ORIENTAL JOURNAL OF
COMPUTER SCIENCE & TECHNOLOGY
An International Open Free Access, Peer Reviewed Research Journal
Published By: **Oriental Scientific Publishing Co., India.**
www.computerscijournal.org

ISSN: 0974-6471
June 2012,
Vol. 5, No. (1):
Pgs. 01-08

A Practical Approach to Implement Education Technologies in New Universities

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(Received: February 12, 2012; Accepted: June 04, 2012)

ABSTRACT

The integration of educational technologies to support operational models for modern universities is playing an increasing and crucial role in developing university visions and educational strategy. This is particularly true for newly established universities and educational organizations. In this paper, the author presents a scenario-based conceptual framework to relate technology with classroom learning and at the same time maintaining alignment with the organizational strategy. The approach is used to discuss the practical aspects of implementing and managing educational technologies. As a case-study, a modern private not-for-profit university in Saudi Arabia was used to illustrate the applicability of this approach. In order to evaluate the stage at which the university is operating, the Technology Acceptance Model (TAM) was used. Usage of these models in a coordinated manor helped the university to evaluate current state and 'visualize' future options. This in turn,helped to consolidate the views of key stakeholders and facilitate effective decision making. The whole approach was useful to maintaintwo-way alignment with the formal university strategy, with particular emphasis on the operational and logistical perspectives rather than financial.

Keywords: Educational Technology, Business Alignment, Governance, Technology Acceptance Model (TAM).

INTRODUCTION

Due to its critical role in learning, the designing and implementation of classroom's educational technologies become significant requirements in modern education (Newby *et al*. 2010, Francesch *et al*., 2009, Ottenbreit-Leftwich *et al*., 2010). In managing this challenge, the university needs to overcome various logistical and educational barriers (Brinkerhoff *et al*., 2006; Deborah *et al*., 2008) to build tailored and a customized educational system. Two of these barriers are related to maintaining constant alignments with the educational strategy (Singh and Woo, 2009) and ability to 'visualize' a roadmap in the investment and potential options along the way.

In this research, the author presents a view gained from practical observations ofimplementing educational technologies in a new university. Two tools were particularly utilized for this purpose; maintaining alignment with the university educational strategy and the development of scenario based learning-technology model. Together with a suitable

assessment model, for controls needs, the university can achieve a level of overall governance on potential implementation options for developing tailored classroom educational technologies.

Framework of Strategic Alignment

Due to the competing barriersto integrate technology into classrooms (Donnelly *et al*. 2011), the design and implementation of the classroom educational technology together with effective management requires a holistic and pragmatic approach at the university level.To achieve this target, it is critical to align the information technology with the organizational objectives (Baets, 1996) which in turns positively impact the organizational business outcomes (Chan, 2007). In the context of this research, atwo-way alignment model is developed to align the information technology with the university educational strategy. Many researchers have studied this alignment from different perspectives. For example Deborah *et al*. (2008) discussed the impact of educational technology integration on professional development as a barrier. The model presented in this work was practically derived from the actual interactions between key stakeholders and from the project implementation of educational technologies. In particular, the model links *'Academic'* and *'Operational'* aspects for implementing classroom educational technology; see Fig. 1.

