ISSN: 2167-1435
v29 n1932

A Systematic Approach to Faculty Development Towards Improved Capability in Tertiary Teaching in a Blended Learning Environment

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Abstract

The blended learning (BL) approach provides an efficient and effective instructional experience. However, adopting BL poses some challenge to faculty; the most important obstacle found in this research is faculty's lack of knowledge regarding the use of technology in their teaching. This challenge prompted the researchers to develop a solution to address this problem by improving faculty's ability to use of technology in teaching. A systematic Learning Management System (LMS) Process Improvement Model, named Opening, Analyzing, Stimulation, and Achieving Processes (OASA), is proposed that enables educational institutions to establish a well-designed, effective faculty development program for BL teaching and learning. OASA is structured into five levels. Transformation from the lower to the higher levels of capability in BL teaching and learning is based on prescribed processes intended to provide a new foundation of practices. The conceptualization of OASA was demonstrated by means of a prototype with scope focusing on enhancing faculty's level of capability from Level Two to Level Three. The research has been validated using various validation strategies. The main finding is that OASA is a well-founded approach that can help educational institutions overcome challenges related to faculty's lack of knowledge in using technology in teaching. This study found that adopting OASA would make faculty development processes more understandable, give faculty a starting point for BL pedagogy, keep faculty focused on tasks, and show a process of BL improvement until faculty achieve best practices. In addition, the main contribution is that OASA expands the BL body of knowledge, generalizing a solution for problems relating to faculty's lack of knowledge about technology, and demonstrating the proposed solution by means of a Blackboard based prototype of BL course.

Keywords: Blended learning, Higher Education, Process Improvement, Capability Maturity, Faculty Development

1. INTRODUCTION

Globalization has become real in the current century, and it is generally agreed that advancement in Information and Communication Technologies (ICT) provides opportunities for competitive advantage in various sectors, such as e-economy, e-business and e-education.

The educational sector is one which allows for adjustment to the strategy to provide better services to learners. Information Technology (IT) for education, also called e-Learning, helps to provide modern, efficient, effective and cost-effective alternatives to traditional on-ground teaching and learning.

e-Learning is defined as a learning model that delivers course content via electronic means such as the Internet, Extranet, Intranet, broadcast, satellite, audio/video, interactive TV and CD-ROM. The concept of e-Learning has been around for decades, and software systems to support its adoption are of the most significant recent developments in the Information Systems (IS) industry.

Developments in technology allow educational institutions to redesign their teaching and learning processes to take advantage of the features and capabilities of ICT systems. At the same time, faculty in such educational institutions should be supported in the adoption of appropriate technologies for their pedagogy, as well as stay informed about the latest developments coming to the educational market.

The use of educational technologies in delivering higher education courses represents a real challenge for faculty members to support their culture of teaching (Travis & Price, 2005). One of these challenges is faculty' lack of knowledge to use technology (Boggs & Pirani, 2003).

In Saudi Arabia there is insufficient empirical data and assessment on BL adoption in universities (Al-Sarrani, 2010). This situation has prompted the researchers interest to explore the use of Learning Management Systems (LMS) for the BL mode of delivery.

The preliminary literature review for this research found that lack of knowledge regarding adopting BL for teaching at the university level is among the key factors in developed and developing countries, and also in Saudi Arabia. This research has aimed to overcome the lack of knowledge factor by means of a Faculty Development Program, which can aid faculty to gain higher levels of capability to use the LMS, including the various functions supporting pedagogy and didactics for BL at the tertiary level.

The paper reports on the context of the study, the research problem addressed, Research Planning for the investigation, conceptualization of a solution to the research problem, and Demonstration of Concept. A Summary is provided and some Conclusions are given at the end of the article. More detail about the study is provided in Badawood (2012).

2. RESEARCH CONTEXT

Background of the Study

Technology today allows a variety of teaching and learning models to be adopted in higher education institutions. These models range from face-to-face to distance learning models. With online technologies there are many approaches followed, such as e-learning, m-learning, e-mentoring, e-tutoring, web-based instruction, web-enhanced instruction, hybrid courses, and BL models (Davis, 2007).

In this research project, BL is used as defined by Heinze and Proctor (2004): "a learning model that is facilitated by the effective combination of on-ground and online modes of delivery in support of different styles of teaching and learning, and founded on transparent communication amongst all parties involved in a course".

In a world that is becoming increasingly dependent on technology, policy makers are questioning whether the traditional classroom experience meets the requirements of students in the 21st century, not only in the United States but also worldwide.

