique features is the opportunity learners get in assessing themselves of their progress in the learning process through self-tests, feedback and comparing their progress with their classmates.

Online courses in general have the following components which are all accessed via the interface:

- Home page
- Announcements
- Syllabus/ Course outline/ Learning objectives
- Course content and learning activities that include self-tests and reflection activities
- Links to enhancement and alternative remedial resources
- Communication tools (discussion board, email, and chat)
- Learning journals

- Assignments and Assessments
- Evaluation

With all the careful analysis, planning, and reviewing, the developed instruction will only theoretically work. A test run or piloting with actual learners prior to the implementation phase is done in order to check the viability of the course. It can be quite useful in that their feedback can be used to revise instruction and improve it. It does require a level of rigor and time. In this research study, a pilot group was used to take this approach as a means of receiving instruction. Their feedback on its use was used to inform its revision and thus to improve its effectiveness.

### ***5.8.3 Evaluation of the Model***

No educational model or implementation framework is complete without an evaluation component which is crucial for quality control and shaping future directions. This is particularly true in the case of online/ blended learning as it is important to determine its impact on student learning. The course evaluation process aims to monitor student views on the effectiveness of the course to meet their needs and satisfaction, and to achieve continuous improvement of the course. In fact, evaluation at each phase is important because it allows us to refine the entire process at the appropriate time by comparing the intended outcomes (planning) with those that were achieved (assessment).

It is important to evaluate both the online and classroom-based processes to ensure the relevancy of content, opportunity for participation and feedback, and if relevant information and guidance are included at the appropriate stages. Since this study uses an iterative design approach, evaluation and revision of the design and development of the courseware form an ongoing process.

In this research study, the evaluation phase will consist of both formative and summative evaluation, as well as subsequent revision processes. According to Cottle (1996), the implementation and evaluation phases are interrelated and interdependent, and interact so closely that it is virtually impossible to separate them as distinct phases [online]. Formative evaluation is best done during the implementation phase, often with the help of subject-matter experts and learners; then it is possible for the designer

to focus on how it works in a practical situation and to check whether the system works effectively and efficiently according to initial expectations. Formative evaluation can help identify choices that might not be the most effective, giving the developer, designer and even the researcher an opportunity to revise the course for efficiency and effectiveness before implementation (Lockee, Moore, and Burton, 2002; Dick, Carey, and Carey, 2005). Formative evaluation can be carried out through observation of students' progress, questionnaires, observations, interviews, self-assessment instruments, focus group and individual interviews. All of these forms of evaluation provided the data which is analysed in Chapter 6.

Summative evaluation is carried out at the end of a programme by collecting and analysing findings. It assesses the ability of the learning environment to meet its stated goals and objectives. The purpose of summative evaluation is to determine whether specific performance objectives were accomplished or the degree to which the original instructional goals have been achieved (Wojtczak, 2002; Gustafson and Branch, 1997). It is a measure of the quality of the project and it enables the instructional designer to perform any required modifications in future designs or before it is used for another cohort.

All the design criteria / elements discussed in Section 3.12 were integrated into the six dimensions of the LAPTEL model during its design, development and implementation. In other words, the evaluation instruments are based on five-dimensional design criteria that match with the all aspects of the LAPTEL model. The evaluation tools (Appendices B and C) were developed with performance indicators based on these design criteria, and the checklists from the following three studies found in the literature as best practices for evaluating online models in general. The instruments cover all essential instructional and learning processes that comprise educational environments, course development, teaching and learning, interaction, collaborative learning, and evaluation and assessment activities as found in the literature (e.g., Harper, Chen, and Yen, 2004, pp. 585–598; Raab, Ellis, and Abdon, 2002, pp. 217–229).

- (i) The Seven Principles of Good Practice by Chickering and Gamson in (1987), its modification for online learning by Chickering and Ehrmann (1997) and the

lessons derived from the seven principles by a team of five evaluators (Graham, Cagiltay, Lim, Craner and Duffy, 2001) (See Section 3.5.6).

