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In this issue:

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INFORMATION SYSTEMS EDUCATION JOURNAL

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A Systematic Approach to Faculty Development - Capability Improvement for Blended Learning

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Abstract

Blended learning (BL) provides an efficient and effective instructional experience. However, adopting a BL approach poses some challenges 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 research project focused on improving faculty's ability to support their pedagogy with technology. A systematic Learning Management System (LMS) Process Improvement Model, named OASA, is proposed which enables educational institutions to establish a systematic and effective faculty development program for BL teaching and learning. OASA is structured into five levels, and transformation from lower to higher levels of capability in BL teaching and learning is based on prescribed processes, and is 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 several validation methods. The main finding is that OASA is a well-founded approach that can help educational institutions overcome challenges relating 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. 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 a BL course.

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

1. INTRODUCTION

Information Communication Technologies (ICT) provide opportunities for competitive advantage in various domains, such as e-economy, e-business, and also in e-education. In the education domain there has been an extensive transformation towards strategies that can provide more accessible education opportunities and services for educators and learners. Information Technology (IT) systems for education, also called e-Learning systems, aim to provide efficient and effective alternatives to traditional on-ground teaching and learning. E-Learning refers to a learning model utilizing electronic means such as the Internet, Extranet, Intranet, broadcast, satellite, audio/video, interactive-television and CD-ROM, to deliver and access course content. The concept of e-Learning has emerged over decades, and web-based software systems that support its adoption are of the most significant recent developments in the Information Systems (IS) industry.

Developments in technology have allowed education institutions to redesign their teaching and learning processes to take advantage of the features and capabilities of web-enabled ICT systems. Moreover it has become very important to support faculty in integrating appropriate technologies in their pedagogy when they engaged in e-Learning, as well as help them to be informed about the latest developments in the field.

The use of education technologies in support of traditional teaching of higher education coursework represents a real challenge for many faculty members (Travis & Price, 2005). One of these challenges is faculty's lack of knowledge to use technology effectively (Boggs & Pirani, 2003). A study in Saudi Arabia has found that there is insufficient empirical data and assessment of Blended Learning (BL) adoption in universities (Al-Sarrani, 2010). Blended learning here is synonymous with the term hybrid learning, where traditional on-ground teaching is complemented with online modes.

A preliminary literature review done for the research reported here determined that there is a lack of knowledge regarding adoption of BL at the tertiary level, and that this is among the key challenges in some developed and developing countries, and also in Saudi Arabia. This situation has stimulated research in the use of Learning Management Systems (LMS) for the BL mode of teaching and learning. This research aimed to overcome the lack of knowledge factor by means of a Faculty Development Program that can aid faculty to gain higher levels of capability in using the LMS, including the various functions available in support of the pedagogy and didactics for BL.

The paper reports on the research context of the study, the research problem addressed, research planning for the investigation, conceptualization of the solution to the research problem, the demonstration of concept, and research validation. A summary and some conclusions are provided 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 hybrid and fully online 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, and BL approaches (Davis, 2007).

As universities strategize 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. Plans to achieve these goals include transitional approaches to e-Learning and traditional classroom instruction in what is referred to as 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). In this article, 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".

It is clear that adopting the BL model mandates that faculty members are prepared to use technology in their pedagogy since up to half of the course will be conducted online. The requirement that faculty have the capability to use educational technology makes the adoption of BL complex. Also, there is an intricate relationship between faculty pedagogy and teaching in BL mode, partly due to faculty's lack of knowledge to use educational technology in teaching.

Research Problem

The Ministry of Higher Education of Saudi Arabia encourages university faculty to use BL in teaching, since it offers a more cost-effective and pedagogically sound way to blend traditional modes of teaching with new technologies (Al-Sarrani, 2010). 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. Further analysis revealed that little is known about Saudi faculty knowledge of BL to bring it into widespread use.

Purpose of 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. Based on the problem analysis the purpose of the study aimed 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 BL courses. The research hypothesis was: "*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 aid faculty readiness for capability improvement*".

3. RESEARCH PLANNING

After the research problem was identified, research planning was performed to organize the research in terms of the research strategy, approach, process model, and design as described in the next sections.

Research Strategy

An empirical/positivist strategy was adopted which 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 to BL for tertiary 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 insights obtained, conceptualize a theoretical conjecture, demonstrate concept, and validate the research.