As universities plan to make it a priority to utilize best practices in educating students through technology, and newer pedagogies, online learning, face-to-face learning, and unique combinations of the two are being explored. The plans to achieve these goals include transitional approaches to e-Learning and traditional classroom instruction in what is referred to as a BL (Allen & Seaman, 2007).

BL is not a new learning model, though its use has steadily risen in higher education due to pedagogical, economic and other reasons (O'Laughlin, 2007). It is considered to be the best learning model since it has the convenience of the online delivery without losing the benefits of the traditional face-to-face learning model.

Current research, supported by the Sloan-C Consortium, indicates that the use of the BL model is complex and varied, as well as reflecting a dynamic state of flux in higher education (Allen et al., 2007).
It is clear that adopting the BL model mandates that faculty are prepared to use technology in their pedagogy since up to half of the course time will be online. The requirement that faculty have the capability to use educational technology makes the adoption of BL complex. Also, there is a complex relationship between faculty pedagogy and teaching in BL mode, partly due to faculty's lack of knowledge to use educational technology in their teaching.

Research Problem

The Ministry of Higher Education of Saudi Arabia encourages university faculty to use BL in their teaching and learning, since it provides a more cost-effective and pedagogically sound way to blend traditional modes of teaching with new technologies, as well as provides a way to bridge this new technology with cultural and religious practices (Al-Sarrani, 2010). The Al-Sarrani study examined Science faculty concerns and professional development needs to adopt BL in their teaching at Taibah University in Saudi Arabia. The study examined two research questions: 1.What are the Science faculty concerns in adopting BL at Taibah University; 2. What are the Science faculty professional development needs in order to adopt BL at Taibah University? The key findings were that there is a statistically significant difference in the participants' concerns in adopting BL, and between Science faculty's use of technology in teaching and their attitudes towards technology integration in the Science Curriculum (Al-Sarrani, 2010). However, little is known about Saudi faculty knowledge of BL to bring it into widespread use.

The findings of the Al-Sarrani investigation highlighted the lack of empirical data about factors of perception of university faculty, and assessment processes on BL in Saudi Arabia Al-Sarrani, 2010).

Need for the Study

The focus of this study has been to address faculty's lack of knowledge to use technology in their teaching by means of BL delivery. A solution is needed to address the problems argued in previous section. The solution developed in this research includes a systematic LMS Faculty Development Program to support a BL model using a Process Improvement Model, in which faculty can enhance their teaching and student learning capabilities.

Purpose of the Study

The purpose of the study was to identify and improve the processes involved in a Faculty Development Program, thereby aiding them to integrate the tools offered by the LMS in the pedagogy of their BL courses.

3. RESEARCH PLANNING

After a research problem is identified, research planning is performed to organize the research in terms of the research strategy, approach, process model, and design.

Research Strategy

An empirical/positivist strategy was adopted that is characterized by observations and interventions using several methods (Remenyi et al., 1998; Boland & Hirschheim, 1987; Galliers & Land, 1987; Steenkamp & Basal, 2011). This strategy was appropriate for research focused on the phenomena, processes, and behaviors of particular interest in higher education in Saudi Arabia. This called for an approach and supporting methods to conduct the literature review, data collection and analysis, derive a grounded theory based on insight obtained, conceptualize a theoretical conjecture, demonstrate concept, and validate the research.

Research Approach

Supporting methods helped the researcher gather comprehensive data about the problem under investigation.
The research approach and consequent research design was supported by a number of methods as summarized in this section (also refer to Appendix 2 Tab
Data collection

The following methods were used for collecting qualitative data:

- Literature reviews were a good source for the data collection phase.
- Grounded theoretical framework: Khan's octagonal framework was used as a grounded theory for the research project as various issues within the eight dimensions of this framework were relevant in several

studies conducted to review resources and tools of e-Learning programs (Khan, 2005). The framework is regarded as a modern and comprehensive among similar frameworks.
- Grounded theoretical framework: Capability Maturity Model (CMM) was used to design a conceptual solution, based on the notion of levels of capability. The CMM was initially developed at the Software Engineering Institute (SEI) at Carnegie–Mellon University in 1987 (Humphrey, 1998).
- Qualitative data collection based on the Blackboard based prototype of the conceptual solution.

Prototyping

- Blackboard based prototyping was included as part of action research conducted during the Demonstration ofe Concept phase
- The following method was used to evaluate the demonstration of the concept:
  Open-ended interviews with seven independent reviewers to evaluate the Learning Management System (LMS) Process Improvement Model (OASA) on the Blackboard based prototype. The interviews were structured, informal and in person. They helped collect more detailed and comprehensive information regarding the proposed OASA model to achieve the goals of this research project.