- (ii) A set of guidelines from Blackboard™ (1998: [online]) that may be used as a checklist is as below:
  - (a) Is there appropriate motivation established to insure student interest and attention to the material and assignments?
  - (b) Is the necessary content provided for all course components?
  - (c) Is the presentation sequence of the content accurate and clearly indicated to guide students through the material?
  - (d) Is all the required information available to the student?
  - (e) Do ample practice exercises exist for students to achieve appropriate rehearsal, processing, and knowledge acquisition of the content?
  - (f) Are there adequate opportunities for instructor and classmate feedback included in the materials?
  - (g) Are appropriate tests, activities, and evaluation tools provided to assess student progress?
  - (h) Are sufficient follow up activities provided to maintain learning and motivation over time?
  - (i) Is the student presented with clear paths, navigational guidance, and transition information to direct them through the course material and components?
  - (j) Are supplemental handouts, such as outlines or checklists available to the student to facilitate transfer of learning provided?
- (iii) A set of seven key elements highlighted by Harwood and Miller (2001) to be used as criteria for performance measurements of elearning environments; these elements are: accessibility, interoperability, communication/collaboration, flexibility, usability, robustness, and ease of use as key performance elements.



### 5.8.3.1 Evaluation instruments

In this study three instruments were developed and used: Instrument for semi-structured interviews, student satisfaction survey (online) and expert survey. For validation, the evaluation tools were given to four colleagues who are experts in educational research to look at it critically. By this the Researcher was able to understand their views on the various items that appeared in the tools in terms of cohesion, and to verify that the statements were linguistically correct. Upon advice from them several items were revised or even removed altogether. The data was further validated using qualitative methods for establishing its trustworthiness as discussed in Section 4.8.

#### (i) *Instrument for semi-structured interviews*

The table in Appendix B summarises the rubrics/items derived from theoretical exposition—learning theories, learning philosophies and instructional design, and the literature on student learning in higher education and online technologies in higher education as discussed in Chapters 2, 3, 4 and 5. These rubrics examine how successfully the five domains of the model (except the element of leadership) have contributed towards student learning; in other words, it evaluates the effectiveness of the model. Since the study focuses on blended learning of students only in one class and not across the entire university, the leadership element was not directly considered and evaluated; however, there were indirect indicators for the impact of leadership identified through participant observation by the Researcher and reports from the Course Tutor and Expert Evaluators. Otherwise, the instrument covers all other possible items related to the effectiveness of the online learning environment based on the LAPTEL model.

The survey items were expected to be rated as 'Yes', 'Limited' or 'No' by the Researcher based on his interpretation of student responses in semi-structured interviews and a group focus interview with the students and also with their teacher. Thus, it is a sort self-report measure of their learning indirectly rather than using course grades or test scores. This assisted the Researcher to judge whether the model has focussed on or lacked the required characteristics. Based on the shortcomings (based on 'No's and the 'Limited's), the model was further improved while the results

of the survey was used to establish typical requirements, as well as generally accepted evaluation criteria for the model in subsequent implementations. The items in this instrument are clear and appropriate enough to be used also as a normal questionnaire survey depending on the respondents' convenience.

One comment that was common from most of them was that the tool was fairly long. Initially the instrument had 78 objective items and two open-ended questions; the number of objective items was reduced to 62 for the next level of study with an open ended question. Before shortening it any further, because the Researcher wanted to find out how it was taken by the participants in the pilot; the arbitrators agreed with the Researcher's view that a long test (provided it was not deliberately made long just for the sake of it) tends to minimise measurement error especially when measuring skills, behaviours and opinions. To get additional comments, three open-ended questions were asked to all students during the semi-structured interviews. The final instrument used for semi-structured interviews is given in Appendix B.