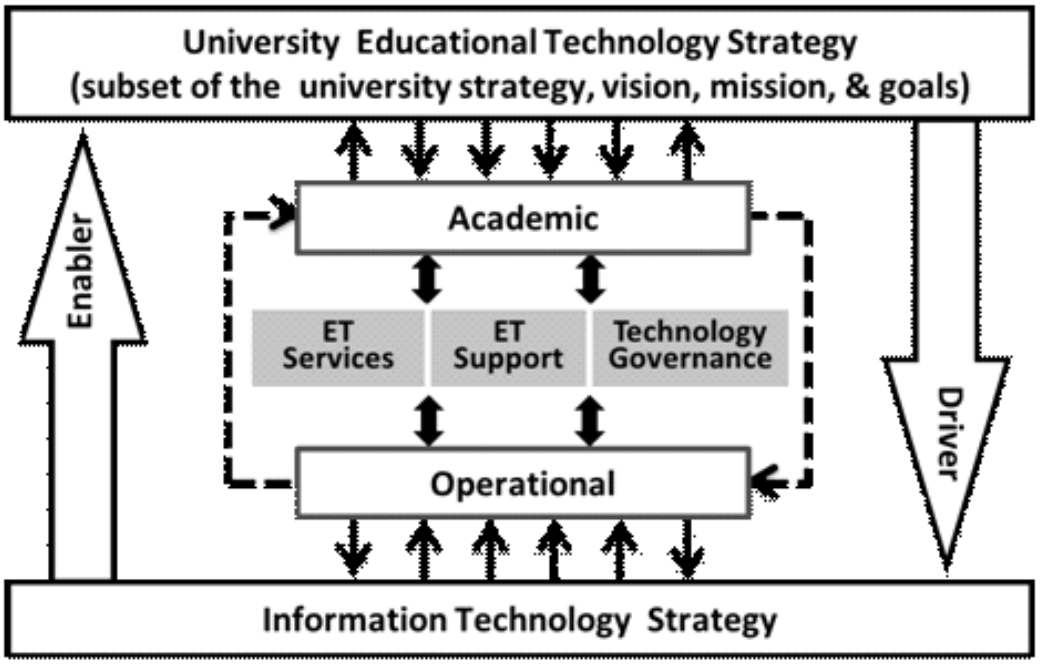

Fig. 1. Schematic presentation on the dynamics of two-ways alignments between the high-level university educational strategy and the detailed day-to-day classroom Educational technology (ET) management

While the 'Academic' aspect is related to the curriculum, the operational aspect is considered from technology and administration perspectives. Due to the important role of maintainingeffective communications with the senior executives on the information technology alignment (Reich and Benbasat, 2000), the discussion presented gives high attention to the communications aspects. This alignment is particularly important due to the dynamically evolving informationtechnologies (Luftman *et al*., 2006). With this in mind, the model presented in

this paper is used to assist understanding of the basic dynamics in facilitating two-way communications between academic and operational processes within the university's overall educational strategy. An important aspect of this model is that educational strategy 'drives' the information technology strategy which in turn 'enables' the university strategy. The intentions to continue this cycle in an iterative approach until 'full' alignment as achieved. To simplify usage of this model, it is assumed that key infrastructural elements such as networking, datacentre, communications …etc. are all being developed, implemented and in a sound operational status.

Analysis Approach: Learning-Technology Relationship

The approach used to analyse the data presented in this research is based on practical experience gained from implementing educational technology in a new university. The starting point was a set of questions:

1. As technology was added, at what point does the university reach a sustainable learning process with consistent results?
2. How does the university managechallenges of day-to-day operations with maximized return on investment?
3. Howdoes the university maintain alignment between educational technologies and strategic directions?
4. How does the university achieve competitive advantage through innovative and balanced technology implementation?

In order to answer these questions and evaluate possible trendsin classroom technology, a scenario-based model was developed to illustrate the relationship between classroom technology and the learning process; see figure 2.

In a broader scene, learning is defined as a knowledge acquisition through cognitive processing of information acquired from both being part of society and from individual through processing (Bandura, 1986). In the literature, many researchers discussed learning from various perspectives, in general terms (Bransford *et al*., 1999), contents (Mai 2004, Schneberger *et al*.

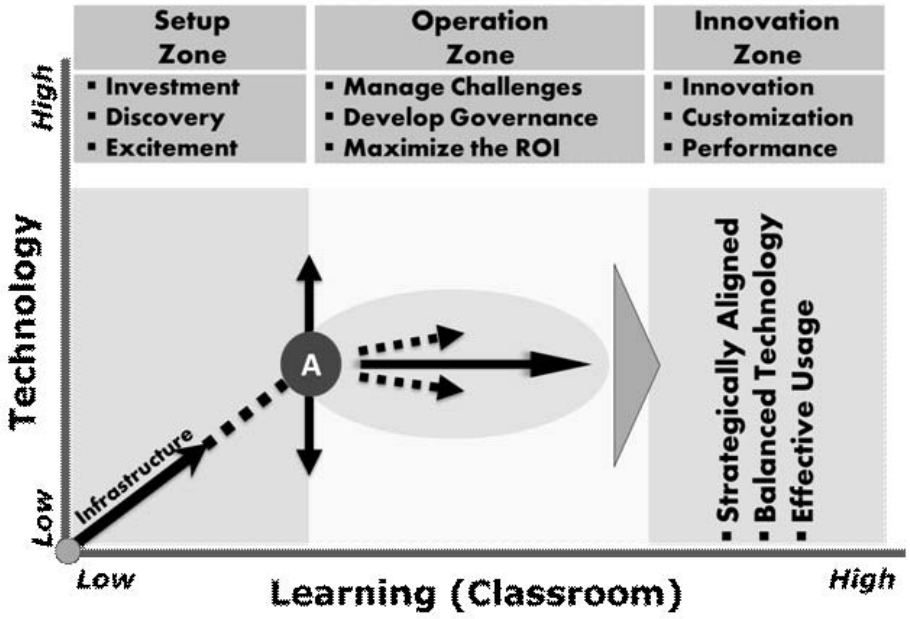

Fig. 2. Scenario based learning-technology relationship for implementing Classroom educational technologies

2008, TseKian Neo and Neo, Young et. al. 2003), integration (Chen *et al.*, 2011), students' perspective (Duff and McKinstry, 2007), and many more. The research presented in this paper, only considers classroom technology as a facilitator to enhance learning within the classroom context. From this perspective, technology is measured in terms of the installed hardware, applications, and practices while the learning is measured in "how technology enhanced learning".