Research Process

A formalized research process has been used by researchers for some time, since it helps them to design systematic research that enables researchers to meet their research objectives

The research process used in this investigation is depicted in Appendix 1. This model starts with performing problem analysis and continues with conducting a preliminary literature review, developing a research proposal, and completing a literature review. The assessment of established theoretical frameworks and models are analyzed to determine if there is a strong focal theory. In case the focal theory is not strong, the researcher derives the grounded theory by inductive reasoning. However, if the focal theory is strong, a conceptual model may be created and demonstrated by developing a prototype. Once the conceptual model is demonstrated, it should be reviewed, evaluated and adjusted or refined as needed. Once the research project arrives at this point, it must be validated and brought to completion.

Brief descriptions regarding the phases of a positivist-empirical research strategy are included in the following section.
Problem Analysis: At this phase, the research problem is identified and analyzed. The focus was on LMS in terms of BL.

Preliminary Literature Review: At this phase, the background theory (distance education) and focal theories (LMS and BL) was be covered in a literature review.

Research proposal: At this phase, the research proposal containing the formulation of the research problem, questions, proposition, and strategy was prepared and presented by the researcher, and approved by the dissertation committee.

Detailed Literature Review: At this phase, the focal theories are analyzed in detail, namely the pedagogy of BL, faculty perception toward BL, process improvement, and theoretical framework.

Assessment: At this phase, selected frameworks (Khan and CMM) are assessed whether they may be considered strong focal theories. The assessment will be based on the framework literature review.

Theoretical Conjecture: At this phase, the conceptual solution (OASA) was designed.

Experimentation: At this phase, a demonstration of the proposed solution in form of a prototype involved the design and development of an actual BL course using the Blackboard LMS.

Review and Evaluation: At this phase, the prototype was tested and reviewed by the researcher, and then evaluated by seven independent reviewers using open-ended interviews.

Refining: At this phase, the conceptual solution is refined based on the feedback received from reviewers.

Validation: At this phase, the research was validated.

Research Design

The key elements of the research design of this research project are summarized in Appendix 2.

ISSN: 2167-1435
v29 n1932

These elements comprise information such as the purpose of the study and research question, approach, strategy of inquiry, method, and evidence collection.

4. CONCEPTUALIZATION

Educational institutions are seeking to improve their BL courses by adopting Learning Management System (LMS) since BL integrated with LMS provides a number of advantages namely effective learning, ease of use, learner engagement, reuse, and innovative approaches (Anderson & McCormick , 2005).

Educational institutions need to know more about faculty and student attitudes, factor of satisfaction, and the outcomes of academic programs and courses. However, this information is not enough to identify processes needed to design and assess a LMS Faculty Development Program that can aid faculty to integrate the tools offered by the LMS in the pedagogy of their BL courses.

In this research it is proposed that educational institutions adopt a systematic LMS Process Improvement Model, here called OASA, in order to establish a well designed and effective BL teaching and learning approach. Such a model would incorporate a process improvement framework with process categories that are structured into levels of capability. These capability levels make processes more understandable, serve as process improvement starting points for specific capability levels, keep faculty focused on the activities of the process involved, and provide steps to perform the activities along with their inputs and outputs. The capability of faculty to perform the activities of a particular process will be assessed upon completion of the activities of the process.

LMS Process Improvement Model (OASA) is to be considered as an empirical and descriptive process model (Wang & King, 2000). It is empirical because it defines an organized and benchmarked model and is based on best practices. It is also descriptive because the model describes what to do according to prescribed process.

Process improvement models have been successfully used by organizations to improve their software and IT processes, services, and delivery (Software Engineering Institute, 2011). In education such a model may be used in many different areas to assess the current status of capability and determine the need for improvement.

OASA

In conceptualizing a solution to the research problem, the researcher has developed a LMS Process Improvement Model called OASA. OASA is an acronym for Opening, Analyzing, Stimulation, and Achieving Processes. OASA is structured, see figure 1, into five levels namely Level One (Aware), Level Two (Capable), Level Three (Knowledgeable), Level Four (Proficient), and Level Five (Practitioner).

