

0315 To what extent could Business Process Management Suite (BPMS) contribute positively to e-learning?

Introduction

The purpose of this paper is to evaluate the effectiveness of Business Process Management Suite (BPMS) as a teaching-learning technology with the lens of the conversational framework (Laurillard 2002). Commercially, BPMS is “a more comprehensive approach to Business Process Management (BPM), it provides all of the process management capabilities of BPM software, plus the following functionality: knowledge management, document management, collaboration tools, business analytics, and a work portal”. (www.bpmbasics.com/introduction/glossary.jsp#b). From the view of analysts, BPMS is

“...an integrated collection of critical software technologies that enables the control and management of business processes. As compared with other model-oriented development tools, such as integrated service environments (ISEs) and integrated development environments (IDEs), a BPMS *emphasizes business user involvement in the entire process improvement life cycle, from design through implementation, deployment, monitoring and ongoing optimization. Rather than reducing reliance on people through automation, a BPMS emphasizes the value of coordinating people and information, in addition to systems, as central resources.*”

(Hill, et al. 2007, italics: author)

It is such wide-ranging aspects of BPMS that lead the author to embark on an initial evaluation BPMS as a teaching-learning tool. The inspiration for this paper came from Professor Laurillard inaugural lecture (2008a) and her paper on learning technologies (Laurillard, 2008b). In her lecture and papers she suggested the possibility that the conversational framework may be used to evaluate teaching-learning technology and identify what such new technology can offer to make the teaching-learning process more effective for the learner and the teaching process more proactive for teachers. One of the challenges that struck the author, was the need to find a technology that could transform education from a bottom-up approach by equipping the teaching community with a tool that is simple to use, like the invention of “chalk and blackboard” or more recently, Microsoft PowerPoint. In other words, can BPMS be an education technology for teachers which can be easily and quickly deployed for online learning? Just as the commercial enterprises look to BPMS for continuous process improvement (CPI), could teachers and lecturers also look to BPMS to continuously improve their teaching and their learners’ learning processes.

In addition, the author hopes to link commercial technological development with research in teaching-learning technologies. At this stage, this theoretical evaluation aims to address the preliminary question—could the educational communities adopt BPMS, a tool that has evolved from the commercial world to further enhance teaching-learning process?

The literature and scope

Since BPMS is a relatively new topic, initial search of current academic

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Abstract

The purpose of this paper is to evaluate the effectiveness of Business Process Management Suite (BPMS) as a teaching-learning technology with the lens of the conversational framework (Laurillard 2002). The paper hopes to link commercial technological development with research in teaching-learning technologies and bring about better collaboration between the two. This theoretical evaluation aims to address the preliminary question—could educational communities adopt BPMS, a tool that has evolved from the commercial world to further enhance teaching-learning process? The scope of this paper and its evaluative study will be limited to using the conversational framework. The paper will briefly discuss BPMS and its relation to business process and business process management to provide a brief introduction. The main section of this paper will be a detailed analysis of key BPMS components against the conversational framework. The conclusion will provide a summary of the effectiveness of BPMS as a teaching-learning tool based on the requirements set out by the conversational framework. The results of the conclusion could lead to further empirical research on BPMS as a teaching-learning technology tool and may be the opportunity to request funding to carry out a proof of concept.

literature did not return significant and relevant findings to support evolution and analysis of BPMS as potential teaching-learning technology for e-learning and e-teaching. The most relevant academic work was a study by Helic et al. (2005) at the University of Technology Graz, Austria. The study focused on the technologies behind Business Process Management (BPM) and how such technologies could be used to enhance and deliver e-learning.

Some of the technologies discussed are in the context of Enterprise Application Integration (EAI), Workflow Management Coalition (WfMC), Extensible Markup Language (XML), Service-Oriented Architecture (SOA), Business Process Modelling Notation (BPMN) and Business Process Execution Language for Web Services (BPEL4WS). These technologies are fundamental technical components in the construction and running of BPMS as it is known today. Without them, BPMS will not have evolved or matured to a point where business users with little or no programming knowledge could model, execute and monitor business processes online.

Instead of evaluating these BPM technologies in isolation, this paper will focus on the application of BPMS and will use the conversational framework as a benchmark for effectiveness. It should be noted that in their study, Helic et al (2005) did conclude that general learning processes and business processes have strong similarities in both user aspects as well as technical aspects. They concluded that applying BPM technologies to manage e-learning process can improve a wide range of common learning situations in e-learning systems

The scope of this paper and its evaluative study will be limited to using the conversational framework. The paper will briefly discuss BPMS and its relation to business process and business process management to provide a brief introduction to its origin. The main section of this paper will be a detailed analysis of key BPMS components against the conversational framework. The conclusion will provide a summary of the effectiveness of BPMS as a teaching-learning tool base on the requirements set out by the conversational framework. The results of the conclusion could lead to further empirical research on BPMS as a teaching-learning technology tool and may create opportunities to request funding to carry out a proof of concept.