Research Approach

Formalized research processes have been used in the research domain for some time, since it helps researchers to conduct systematic research and attain the research objectives. The research process model for this investigation is depicted in Appendix 1. The research approach and consequent research design was supported by a number of methods as summarized in this section (also refer to Appendix 2 regarding research design).

The following methods were used for collecting qualitative data:

- Problem Analysis, to identify the focus, purpose and scope of the research, specifically on LMS and BL. The research proposal was formulated based on a preliminary literature review and empirical work with LMS and BL, and contains the research problem, questions, propositions, and research strategy.
- Literature review, in which the background theory (distance education) and focal theories (LMS and BL) and their applications were analyzed and interpreted in greater detail. Specifically the pedagogy of BL, faculty perceptions toward BL, process improvement, and established BL frameworks were reviewed, including their constituent models.
- Conceptualization, by grounding the theoretical conjecture in the Khan Octagonal Framework (Khan, 2005). While various issues relating to the eight dimensions of the Khan Framework have been reported in several studies on resources and tools for e-Learning programs, this framework was found to be contemporary and

comprehensive among similar other frameworks (Badawood, 2012). Additionally, concepts from the Capability Maturity Model Integrated (CMMI), developed at the Software Engineering Institute at Carnegie Mellon University from the original CMM, were adopted to design a conceptual solution, namely the Learning Management System (LMS) Process Improvement Model which is proposed for the faculty development program.

- Demonstration of Concept and experimentation by means of a prototype of a BL course within the Blackboard LMS, as part of action research. Evaluation of the prototype was done through open-ended interviews with independent reviewers at the research site and also stakeholders in Saudi Arabia, who evaluated the proposed approach. The interview protocol was semi-structured, informal and in person. The qualitative data collected in this way helped to refine the proposed approach.
- Methods for validating the research models and outcomes included face validation of the conceptual models, prototyping of the conceptual solution, independent evaluation of the prototype and its refinement, validating the support afforded by the research outcomes for the research hypothesis and questions.

4. CONCEPTUALIZATION

The literature confirmed the contemporary reality that educational institutions are seeking to improve their BL teaching by implementing a LMS. Other important pre-conditions for a BL approach to be effective have been identified and have informed the conceptual models described in this section:

- There is awareness that BL integrated with LMS provides a number of advantages, including effective learning, ease of use, learner engagement, reuse, and innovative approaches (Anderson & McCormick, 2005).
- It is apparent that educational institutions need to know more about faculty and student attitudes, factors of satisfaction, and the outcomes of academic programs and courses.
- Faculty requires guidance and support to adapt the pedagogy, didactics and styles of assessment when designing BL courses.
- A sound understanding of the features and tools of the LMS is needed as faculty develops skills in teaching in the LMS environment.
- Faculty should be skilled in aiding students to study and learn in the LMS environment, setting up their computers to be ready for synchronous and asynchronous teaching sessions and be prepared to participate in synchronous presentations and peer evaluations.

The conceptual solution proposes a systematic LMS Faculty Development Program to support a BL teaching and learning model using a LMS Process Improvement Model, named OASA, which is described in the next section. The Development Program aims to enhance faculty capabilities to teach in BL mode to the benefit of student learning. This Development Program is based on a LMS Process Improvement Model containing levels of capability that are achieved by means of prescribed processes. The program requires that the capability of faculty to perform the activities of a particular process be assessed upon completion of the process. OASA is an empirical and descriptive process model along the lines of Wang and King (2000); it is empirical because it defines an organized and benchmarked model usable in practice and based on best practices; and it is descriptive because the model describes what to do according to a prescribed process.

The components of the proposed LMS Faculty Development Program are outlines in the following subsections.

OASA Processes

OASA is an acronym for Opening, Analyzing, Stimulation, and Achieving Processes of the LMS Process Improvement Model. The model is structured into five levels namely Level One (Aware), Level Two (Capable), Level Three (Knowledgeable), Level Four (Proficient), and Level Five (Practitioner), and is illustrated in Figure 1.

The transformation from lower to higher levels of capability in BL teaching and learning is based on prescribed processes (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 aims to provide a new foundation of faculty development practices that enables an academic unit to transform from lower to higher levels of capability.