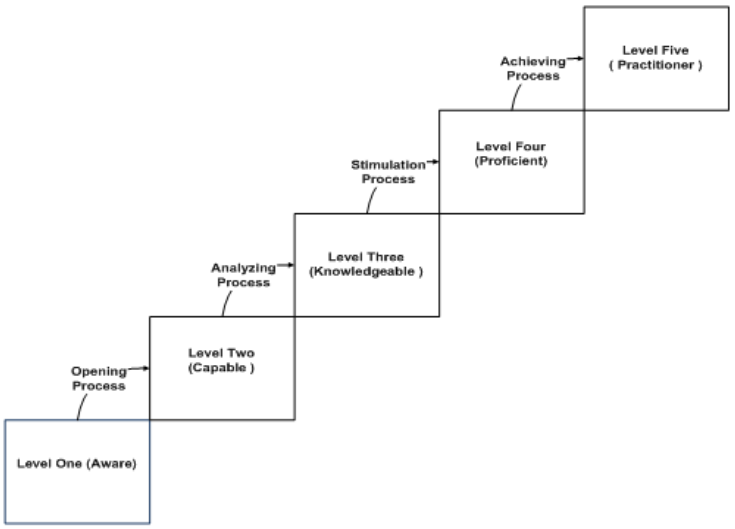

Figure 1. LMS Process Improvement Model (OASA)

The transformation to higher levels of capability in BL teaching and learning from the lower levels to higher levels is based on prescribed processes, namely Opening, Analyzing, Stimulation, and Achieving. For example, to move from Level One to Level Two, the Opening process is the starting point to meet the objectives of this transformation. OASA is intended to provide a new foundation of practices, as well as enabling the academic unit to transform from lower to higher levels of capability.

Level One (Aware): At this level faculty are aware about what the LMS is and what kind of skills faculty would need to adopt LMS functions in their BL courses, as well as the purpose of the LMS Faculty Development Program. In addition, at this level, faculty will be aware about the

levels and improvement processes involved in the LMS Faculty Development Program. This level is to be considered as a preparation level for faculty to be ready to start the LMS Faculty Development Program.

Level Two (Capable): At this level faculty are capable to perform basic LMS functions. Further, at this level faculty will be able to support their pedagogy with the prescribed LMS functions for this level.

Level Three (Knowledgeable): At this level faculty are Knowledgeable to explore more of the LMS functions that are beyond the basic functions provided at Level Two (Capable). Functions at this level will equip faculty to be Knowledgeable about interactions with students. Additionally, faculty will be able to design their pedagogy with support from the prescribed LMS functions for this level.

Level Four (Proficient): At this level faculty are proficient about functions that simplify the connection and interaction with their students. Achievement at this level affirms that faculty are proficient in running VOIP meetings, as well as create and edit podcasts, blogs, and wikis. Being proficient in the mentioned functions will help faculty to run BL courses at an above average capability. Further, faculty will be able to design their pedagogy with support from the prescribed LMS functions for this level.

Level Five (Practitioner): At this level faculty are effective and efficient practitioners in using LMS functions that will enhance their teaching. Faculty will learn how they can run Safe Assignment functions that help in preventing plagiarism. Also, at this level faculty will be practitioners in creating course dashboards that help in facilitating a quick glance of each student's interaction among their courses, including review status, dates since last login, discussion board postings, grades, and adaptive releases. Finally, at this level faculty will be practitioners in exporting the entire course for the purpose of teaching a similar course in a future semester.

Once faculty reach this level they must have integrated the best practices of all previous levels. This means they can manage students, time, tasks, and collaboration, as well as use the technology to offer a pedagogically effective environment.

OASA Transformation Methodology

Transformation from one level to the next is based on the faculty assessment. Faculty can only be trained in the practices at a higher level if they meet the requirements of the level they are at. The proposed transformation methodology which educational institutions should follow to improve faculty capability is illustrated in Appendix 3 The methodology defines activities to use inputs of a level, to achieve the outputs, and then assessing the outputs. The outputs will be assessed, and once faculty assessments meet a level's requirements, improvement training can occur to train a faculty member for the next level of capability.

OASA Assessment and Improvement Methodology

Faculty involved in LMS Faculty Development Programs cannot attain a higher level of OASA unless they fulfill the requirements of the level they are at. Moving from level to level will be based on assessments that help in identifying if faculty competency allows them to progress to the next level. There are two kinds of assessments defined to assess faculty competency:

1. Trainer Assessment: trainers will assess faculty at the start and end of the training period. Trainers will use online and on-ground assignments to assess faculty competency in technology and pedagogy.
2. Peer assessment: faculty as peers will assess each others' assignments so that they can learn from each other.

OASA assessment is not elaborated in this dissertation since it was out of scope of this research project. There are international standards for System Life Cycle Process Assessment, such as the ISO/IEC TR 15504 Part 6 (Bella, 2008) that can guide such a project.

OASA may be used to assess faculty for their capabilities in the use of LMS from the technological and pedagogical perspective. Improvement and progression to a higher level of capability is based on faculty effort. Faculty need to practice to pass the level assessments. Once they pass an assessment for the level they are at, they can attend faculty development sessions to attain the next higher level, and in time they can reach Level Five where faculty are regarded as practitioners in the utilization of BL practices.