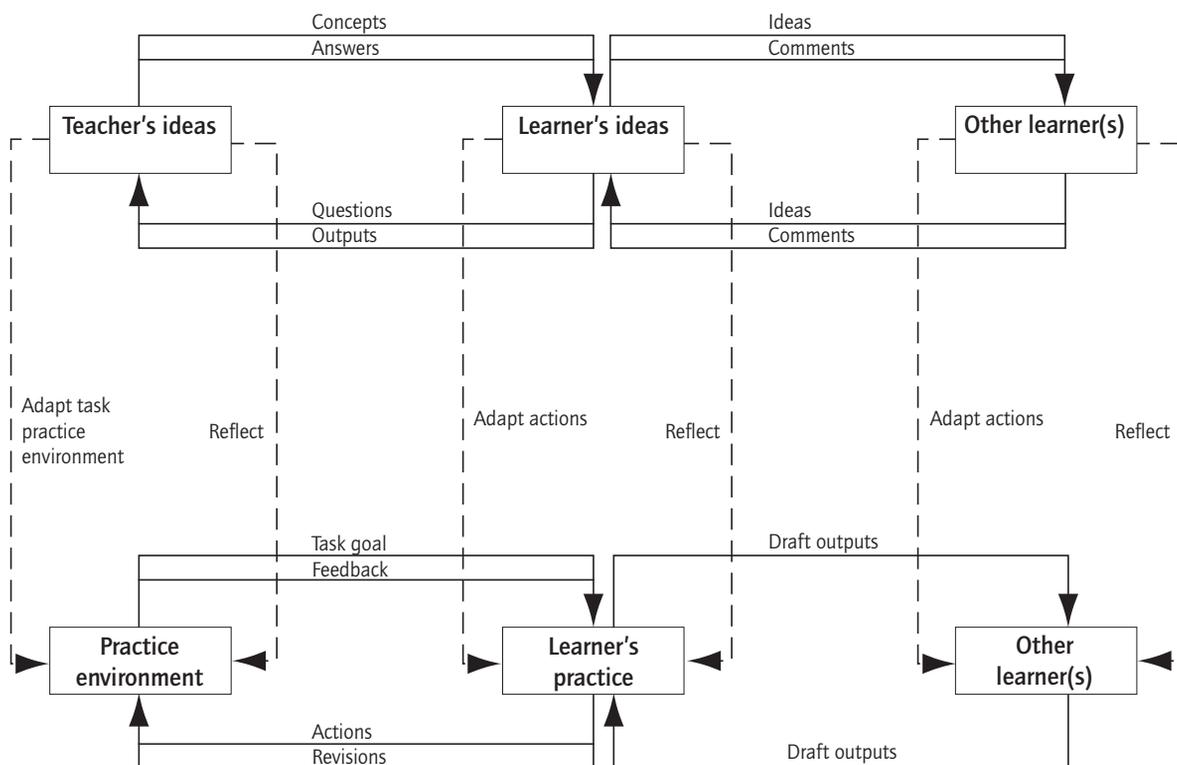
A brief history

To best describe BPMS, the author starts with examples that are related to the commercial world because this is where BPMS originated. An example of a business process is online purchase, which many readers could relate to, but who may not be fully aware of the complexities of the processes which need to take place behind the scenes for an online purchase to be fulfilled. The business process of buying something online could consist of a coordinated chain of activities intended to produce business results. In the case of buying a book online, the fundamental outcomes are the delivery of the book to the right address and that the right price has been charged to the purchaser's credit card. The component steps of this process are carried out by both systems and people. To make the process work, an exchange of the goods (the book), money and data has to take place across systems and people. For example, when the right book has been selected and paid for by purchaser, the system has to trigger a process to find the book from the right location in the warehouse, pack the book and place the packed item in the next process—the distribution process. The distribution process has to coordinate deliveries with a third party system and notify the purchaser on the e-commerce site that the book ordered has been dispatched. This simple example shows that business processes often run across different systems and people. In this case, the online book store, the information systems required may consist of an e-commerce site, a third party payment system,

an inventory system for stock control and a logistics system to manage the distribution. From a human aspect, they are packers, couriers and managers—to mention but a few—to make this process work.