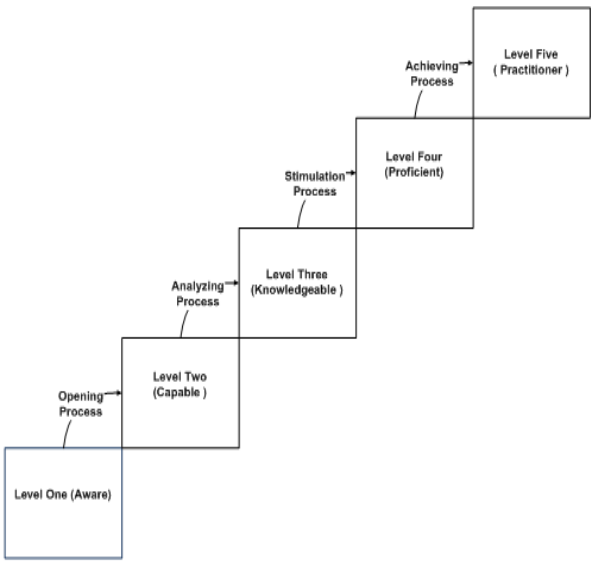

Figure 1. OASA - LMS Process Improvement Model

Level One (Aware): At this level faculty is *Aware* of what the LMS is, the purpose of the LMS Faculty Development Program, and what types of skills faculty would need to integrate LMS functions in their BL courses. In addition, faculty will be aware about all the levels and improvement processes involved in the LMS Faculty Development Program. This level is to be considered preparatory for faculty to get ready to start the LMS Faculty Development Program.

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

Level Three (Knowledgeable): At this level faculty is *Knowledgeable* to explore more of the LMS functions that are beyond the basic functions provided at Level Two. Functions at this level will equip faculty to effectively interact with students using appropriate tools. Additionally, faculty will be able to design their pedagogy with support from the prescribed LMS functions of this level.

Level Four (Proficient): At this level faculty is *Proficient* in functions that simplify the connection and interaction with students. Achievement at this level affirms that faculty is proficient in running VOIP meetings, as well as creating and editing podcasts, blogs, and wikis. Skilled in the mentioned functions will help faculty run BL courses at an above average capability. Furthermore, faculty will be able to enhance the design of their pedagogy with support from the prescribed LMS functions for this level.

Level Five (Practitioner): At this level faculty is an effective and efficient *Practitioner* in using LMS functions that will enhance teaching. Faculty will learn how to run Safe Assignment functions that help in curtailing plagiarism. Also, at this level faculty will be practitioners in creating course dashboards that provide a synopsis at a glance of students' interaction in their courses, including review status, dates since last login, discussion board postings, grades, and information about adaptive releases. At this level faculty will be adept at exporting entire courses for the purpose of teaching a similar course in a future semester.

Once faculty reaches this level the best practices of all previous levels are integrated in the capability. This means faculty has acquired the needed skills to manage student assignments in terms of time, tasks, and collaboration, as well as to utilize the technology to offer a pedagogically effective learning experience.

OASA Transformation Methodology

Transformation from one level to the next is based on faculty assessment. Faculty can only be trained in the practices at a higher level if they meet the requirements of the level they attained. The proposed transformation methodology for improved faculty capability, illustrated in Appendix 3, defines activities to use inputs of a level, to achieve the outputs, and then assessing the outputs. Once the output assessment meets the prescribed requirements of the level, improvement training can occur to develop a faculty member's skills for the next level of capability.

OASA Assessment and Improvement Methodology

As mentioned faculty involved in the LMS Faculty Development Program cannot reach a higher level of OASA unless they meet 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. Two types of assessment are 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 acting as peers will assess each other's assignments so that they can learn from each other.

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. It is recommended that faculty gain experience before attending level assessments. Once the assessment for a level has been passed, faculty may attend faculty development sessions to attain the next higher level, and in time attain Level Five capability, where faculty is regarded as practitioners in the utilization of BL practices. Detail regarding OASA assessment is not elaborated in this paper. There are international standards for System Life Cycle Process Assessment, such as the ISO/IEC TR 15504 Part 6 (Bella, 2008) that can guide assessment initiatives.

OASA Conceptualization

Appendix 4 illustrates OASA in a class diagram, which comprises a number of classes that are essential to BL faculty development and training. They 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 Levels of Improvement. Levels of Improvement 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. Other classes are Assessment, conducted 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 with operations applying to all 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, namely Input, Activity, Output, and Assessment. To demonstrate the OASA concept, the researchers chose Level Two (Capable) and Level Three (Knowledgeable) functions, that are covered under Analyzing Process, for the prototype.