OASA Class Diagram

Appendix 4 illustrates the LMS Process Improvement Model (OASA) class diagram which comprises a number of classes that are essential to BL faculty training that are the class of Faculty; class of Student; class of Pedagogy, which covers online and On-ground classes; class of Technology; class of LMS; class of Development Program; and class of Level of Improvement. The latter class has five types namely Level One (Aware), Level Two (Capable), Level Three (Knowledgeable), Level Four (Proficient), and Level Five (Practitioner), which calls for a generalization/ specialization relationship (Is-a relationship) allowing for inheritance to be expressed in the model. The class of Assessment, which is done by trainers and peers; and class of LMS Process Improvement Model which includes Opening, Analyzing, Stimulation, Achieving processes.
Two classes have a generic set of operations. First is the Level of Improvement class which has a generic set of operations that works with all of the levels under this class. The generic set of operations includes In-class Practice, Online Practice, Execute Case Study, and Evaluation. Also, the LMS Process Improvement Model has a generic set of operations that applies to all the processes under this class. The generic operations are input, cavity, output, and assessment. To demonstrate the concept, the researcher chose the Level Two (Capable) and Level Three (Knowledgeable) functions, which are covered under Analyzing Process, to be the scope of the demonstration of concept.

OASA Road Map Diagram

The road map of the proposed conceptual solution in Appendix 5 represents the conceptualization of implementing OASA. The diagram shows the levels, constituent processes (except Level One which does not need a process to start), transformation methodology elements to develop faculty from lower levels to higher levels of capability, and the relationships between these elements.

5. DEMONSTRATION OF CONCEPT

Overview

The demonstration of the concept involved the creation of a prototype of a blended learning (BL) course using the Learning Management System (LMS) Blackboard System environment. The creation of the course is based on the OASA Model, described in Section 4. The scope of the demonstration is to design an LMS Faculty Development Program for transforming a faculty member's level of capability from Level Two (Capable) to Level Three (Knowledgeable).

The LMS functions demonstrated in the Blackboard based prototype are as follows:

- Logging into LMS.
- Access Courses Page.
- Access a Course Control Panel.
- Add Course Documents.
- Send E-mail.

Every function demonstrated is given in terms of the following:

- Function description.
- Function requirement.
- Function demonstration steps and screenshot.
- Pedagogy needed.
- Faculty practice.
- Faculty evaluation.

Prototype

The prototype course was created by the researcher within the Blackboard LMS. The Blackboard LMS is a software application that used to enhance virtual learning environments. It enables faculty to manage courses and students to reach courses' contains easily. It includes various functions namely, course and content management, discussion board, virtual classes, and collaboration tools such as email, blogs, wiki, and podcast. It also includes assignment repository, grad book, and reporting performance dashboard (Blackboard Inc, 2004).

The LMS functions that were demonstrated are Level Two (Capable) to Level Three (Knowledgeable) functions. The functions are Log into LMS, Access Course Page, Access Course Control Panel, Add Course Documents, and Send E-mail.

6. Validation of the Research

Research validation is a mandatory step in the research design and procedures. Validation can occur when an adequate level of confidence exists that the researcher's claim truly reflects what is measured or observed (Remenyi et al., 1998)

The researcher used several validation strategies to validate the findings of this research project, namely validation relating to the research questions, conceptual solution, and the prototype in terms of the conceptual solution according to predetermined criteria.

After applying the validation strategies the researcher determined that the proposed conceptual solution OASA is a valid solution to the research problem addressed in this investigation, very useful in an academic environment, and specifically in higher education in Saudi Arabia.

7. SUMMARY AND CONCLUSIONS

The research confirmed that one of the most significant challenges education institutions have are e faculty's lack of knowledge to design courses with technology support and lack of confidence to use technology in teaching. He has proposed a design for a LMS Faculty Development Program which can help faculty to integrate the tools offered by the LMS in the pedagogy of their BL courses.

A Process Improvement Model (OASA) was developed which is divided into five levels, where the transformation to higher levels of capability in BL teaching and learning from the lower levels to higher levels is based on prescribed processes.

The research made three main contributions:

- Expands the body of knowledge regarding BL. Enhanced understanding was obtained of facultys' positive and negative perceptions toward BL and the challenges that faculty, students, and education institutions face when adopting BL.
- Developed a generalized solution for problems relating to facultys' lack of knowledge regarding using technology in teaching. The proposed solution might help educational institutions to design a Faculty Development Program based on levels of capability.
- Demonstration of the proposed solution by means of a BL course using an LMS Blackboard-based prototype. The demonstration shows how such a solution helps faculty to gain familiarity with the LMS, including the various functions and practices to support their pedagogy and didactics for BL at the tertiary level.