To illustrate the use and applications of the proposed scenario based approach, the development of the classroom educational technologies was divided into three main zones, described briefly below:

Setup zone: the main driver of this zone is to achieve minimal requirements for educational technology implementation to facilitate learning, i.e. addressing question 1. Here the initial bulk investment, discovers the added values, and normally excited on the outcome.

Operational Zone: used to integrate and operate the technology with due considerations to emerged challenges, i.e. addressing question 2. Without changing learning outcomes, the university can continue to add more technology, adopt a balanced level or even reduce the technology implemented within the classroom. The actual action and plan will largely depend on the educational strategy, environmental factors, and impeded performance measures.

Innovation Zone: this is the long-term ultimate maturity state that can satisfy the organizational vision, mission and educational statement and address questions 3 and 4.

Another set of key benefits that might be obtained from the scenario based learning-technology chart, are to assist both executive and operational managements to:

- Effectivelyanalyse and communicate potential implementation options and achieve acceptable degree of governance.
- Adopt a holistic view linking the present state with the past state and 'visualize' potential options for the future.
- Plan suitable performance system to evaluate progress and retune on investment.

RESULTS AND DISCUSSIONS

Integrative approach coupling the alignment modelshown in figure 1 with the technology-learning model (figure 2) was used to assess the university educational technology implementation options. The role of technology on this coupling, the acceptance level and the degree technology in facilitating learning were evaluated using a widely used approach known as Technology Acceptance Model (TAM), (Davis, 1985). Two determinants of the computer acceptance were used and applied in this model: perceived ease of use and perceived usefulness (Davis,1989). Based on these determinants, the model is widely used to explain and predict how users acceptcomputer technology (see for example, Hu *et al.*, 1999).In general, technology acceptance is defined as "an individual's psychological state with regard to his or her voluntary or intended use of a particular technology" (Hendrick *et al.*, 1984).

The complex nature of the multifaceted interactions between the alignment, learning-technology, and TAM models are far from being precise. In addition, the exact degree of correlation and quantification of the relationship between academic, operations, and technology impact further complicate the situation. Therefore, for simplicity, in this paper the TAM was only applied to assess the impact of technology to facilitate learning within the classroom context. In terms of classroom technology management, the technology manager needs to consider technology as an enabler of the university educational mission rather than being entrapped in the detailed software and hardware interfaces.Furthermore, from practical experience, a set of support factors are required to enhance educational technology management. These include short reporting line to executives, strong academic and instructional knowledge, and strong interaction with academic operations (for example through committees), attending strategic departmental meetings, and consultancy on technology elements of current or

newly proposed academic programs. These factors will help to bridge the gap or possible miscommunication between academic and operational staff.

At Alfaisal University, as a start-up university, reaching the pivoting point A (see figure 2) in the learning-technology diagram was relatively straightforward.The critical question was how to gain the buy-in of all teachers to use the system.While some teachers are eager, others showed resistance and normally have'plan B' in case the technology doesn't perform as expected. The implemented awareness campaigns(group and individual based) and the on-the-lessoncoachinghelped greatly. By the end of the second semester, over 50% of teaching staff were using the classroom educational technology, and this was increased to over 80% by end of second year.Although this meant adding more technical support staff, but on the other hand it shows substantial increase in the positive feeling on using classroom technology. A key success factor for this relative success is the two-way interactions and communications between academic and operational stakeholders which greatly helped to foster the relationship between technology and learning which in turn met the university educational strategy. Furthermore, the universityhigh initial investment helped to set the scene for smooth operation with minimal disruption that particularly helped to minimize technology use anxieties. In addition, a case-study approach by early technology adopters greatly enhanced the buy-in of scepticalusers. These early technology adopters formed user base to investigate technology usage post the pivoting point. The focus here was on evaluating teachers and students'acceptance and usage of classroom technology.

As implementation advances, the university progresses to the operation zone where technology is settled with more focus on learning pedagogy. To evaluate what options are suitable to the university, the TAM model was applied. But first it worth emphasizing that based on the learning-technology relationship presented earlier, the technology role only considered as a facilitator to support the learning-based activities. Therefore, to assess selected university track in the operation zone, the four integrated variables of TAM were used to collect feedbacks from both teachers and students. The basic definitions of these variablesare presented in terms of one sample questions for each as below:

- Perceived Usefulness: how educational technology facilitates students' learning?
- Perceived Ease: do you required advanced skills to use educational technologies?
- Subjective Norm: how others' opinion impacts your usage of educational technology?
- Computer Self-Efficacy: how competent are you in using the educational technology?