OASA Road Map Diagram

The road map of the proposed conceptual solution illustrated in Appendix 5 represents the conceptualization of implementing OASA. The road map 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 concept involved the creation of a prototype of a BL course within an appropriate Learning Management System (LMS) environment. The course was developed based on the OASA Model, described in Section 4. The scope of the demonstration is transforming a faculty member's level of capability from Level Two (Capable) to Level Three (Knowledgeable).

The LMS functions demonstrated in the prototype are:
- 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 within the widely adopted the Blackboard 9.1 LMS available at the research site. Blackboard LMS is a software system with features and functionality that enhances virtual teaching and learning. It is also used in many education institutions to support on-ground courses. Blackboard LMS includes various functions and features such as course and content management, discussion

board, virtual classroom tools, and tools for collaboration such as email, blogs, wikis, and podcasts. It also includes an assignment repository, grade book, and a reporting performance dashboard (Blackboard Inc, 2011).

6. VALIDATION OF RESEARCH

Research validation is an essential part of a research project. Validation can occur once an adequate level of confidence exists that the researcher's claim truly reflects what is measured or observed (Remenyi et al., 1998). Several validation methods were triangulated to validate the findings of this research project, namely face validation of the conceptualization (Khazanchi, 1996), demonstration of the conceptual solution and evaluation of the prototype; validation of the research questions; support for the research hypothesis.

Face Validation: Concepts modeled in the conceptual solution were evaluated for plausibility in terms of the following and are supported:

- Is the Process Improvement Model (OASA) systematic?
- Does any theoretical rationale sustain the development of the Process Improvement?
- Does the Process Improvement Model (OASA) add value to the Educational Institution?

Validation of the prototype: The prototype demonstrating the conceptual solution was an instrument to validate the theoretical conjecture and constituent concepts in terms of the feasibility, effectiveness, pragmatics and repeatability. Additionally the prototype was evaluated by independent evaluators at the research site, and also by stakeholders in Saudi Arabia following a defined interview protocol, in terms of criteria including clarity and understandability, ease of application and use, information value, and completeness, seeking support for the following:

1. The LMS Faculty Development Program is clear and easy to follow.
2. Function descriptions are informative.
3. Function Requirements are understandable.
4. Function Demonstration and user interface is straightforward.
5. Needed pedagogy is informative and comprehensive.
6. The LMS Faculty Development Program covers Faculty Practice comprehensively and covers all functions needed in BL.
7. Faculty Evaluation is rational and practical.
8. The LMS Faculty Development Program is a comprehensive training program for faculty teaching in BL mode.

Validation of research questions: Answers were determined tor the following questions:

1. What are the main challenges facing faculty when they are assigned to teach a BL Course?
2. How can educational institutions overcome this challenge?
3. How can a process improvement model address and resolve faculty's lack of knowledge to use technology in a BL course?

Triangulation of the outcomes of the adopted validation methods lead to the conclusion that the proposed OASA model and approach for faculty development is a valid response to the research problem addressed in the research study, and that the hypothesis is supported.

7. SUMMARY AND CONCLUSIONS

The research was motivated by the awareness that there is a lack of knowledge and experience in integrating traditional and online pedagogies to offer BL coursework in university education. In Saudi Arabia there are significant challenges to equip faculty to design courses with technology support, while also promoting confidence to use technology in teaching.

The proposed LMS Process Improvement Model for Faculty Development (i.e. OASA), described in this paper, aims to overcome some of the challenges, and has been demonstrated to aid faculty to integrate LMS tool support in the pedagogy of BL courses. The OASA approach establishes a systematic and effective faculty development program for BL teaching and learning. The process improvement framework has process categories that are structured into levels of capability. Having levels of capability makes processes more understandable, serves as process improvement starting points for specific capability levels, keeps faculty focused on the activities of the process involved, and provides steps to perform the activities along with their inputs and outputs.

Strong support for the OASA approach was expressed by university and department management and faculty at Taif University, where the approach is being implemented.

This research has made three main contributions:

- Expands the body of knowledge regarding BL. Enhanced understanding was obtained of

faculty's positive and negative perceptions toward BL and the challenges that faculty, students, and education institution leadership face when adopting BL.