8. Acknowledgements

The authors acknowledge the support of King Abdullah Ben Abdulaziz for the study and the input of all the supporting research committees during this research project.

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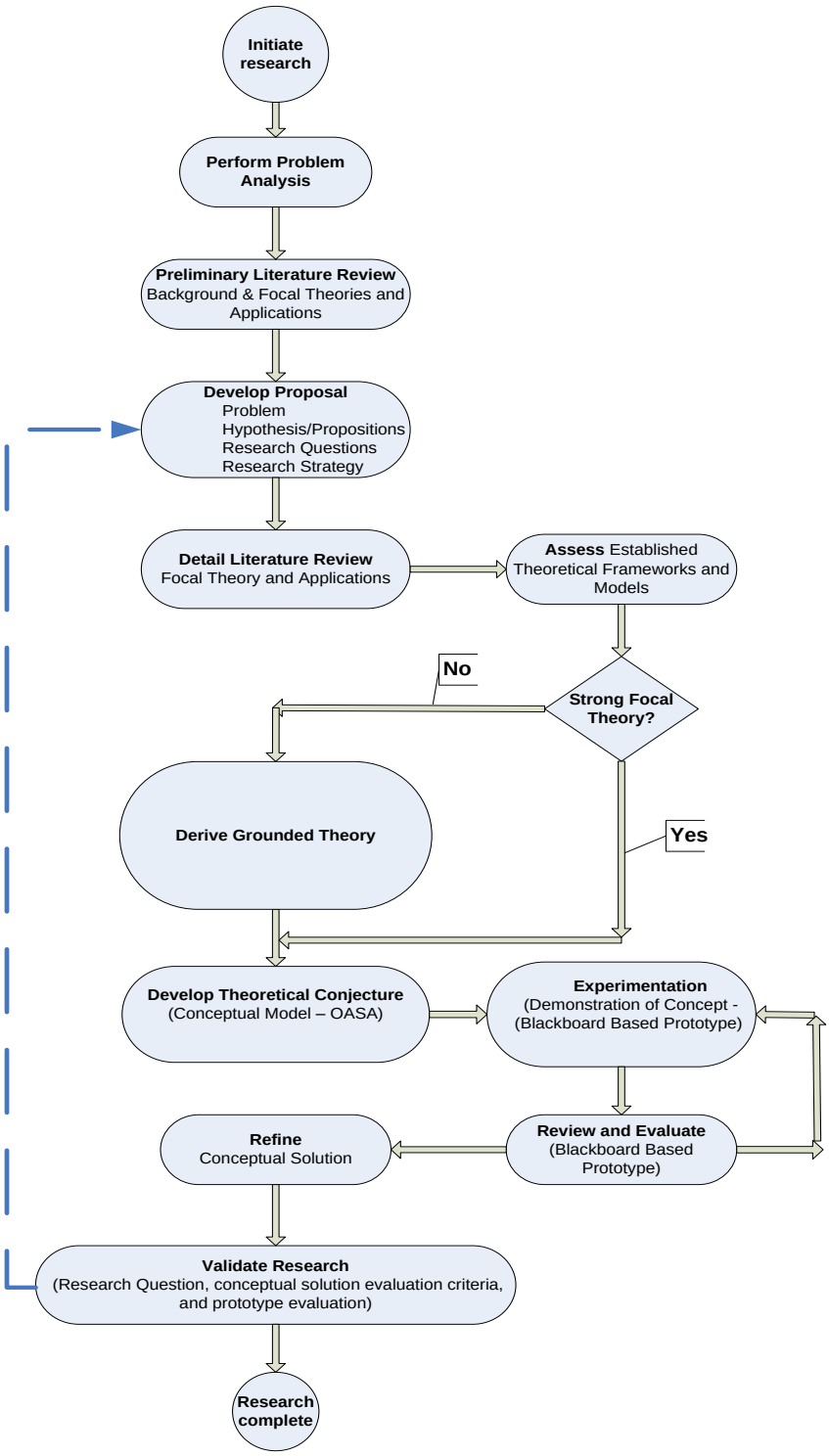
Appendix 1. Research Process Model



ISSN: 2167-1435
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Appendix 2. Research Design