(ii) *Online Student Survey*

Upon completion of the course, an online opinion survey was carried out using the instrument with 25 items as given in Appendix C. It used a 5-point Likert scale, with 1 for Strongly Disagree (SD), 2 for Disagree, 3 for Undecided (U), 4 for Agree (A) and 5 for Strongly Agree (SA). Out of the 25 items, 13 items are worded positive and the remaining negative for balanced keying (an equal number of positive and negative statements) in order to obviate the problem of acquiescence bias<sup>8</sup>, since acquiescence on positively keyed items will balance acquiescence on negatively keyed items (Wikipedia, [http://en.wikipedia.org/wiki/Likert\\_scale](http://en.wikipedia.org/wiki/Likert_scale)). It also tends to avoid errors from subjects' psychological orientation towards responding similarly to items that occur close to one another. The responses to each of these negative items were reversed in meaning while tabulating the responses; that is, if the respondent gave a 1, it became a 5; a 2 changed to a 4; 3 remained as it is; 4 became 2; and, 5 = 1.

There are several items that are common in this survey and the core items used for structured interviews, but this tool is still designed differently to determine student satisfaction from a different perspective. The outcome of this evaluation was

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<sup>8</sup> *A tendency to agree with statements as presented if the same pattern is followed.*

compared with that of the semi-structured interviews to enhance the trustworthiness of the findings. It was also aimed to measure the effectiveness of the learning environment by measuring the level of student satisfaction. Students were expected to respond to all the items. As they were expressing their individual opinion, the Researcher included a provision for an undecided or neutral option.

The concepts of 'reliability' and 'validity' are often viewed as the two primary standards for judging research findings. The above instruments were validated by four colleagues and were also piloted with a small group of ten students from the pilot study group. The outcome of the final survey was interpreted based on the Mean score for each item, its standard deviation and the Mode (descriptive statistics). Based on all the feedback from learners, instructors and even colleagues as well as the instructor's and the designer's reflection on course strengths and weaknesses, appropriate revision in the instructional approach were made that affected content accuracy, instructional quality, visual/production quality, and usability.

A measurement cannot be valid without the instrument being reliable. Further, reliability is a necessary but not sufficient condition for validity. Reliability is the correlation of an instrument with a hypothetical one which truly measures what it is supposed to. In order to estimate the reliability of the student satisfaction evaluation instrument, the 'test and retest' method was used because it attempts to determine whether instrument is stable and consistent when used at different times. The same ten students were given the same survey twice in an interval period of two weeks under identical conditions. Pearson's product moment correlation coefficient was used to calculate the correlation between test and retest outcomes. The closer the results are, the greater is the test-retest reliability of the survey instrument. If the correlation between the two survey administration is high ( $\geq 0.7$ ), then it has a good reliability. A moderate value of 0.5 - 0.6 should be enough in most cases as people's opinions could change with time. If the correlation coefficient is below 0.5, researchers should make the appropriate corrections.

*(iii) Expert evaluation instrument*

A tool was developed for the expert evaluation to be done by four lecturer colleagues. This is based on the pedagogical dimensions of blended learning approach and the

online design criteria synthesized from the literature review. The tool is given in Appendix D.

### **5.9 Changing roles of teachers and students**

With rapid advances in technology, the nature of knowledge and learning for the information age is no more the same as that of the industrial age, and this has major implications for the strategies to be used for inspiring and engaging today's learners who have grown up surrounded with digital media and are used to having instant access to information. They look for flexible resources that change with their individual needs, and prefer to work in student-centred, networked learning environments. All these have major implications for the design and delivery of instruction and demand new responsibilities from teachers as well as students. Moving from teacher-centred practice to this new approach in the online environment often creates dramatic shifts in the perspectives of instructors and their students (Dringus, 2000) particularly in their roles. Some of the challenges and barriers for online learning that have been identified by researchers are the change of roles and responsibilities for instructors (Zheng and Smaldino, 2003).