In recent times, the struggles that the commercial world faces are not centred on the efficiency of each of specific business information systems, but on complexities of enabling cross-functional end-to-end processes across multiple systems (Butler 2007). According to a report on BPMS (Silver 2006), the demand for cross-functional thinking instead of the traditional discrete business functional mindset brought about the management discipline of business process management (BPM) that began twenty years ago as a different way to think about business. Another commercial report published (Butler 2007), concluded that the origin of BPMS came about as the result of a mishmash of re-engineering, enterprise integration and workflow solutions. From the two reports by Silver and Butler and the lectures presented by Professor Laurillard, the author sees a number of similarities between the commercial enterprise and ICT in education. Like the commercial enterprise, many teaching-learning technologies such as Blackboard (www.blackboard.com) and eCollege (www.ecollege.com) have matured in isolation and as a standalone component. Like many commercial applications they are lacking in ability to make connections to other education ICT systems, and more importantly to other teaching-learning technologies to ultimately provide teachers and students with a seamless teaching-learning environment. A typical student enrolling on an online course might have to interact with different systems—student portal, its Virtual Learning Environment (VLE) such as Blackboard, and other learning technologies in order to complete the required learning process. The same could be said for an average teacher who might be required to use various ICT technologies and student information systems to develop and run an effective course. What could be lacking are the technical capabilities and supporting infrastructures that could integrate all these teaching-learning technologies into a single environment which is process focused instead of system or functional focused that a commercial BPMS could possibly provide.

Figure 1: Conversational framework (Laurillard 2002)



General Components of BPMS

The following section describes the general functional areas or components of BPMS. In Helic et al (2005) study, these functional areas or components were referred to as phases. The three phases that were evaluated in their study were model and design phase, deployment and execution phase and analysis and improvement phase. They mapped these to a learning process developed from their experience, which also consisted of three phases -modelling, learning, and observation and improvement phase. Since 2005, commercially, BPMS has incorporated many BPM components and functional areas (Butler 2007). Selected components will be discussed individually in relation to related core structures within the conversational framework (see Figure 1).

Process modelling

This component covers the ability to quickly and rigorously define processes that cut across systems and people. This is frequently delivered by using drag-and-drop modelling environment that often includes process wizard and templates. Since BPMS is a commercial tool, the wizards and templates are based on best practice for business processes. However, if BPMS is adapted to teaching-learning, then similar wizards and templates could be used to design learning and teaching processes. This could be based around the conversation framework or other teaching-learning framework. But unlike a stand-alone modelling tool like Microsoft Visio, the modelling capabilities are seamlessly linked to the design and development environment.

The process modeller will allow teachers of a given subject to create a learning process diagram that shows interactions between teacher, learners and practice environments as outlined by the conversational framework. In the case of practice environments, this could be other learning systems such as simulation games for business students, online self-assessment, online video and discussion for example. The integration component discussion will further show how the conversational framework core structures can be brought together to complete the learning process.

Design and development

This is also referred by some as the authoring environment for “what you see is what you get” (WYSIWYG) development platform, where what the screen or interface that the users see is the same as during the development stage. This component of BPMS is tightly linked to the process modeller, turning the process map into user interfaces and web forms that could include features specified in a learning process. For example, to be able to explain Opportunity Cost (Laurillard 2008a) as a learning outcome, could be followed by further instruction to form groups of three and assign specific roles such as teacher, student and observer. This is then followed by a user interface to rank or vote for the best explanation. To the student, BPMS offers a single interactive environment for learning and for the teachers and learning technologists, it could be the tool that facilitates change without the need for extensive programming or “codeless” application development. This is made possible with web 2.0 technologies like AJAX (Asynchronous Java and XML) that allow drag-and-dropped control from the design palette to quickly design forms and user interfaces.

The design component is not only suitable for developing interfaces for students’ interaction and integration with other learning systems, the design function coupled with the rules function (see rules management and execution) could be used to develop a questionnaire for feedback and self assessment. For example, an interface can be designed to track a number of questions answered correctly and based on a set rules defined by the teacher, increase or decrease the level of difficulty in the next set of

questions presented in a subsequent user interface. In many commercial enterprises, the ability to build and deploy fully-functional web application with little or no programming has empowered many knowledge workers to focus on creating processes that could better address customers' needs, leaving much valuable time for IT specialists to focus on the value added task such as integration with other business systems (Butler 2007).