Purpose of Study	Research Questions	Research Proposition	Strategy of Inquiry	Research Approach	Research Method	Evidence Collection
Identify processes needed to design and assess a development program for faculty that can help them to integrate the tools offered by the LMS in the pedagogy of their BL courses. Adopt a systematic LMS Process Improvement Model in order to establish a well-designed and effective BL teaching and learning approach.	**Question 1** What are the main challenges faculty face when they are assigned to teach BL Courses? **Question 2** How can educational institutions overcome the challenge of teaching BL courses? **Question 3** How can a process improvement model address and resolve facultys' lack of capability to use educational technology in their BL courses?	Faculty capability to teach in BL mode of delivery, supported by a LMS, may be improved by means of a LMS Faculty Development Program, and prepare faculty for improving their level of capability.	Positivist / Empirical	Qualitative/Narrative Analysis	Literature review	Published research relate to the domain investigated
				Grounded theories - Khan Octagonal Framework - Capability Maturity Model (CMM)	Observation Problem and solution conceptualization	Observation
				Demonstrating the conceptual solution	Prototype	Data collected from prototype evaluation
				Prototype Evaluation: Informal and in person Interviews	Structured open ended questions for prototype evaluation	Participants Observations captured
				Research Validation	Validation of Demonstration of Concept (prototype) in terms of Conceptual solution, proposition, and research questions	Meet prototype requirements derived from conceptual solution Supports proposition Answer research questions

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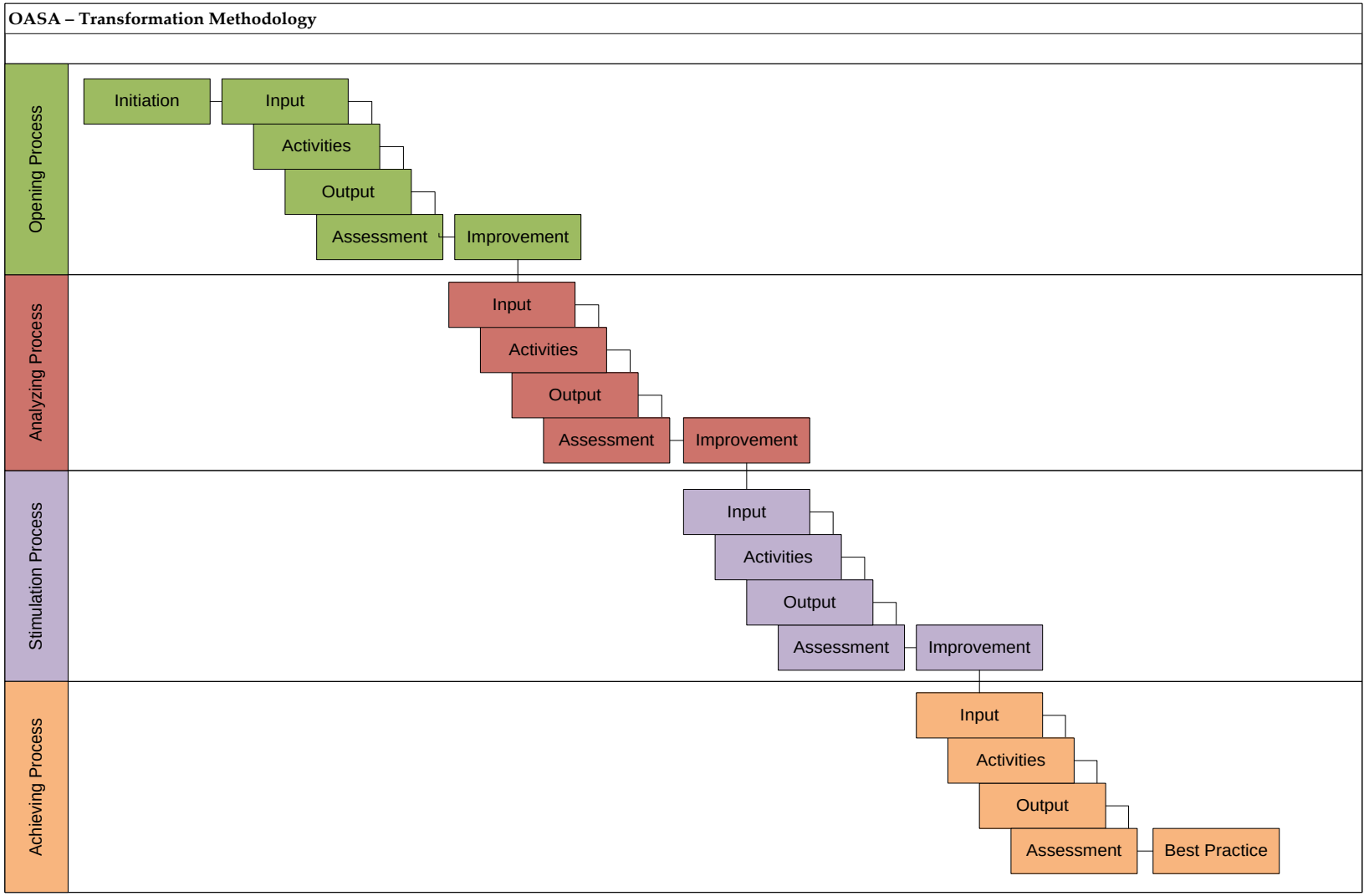
Appendix 3. OASA Transformation Methodology