- A generalized solution for problems relating to faculty's lack of knowledge regarding using technology in teaching was developed. The proposed solution can aid 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 a LMS-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 the pedagogy and didactics for BL.

The findings of this research is in agreement with other process improvement models that 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 several areas to assess the existing status of capability and determine the need for improvement. Further experimentation with OASA is being conducted at the time of writing, and potential refinements and enhancements of the approach are envisaged.

8. ACKNOWLEDGEMENTS

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Editor's Note:

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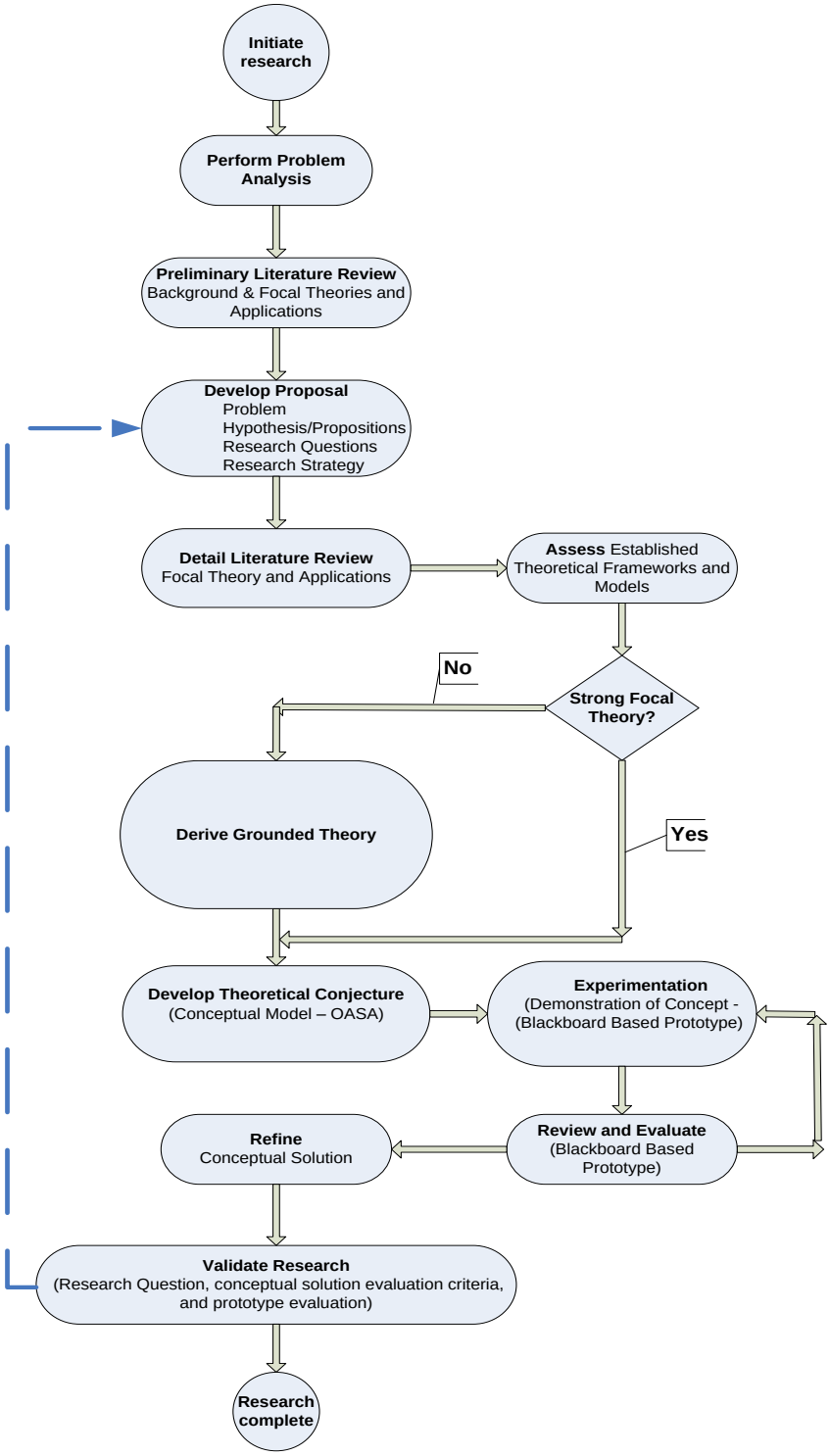
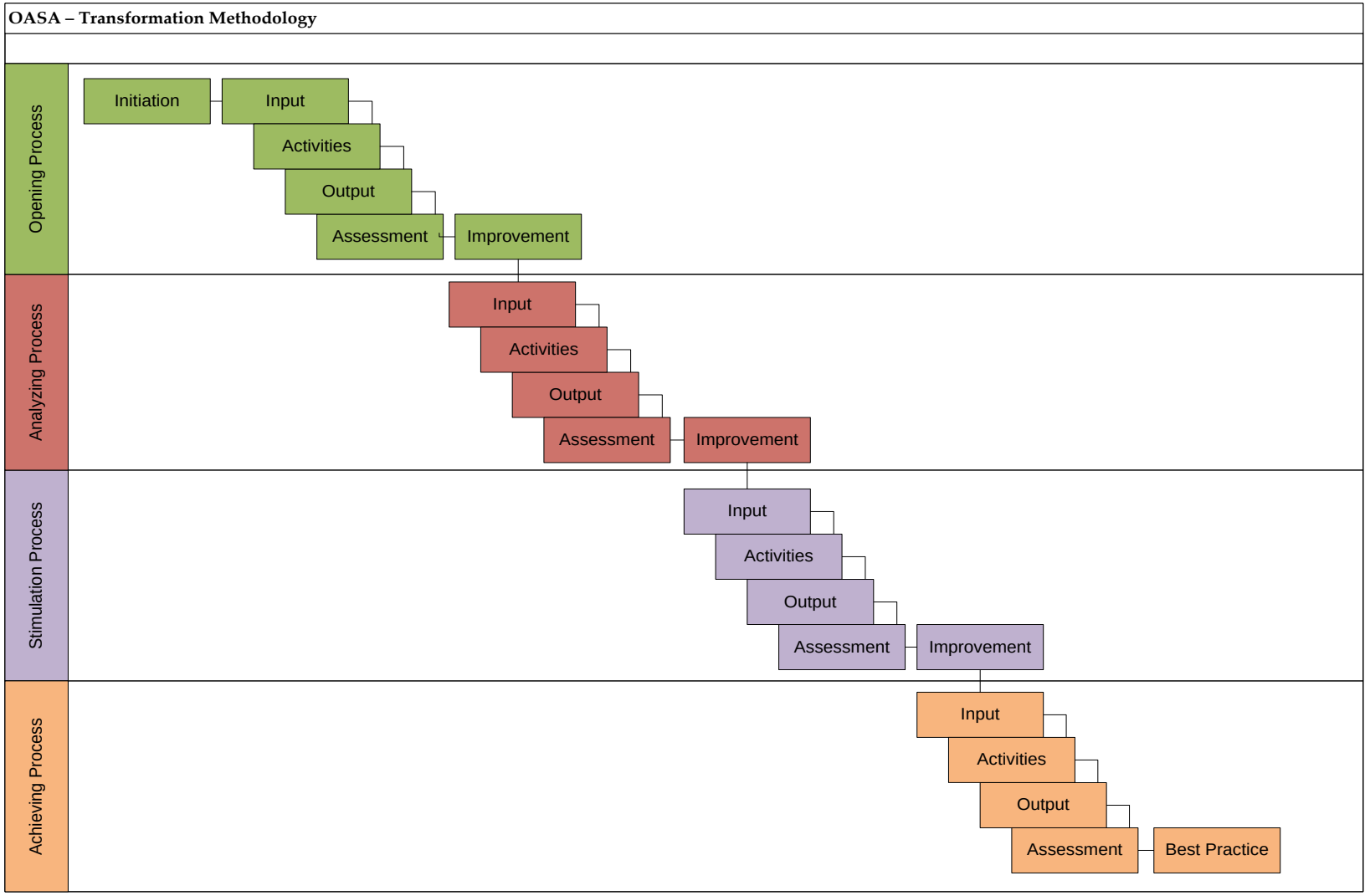
Appendix 1. Research Process Model