Deployment and execution

This is the engine that orchestrates or runs a particular process or multiple processes. This is where the process model and the designed interfaces are executed and orchestrated. Based on the previous example of learning outcome, this is where each of the specific interfaces could be deployed according to the prescribed learning pattern (process). For example, the student could not progress to the discussion interface if they have not yet completed a set of prescribed tasks or students could not proceed to rank the best explanation until they contributed to an online discussion on the concept of opportunity cost.

In advanced BPMS, such engines come with the ability for process tracking. The ability to have a built in process tracking capability will allow teachers to interactively monitor the learning process that has been designed. For example, which students that have not participated in posting questions or how many answers have been given and the number of iterations a learner has given and how their ideas have evolved as a result of the other learners' comments. In the commercial enterprise, this feature is used to collect and process data about the transaction connected to a process. In the case of online purchase of a book, it is used to track the number of books purchased and the number of orders that were processed on-time. It is also used to handle errors—such as when an order has become stuck in a process sequence.

In the conversational framework, this component of the BPMS could be used to link the teaching-learning exchanges of answers, feedback, and actions taken by both teacher and learners on reflection of their contributions, answers and outputs. It could track answers given by the learners and the ideas or comments from other learners. The tracking could trigger an alert such as an email or a mobile text message notifying a student that he or she has not been participating in posting comments or when feedback has been received from fellow learners.

Integration facilities

This component focuses on the ability to support and deliver interaction with other information systems via various technologies that allow bidirectional connections. This is not only limited to data level integration but to reusable technology such Service-Oriented Architecture (SOA). The ability to integrate with other existing systems allows BPMS to work with pre-built application interfaces—such as an existing student portal for managing student access to various e-learning environments such as Blackboard and online e-journal databases. In some BPMS this component is known as Web Service Adapters Development because it provides connection to existing functionality and tools for creating new services. Using this function, a proven teaching-learning process could be packaged as a web service and be deployed for consumption by other departments or courses that have the need to use the same model in many different modules. Although the process will be the same, the concept discussed could be adapted according to the need the specified learning outcome. This could encourage reuse of a proven model and sharing of teaching process as a web service.

Integration in BPMS is not only limited to system-to-system (S2S) integration. It can also support human-to-human (H2H) and human-2-system (H2S) interaction and integration (Butler 2007). Over the years, many integration

vendors came to realise that not all processes can be automated and many commercial processes involve a high level of interaction among individuals, where human intervention cannot be replaced. Returning to our example of learning outcome, the lecturer's comments to a group discussion is an example of H2S interaction. The practice environment and the learners' practice may require a form of H2H interaction where a social science student may be required to undertake some field work to carry out an interview or observation. The recording (voice or video) can then be posted as the learner's idea on to the learning process as a case study for comments by other learners. The collection of cases recorded can form a social learning environment for the next stage of the course or it can be linked to the learner's online portfolio so that other teachers may review and assess how the student has progressed through his or her individual learning process. However, a detailed discussion on student learning life cycle management and BPMS is outside of the scope of this paper.

Business rule management (BRE – Business Rule Engine)

This is the “logic” behind the business process. Before the days of programming, “conditions” were coded into applications to automate the flow of decision. For example, if a consumer purchased more than five books, a hard coded business rule could be used to allow free delivery. Each time the business wants to make a business decision to change the rule, the business person responsible for the rule couldn't make the change without intervention from a programmer. In theory, BPMS the rule engine is delivered as an independent but integrated component to the entire suite. This allows rule change without impact to the underlining process and can be carried out through simple web interface, on the fly. But not all analysts share the same view, Silver (2006) warns that change to some complex rule engines may not require programming, but it may still require a programmer to implement. The author's own experience with some BPMS rule engines can be said to be user friendly—some taking a Microsoft Excel approach and other more graphical in nature.

The rule engine might not have direct application to the conversational framework, but indirectly this function offers teachers the ability to design “logical” online programmes with capabilities that could be applied to developing self-assessment and delivering some form of personalised learning—for example, to start a new process if a student continuously answers a set of questions wrongly. The rule engine could be used to release a pending task, to post a group's questions/answers for all other groups to view when all groups have submitted their posting online. The rule engine can be used to update process data and send notification.

The following example might not provide a direct link to teaching-learning but what the author hopes to show is how other educational business systems or processes could be integrated into online teaching-learning process using BPMS: A student who has just completed a particular online module and its assessment outcome updated automatically to the student record system and a notification alert to register for the next module after the university exam board has approved the posted grade.