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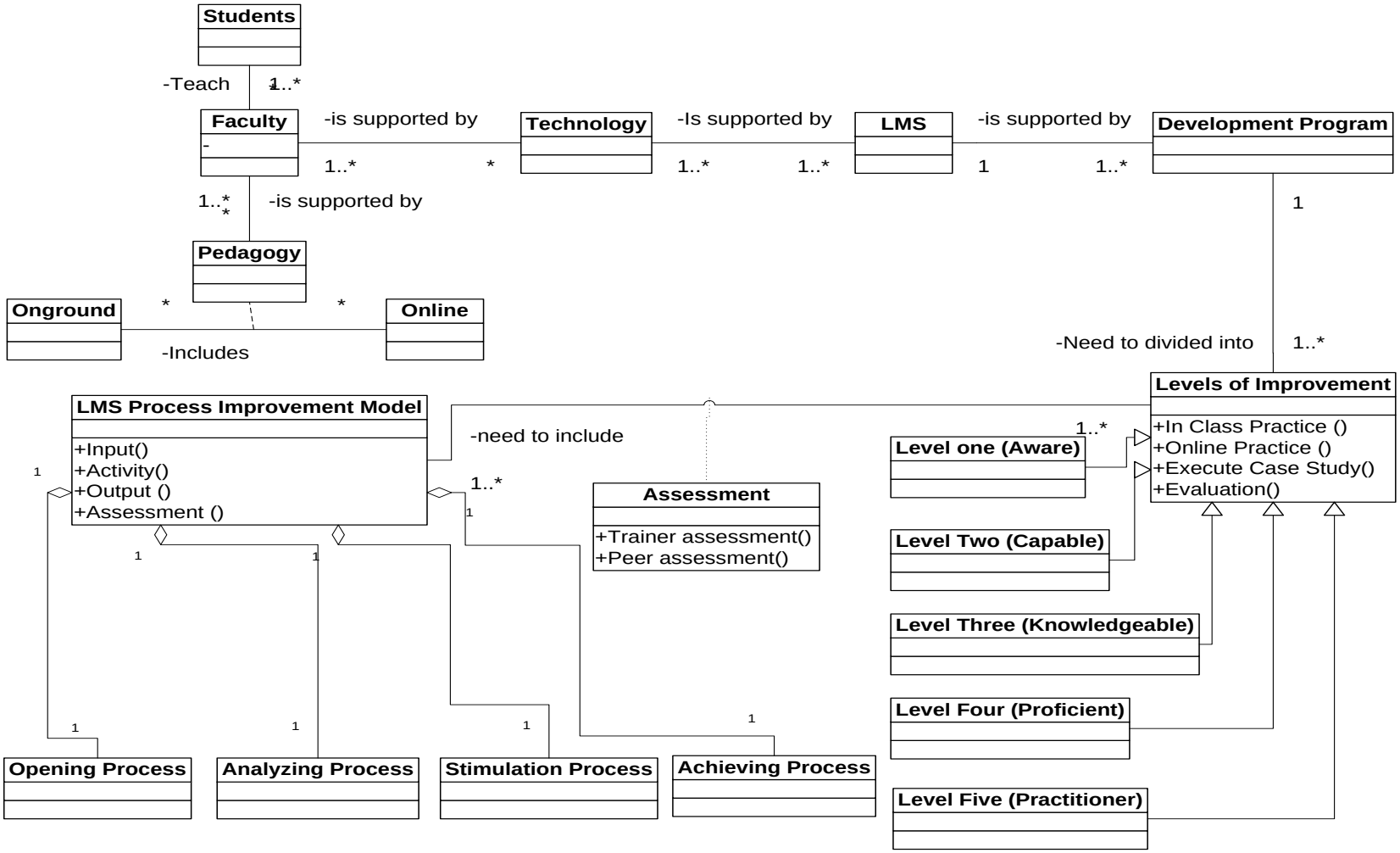
Appendix 4. OASA Class Diagram



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Appendix 5. OASA Road Map