#### *(i) New Roles of Teachers:*

In such a student-centred and teacher-supported learning environment, the role of the teacher is no longer the all-knowing “sage on the stage” who expertly transmits knowledge but a facilitator of student learning, an experienced member of a learning community, researcher, consultant, mentor, or resource person. Further, since the online environment is different from the more traditional passive classroom, it is important for the instructor to motivate students to adjust their roles to become a more active online learner.

Besides their role shifting, the role of the virtual instructor is to select and filter information for student consideration, to provide thought-provoking questions, and to facilitate well-considered discussion (Kettner-Polley, 1999). Within the context of social networking tools, teachers are on the verge of becoming creators of conducive learning environments and designers learning experiences. They need to be creative

and be able to pose thought-provoking questions (rather than to provide answers) that stimulate higher-order thinking skills and metacognition, to challenge learners' curiosity, and to encourage them reflect on the learning process. Even the most experienced traditional teacher requires additional skills to teach online; they need to explore new pedagogical options that reflect sound online instructional principles and technological innovations.

In online student-centred online learning environment, learning occurs by building on previous knowledge, through interaction with rich learning environments, and results from engaging in authentic activities, and social interaction and negotiation supported by the teacher. In online education, the nature of interaction between students and their instructors have changed from synchronous in face-to-face instruction to mainly that of asynchronous in a virtual community. Moore (2001) noted that to effectively deliver online courses, faculty must promote student-to-student interaction with minimal faculty intervention, engage students in regular assignments, cultivate students' self-directed abilities, and then provide specialized attention to students who lack self-directedness. Due to several such changes, Zheng and Smaldino (2003) argue that, besides being a facilitator, the instructor should also be an instructional designer.

Collis, Vingerhoets, and Moonen (1997) formed a set of key principles for good teaching and learning in higher education the first of which is to “scaffold the learner’s increased self-responsibility for learning” (in a VLE). Other factors are to stimulate active engagement, elicit articulation and reflection, lecture less while giving more feedback and to encourage more frequent targeted communication. In addition, since learners are perceived as constructors of knowledge in the new paradigm, the learners’ unique perspective must be evaluated and attached more importance than external criterion-referenced evaluation. All these mean that teachers have to adopt new instructional approaches, and assessment strategies, incorporate collaborative tasks, and develop technological skills.

Instructors need to scale up their attitudes to teach online, understand what skills are needed, and know what they can do to ensure the quality of online instruction. As Deubel (2003) has argued, an instructor's attitude, motivation, and true commitment

affect much of the quality of online instruction. In addition, instructors must be ready to engage in a range of teaching innovations and for investigating the impact of these approaches on student learning (i.e., the scholarship of teaching and learning).

From the forgoing discussions, online teachers should also have the skills in the following:

- How to motivate students to learn;
- Pedagogical techniques that differ from traditional face-to-face techniques whereby the student and teacher have to actively co-create the learning environment;
- How to establish effective communication and interaction in the absence of nonverbal visual cues;
- Good facilitatory tutoring skills for self-directed learning and for challenging learners' thinking or reasoning skills (problem solving, metacognition, and critical thinking) by asking the 'right' questions which probe their understanding deeply and spark their intellectual curiosity;
- Effective assessment techniques for measuring student achievement and learning including higher order learning outcomes.

Nunes and McPherson (2006) propose the following skills essential for online tutors:

- a) To plan and organise delivery by clearly specifying learning objectives and outcomes;
- b) To set learning agendas and providing leadership and scaffolding in learning activities;
- c) To welcome and embrace diversity of learning outcomes, attitudes and styles;
- d) To adapt supporting styles to the needs of individual participants;
- e) To provide advice on different levels of access to learning materials according to the needs of individual participants;
- f) To create an atmosphere of collaborative learning of which the tutor him/herself is often an integral part;

- g) To be able to cope with and resolve online conferencing conflicts and difficult behaviours;
- h) To encourage active construction of knowledge by being actively involved in discussions, activities and debates;
- i) To develop and implement methods for learner feedback and reinforcement;
- j) To present advance organisers into the content materials and advise on learning pace so as to avoid cognitive overload and information anxiety.