Simulation and testing

There are tools for process simulation and optimization. When a process has been mapped out using design function, a business user could run a “what-if” simulation using estimated data to see how the process will behave in various conditions. Again, using the online book order example, a process designer might simulate demand for online orders to understand the resource require to pack and deliver the books on-time. In BPMS, the simulation is tightly integrated to the modelling function and in most cases it is the same environment used for modelling. The optimization component

further allows data to be collected at run-time and stored for historical analysis. Hence simulation can be run against historical data to help improve a process that has been running over-time. Teachers might find this function useful to test drive their course to see if the resources allocated in relation to time for a selected type of teaching method are sufficient. However, without further empirical tests, it is not possible to determine the application of simulation to the teaching-learning process.

Analysis and improvement

The analytic function has been briefly mentioned in the process execution section as process tracking. But in BPMS, process analysis is an important component that deserves further discussion. One way to see the analytical component of BPMS is in its operational value. It may be likened to the heart beat and blood pressure of a live business process. In many BPMS, this often takes the form of a dashboard with indicators, meters and graphs to show the performance of a given process. Hence, some BPMS analysts refer to this function as performance management (Silver, 2006) as this is often linked to operational key performance indicators (KPI). To others, this component is known as BAM—short for Business Activity Monitoring (Butler, 2007).

Business users of BPMS use BAM/KPI to perform their own analysis and determine the root cause of process problems. The high level of visualisation provided by BAM provides business users an easier way to identify critical path flows and process bottlenecks. For example, when a late delivery is often experienced on a given day, the process owner can drill down and explore in detail to find the root cause. It could be that a part-time courier is employed to deliver on Thursdays and that he or she is not familiar with packing order. BAM tools provide further analytical capabilities, such as statistical correlation to different KPIs and explore interactions. For a number of orders delivered on-time with a given level of staffing over a given period may provide an insight into resource allocation. At this stage, it is not possible to find a relevant application for the conversational framework. However, in the wider context of course management, indicators such as attendance—online or class room, and exam results may provide insights into general “wellbeing” of a course. The author recognises that further work is necessary to better explore how the BAM function can be applied to teaching-learning process, but it is beyond the scope of this paper.

Extended functionalities

Most commercial BPMS tools also come with built in features for online discussion and other user and group collaborative functions. However, if a university is using the Blackboard feature for posting online discussion, the design environment along with its integration capability will allow seamless integration to the relevant components of Blackboard and other e-learning tools. Some other collaborative functions include instant messaging, blogs and community bulletin boards. Other extended services may include document and content management that is seamlessly incorporated into the process flow. The document and record technology is capable of storing, archiving, indexing, picking and tracking all types of content—structure and unstructured data. This capability could be used to manage learners’ assessments, student projects and mine online discussions for the unstructured knowledge. In the commercial world, this capability is known as case management and function is deployed for processes that have a high level of focus on a particular type of content e.g. applying for a mortgage online. In the teaching-learning process, this function could be used to facilitate a collaborative effort to develop a new course, where creation of a new course is managed as a case that is subjected to review, feedback, adaptation, reflection and finally approval.

Conclusion

The theoretical analysis of the above eight components of BPMS show that at least six of those components or functions meet the requirement of the conversational framework. Of the two components—Simulation & Testing and Analysis & Improvement did not entirely fit into the conversational framework. For both of these functions, empirical research may be required to determine their role in supporting teachers and learners. Returning to the questions that this analysis hopes to answer, (1) Can BPMS be the education technology for teachers to easily and quickly deploy learning online? Almost certainly—this ability is supported by the process modelling, design & development, deploy & execution, integration and business rules engine. (2) Just as the commercial enterprises look to BPMS for continuous process improvement (CPI), could teachers and lecturers also look to BPMS to continuously improve their teaching and their learners' learning processes, and in the longer term increase value creation and productivity? This question cannot be fully answered in this theoretical analysis based on the literature reviewed and limited teaching-learning experience of the author, but BPMS may still offer a degree of possibility through its simulation and analytic functions.

The general outlook of this paper is that BPMS as a collective technology and software has the potential make a contribution to improve the teaching-learning process. Although the commercial world and education may share similar needs for ICT in process management, it is not certain from this theoretical analysis of BPMS that it would bring the same benefit to education as it has to commercial enterprises. The benefits experienced by businesses might not be repeatable in all aspects of education, more specifically in the teaching-learning process. Unlike the commercial process, teaching-learning may not be as clear-cut as “the interaction between individual and provider is a very personal contract and learners are not customers, and they are not always right” (Laurillard, 2008b)—the imbalanced, uncertain and delicate relationships that exist throughout the teaching-learning process between teachers and learners make adapting a commercial technology such as BPMS for education a challenging task, but not an impossible one.

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