The data from 10 faculties and 20 students were collected through tailored questionnaires and qualitatively analysedto an order of magnetite. The structure and contents of the questionnaire were based on the above four TAM variables and the results are compared as pi-charts and shown in Fig. 3.

Below are key observations gained from analysing collected data

- Both teachers and students perceive educational technologies as crucial elements to enrich instructional practice and achieve adequate level of students' engagement.
- Students seem to be more comfortable and confidence in using educational technologies even though some students have not used it at all.
- Teachers seem to have high level of anxiety in using educational technologies compared to the students.

In general, above results suggest that teachers are mainly using classroom technologies to enrich course contents and manage the students' submitted course related work. On the other hand, teachers are experiencing more difficulties in maintaining students' engagement throughout the lectures. These two elements competed against each other resulting in a balanced opinion on technology usage. For the wider picture related to the university adoption of technology level with close academic-operational

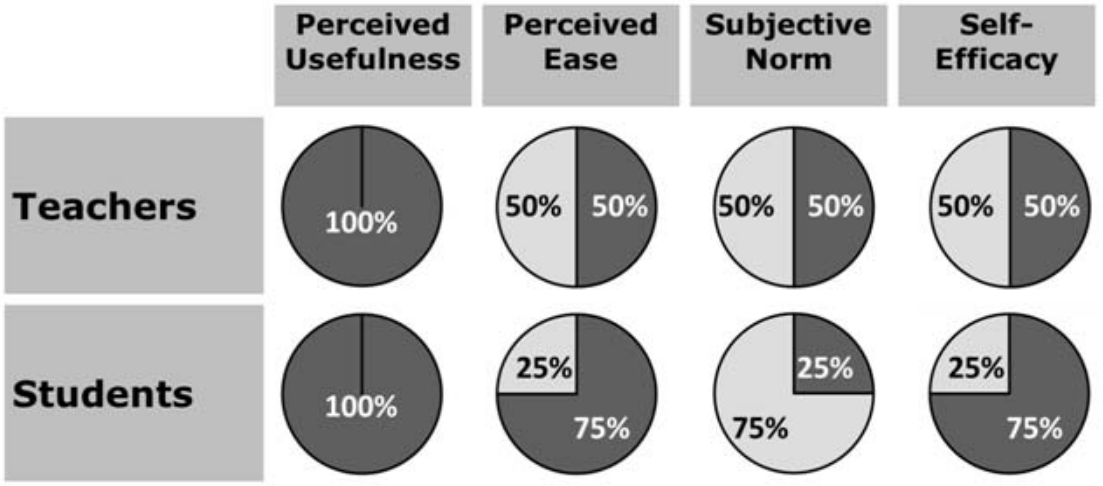

Fig. 3. Comparison of teachers and students response to main questions related to the four dimensions of the TAM model. The dark shaded areas representpercentagesof the answers in favour

interaction, this is translated into the adoption of steady technology level but with more efforts on contents to stimulate students' engagement. In terms of the learning-technology diagram, this is represented by the solid line shown in figure 2, which is supported by the level of technology added during the second year of operations at the Alfaisal University. As a young university, it is early to assess whether more technology should be added or indeed reduced; these options are depicted as dotted arrows shown in figure 2. However, the university is adopting iterative approach to settle on suitable educational technology roadmap consistent with its educational strategy. This means the university will try different technology engagement pilot projects to select the most suitable level. Some signs of these projects already visible, but for effective management, a detailed tailored quantitative evaluation must accompany this endeavour. For example a study is required to assess whether adding more technology (such as laptops, PDAs, …etc.) will get in the way of students learning rather than assisting.

The data presented in this work, the correlation between learning-technology, and the alignment models can all serve as reference framework to track and monitor a fresh implementation of educational technology to meet the university strategic objectives. However, the study also has some limitations, for example the interviewed students have limited prior experiencewith educational technology, teachers come from diverse backgrounds and experience, vast variation in course dependency on educational technologies, infrastructural issues negatively impact student's attitude to educational technology, and the data was analysed using simple statistical approach.

The results of this work represent a first stage in a two-stage methodological approach. The main findings from this stage are used to develop a detailed survey to consider above limitations in conjunction with a quantitative analysis of the relationship between the university strategy, adopted technology,and the impact on the future development plans.

CONCLUSIONS

A scenario based technology-learning model was coupled with the university educational strategy and the Technology Acceptance Model (TAM) to evaluate and select potential options for implementing classroom educational technology

for a new university. With due considerations to the university vision and effective communications between academic and operational staff, the university can better understand current status and plan for future targets. This further helps to proactively take appropriate decisions and measures to maintain alignment between educational technology and the university strategic objectives. The approach can serve as a visual model to discuss and communicate current state and future options to create common understanding grounds among key stakeholders.

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