Mason (1998) advocates the organizational, social and intellectual roles of the online lecturer. Bonk and Wisner (2000), Wlodkowski (1999), and Besser and Bonn (1996) identify the following as the most critical skills of an online instructor: Expertise, Empathy, Enthusiasm, Clarity, Cultural responsiveness, Mentor, Provocateur (prompting critical thinking in learners), Observer, Participant, Co-learner, Assistant, Community organizer, Host, Facilitator, Mediator, Patient, Positive, Friendly, Responsive, Caring, Flexible, and Web-smart. Bonk and Wisner (2000) also note that a lecturer who offers web-based courses requires competencies such as: Social, Managerial, Research, Pedagogical and Technical skills. It is important for instructors to be familiar with these essential aspects to enable them build an effective online learning community and integrate it with occasional face-to-face sessions in order to take advantage of both in a complementary manner.

*(ii) New Roles of Students:*

Students must move from being a more traditional passive classroom learner to a more active online inquirer who can collaborate with peers in order to develop personal understanding of course content. By these changes in approaches, learners gradually take increasing responsibility for their own learning as they become effective self-directed learners. To become successful self-directed learners, they must accept responsibility for majority of their learning. This involves setting their own time schedules, developing the right study habits and discipline necessary for accomplishing the tasks. Garrison, Cleveland-Innes, and Fung (2004) suggest that online learners must take more responsibility, adjust to a new climate, adjust to new context, synthesize ideas, know how to participate, synthesize ideas, apply ideas or

concepts, and stimulate their own curiosity. According to Palloff and Pratt (2003) online learners should be willing to take “responsibility” for online community formation and be willing to work “collaboratively”. Instructors should clearly explain to students in advance the change in roles they must adapt in order to be successful in online learning environment.

A major advantage of online learning to students is its flexibility; however, this flexibility also poses a challenge to them: they have to adapt the new pedagogical approaches which are a lot different from the teacher-directed approaches; they have to manage their learning time themselves, and develop strategies of creating knowledge and monitoring their own learning process. They must engage in social negotiation activities, often via online discussions, online project work and online collaborative activities. The new approach puts high cognitive demands on some learners, especially on the low ability group. The cognitive load has the potential to cause problems in cognitively ill-equipped learners, making them feel “disorientated,” and causing “cognitive overload” in such learning environments (Oren, 1990).

Liyoshi, Hannafin, and Wang (2005) suggest that technology as a cognitive tool can help learners in overcoming their disorientation and cognitive burden because cognitive tools are capable of searching, accessing, and organizing and processing a large amount of information. Therefore, if technology can be used appropriately, it can address challenges posed by technology itself.



### **5.10 Summary**

This chapter was built on the literature and the theoretical framework from which the design principles for the pedagogical model were derived. The LAPTEL model provides a framework for good practice in engaging students in learner-centred learning tasks in a blended learning environment; it is designed to give greater control to students in order to promote and facilitate their own construction of knowledge and meaning through constructivist tasks as well as socio-dialogical processes. Current instructional design models do not provide effective strategies appropriate to the teaching and learning culture of UB, and therefore, the focus of this work is to propose strategies for making face-to-face approaches more learner-centred using affordances of technology for asynchronous as well as synchronous communication and interaction. Thus, the Researcher has considered moving beyond these existing models by adapting and manipulating them for the given context, mainly using iteration of design processes, continual evaluation and subsequent modifications through the LAPTEL model.

Further, based on the design concepts derived from the literature, an evaluation instrument to assess the students' perceptions on the delivery of the course was developed and it was checked for validity and reliability during the piloting stage of the model. This chapter addresses the sixth and seventh specific objectives that were formulated in the beginning in order to achieve the goal of this study.

A media prototype of the course was modelled in the next Chapter 6 for the purpose of piloting and subsequent modifications.