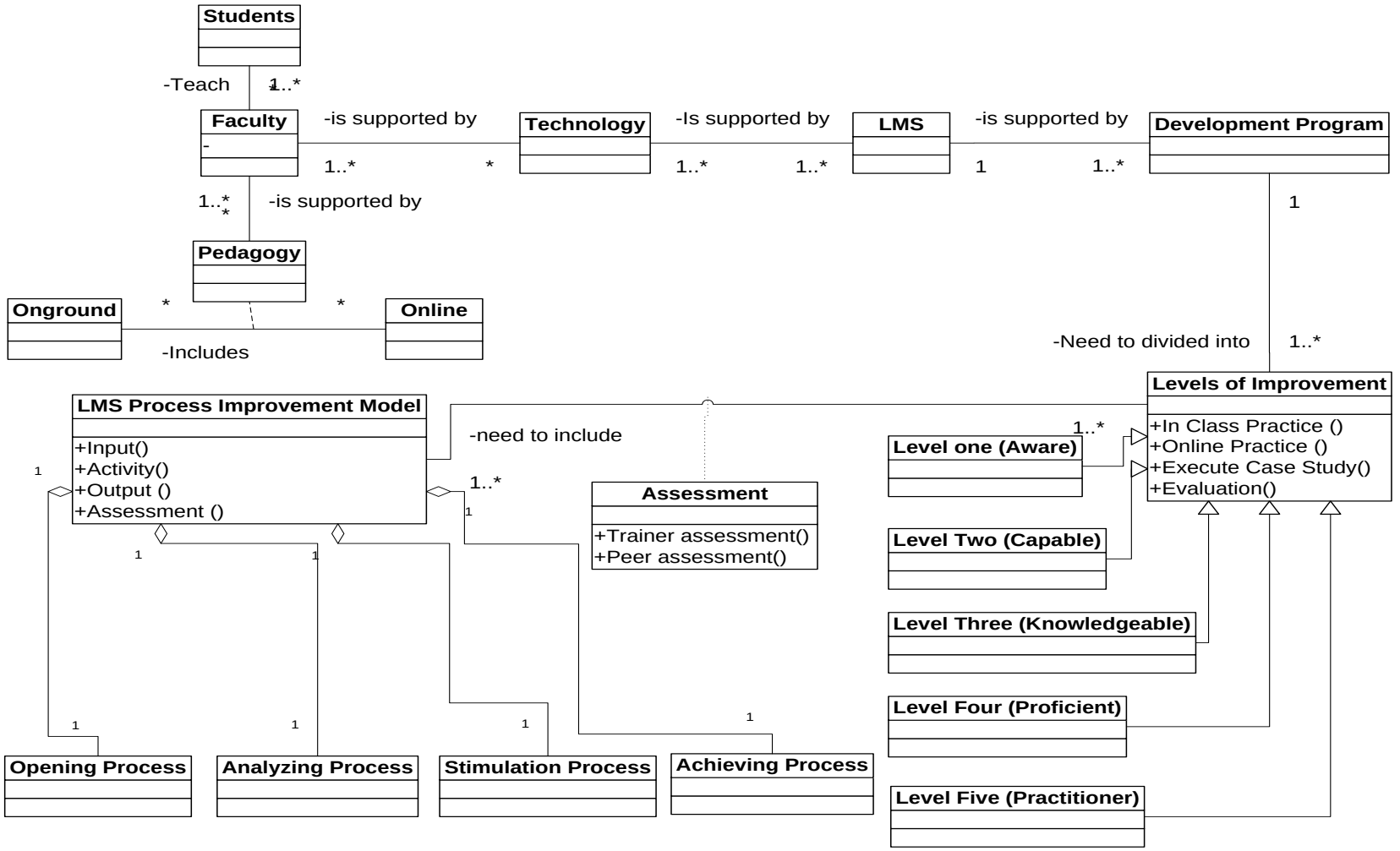
Appendix 2. Research Design

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 to integrate the tools offered by the LMS in the pedagogy of 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 faculty's 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	Action Method using structured open ended questions for prototype evaluation	Participants Observations captured
				Research Validation	Validation of conceptual solution, Validation of Demonstration of Concept (prototype) in terms of Conceptual solution, Validation of hypothesis, and research questions	Data collected re evaluation of conceptual models, the prototype, Support for hypothesis, Answers to research questions

Appendix 3. OASA Transformation Methodology



Appendix 4. OASA Class Diagram



Appendix 5. OASA Road Map