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Framework for the Productivity-Oriented Conceptualisation of Blended Learning Services

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Abstract

Measuring and managing Blended Learning (BLS) success has long been and is of great interest to both researchers and practitioners. As yet services in the field of corporate education are difficult to appraise and compare in terms of their economic efficiency. The development of a model of productivity for educational services is intended to make them more comparable in terms of input (effort expended by teachers and students), in terms of throughput (affected by both customers and suppliers) as well as output (success of training and practical application of knowledge gained). This article develops a productivity framework for Blended Learning Services which draws on models from the disciplines of business economics, didactics, psychology, and information systems. This conceptual model is a necessary instrument for the systematic measurement and management of productivity for Blended Learning Services and is designed to aid productivity-oriented development and the provision of corporate educational services.

Key words: Blended Learning Services, service productivity, productivity framework, evaluation

1. Introduction

Arthur, Bennett, Edens and Bell (2003) identified the influence of technology on all learning scenarios referred to as Blended Learning (BLS) as a major trend in education. Basically, there is a consensus in theory and practice that advances in technology are the main agents of a dramatic change in the way people learn and students interact with their teachers (Chou 2003; DiMaggio, Hargittai, Neuman and Robinson 2001; Joiner 2004; Rossett 2002). Blended Learning scenarios will gain more importance and will lead to new ways of learning (Arthur et al. 2003).

Technology-mediated learning has many variations and is often a combination of the following learning modes (blended learning): web-based or computer-based, asynchronous or synchronous, instructor-led or self-paced, individual-based or team-based (Gupta and Bostrom 2009). More precisely, the goal of Blended Learning is to integrate the strengths of synchronous (face-to-face) and asynchronous (text-based internet) learning activities (Garrison and Kanuka 2004). The great variety of research approaches and results leads to divergent research results, due to different research foci in different disciplines against the backdrop of changing environmental circumstances.

Research on BLS has drawn from many fields other than information systems. Psychology, education, organizational behaviour and computer science have contributed directly or indirectly to the topic (Gupta, Bostrom and Huber 2008). From a business perspective, it can be shown that since the use of educational information technology is on the rise, an increase in productivity creates economically relevant potentials (Strother 2002). Unfortunately, there is no unified notion of productivity in the services sector (Baumgaertner and Bienzeisler 2006), which results in an inconclusive database for the impact of BLS on an individual and team level. Although many studies have already used input-output research designs, they seem to neglect critical aspects of the learning method and process (Gupta and Bostrom 2009). The research done so far is not adequate to face the upcoming challenges in BLS and still is not sufficient for dealing with the dynamic development in practice (Alavi and Leidner 2001; Sasidharan and Santhanam 2006). Consequently, a systematic approach is necessary to integrate and evaluate technology in the field of BLS supporting a productive service provision in terms of providers' input and providers' or customers' output.

Since productivity is a key performance indicator, a systematization of services would serve to make them more comparable and is indeed a prerequisite for an efficient controlling of educational training measures and for keeping track of how productivity developed over a span of several years (Bullinger and Schreiner 2006). Therefore, a common understanding of BLS has to be established, taking into account results from various disciplines. Based on these results, researchers and training providers need to identify and analyze critical success factors for a productive BLS provision considering multi-dimensional determinants and success factors. Consequently, the goal of this article is to identify dimensions for relevant input, throughput and output factors of Blended Learning Services.

2. Identifying a Productivity Framework for Blended Learning Services

Gupta and Bostrom (2009) developed a comprehensive theoretical model to cure or explain inconclusive results in BLS research and to increase the accessibility for researchers and practitioners. They stated that most research designs ignore critical aspects of the learning method and process by exclusively focusing on input and output factors (Alavi and Leidner 2001; Gupta and Bostrom 2009). Nevertheless, the term productivity refers to the quantitative ratio of an output to a given input (Grönroos and Ojasalo 2004). That means that in order to ensure the adequate productivity evaluation of Blended Learning Services, a multi-dimensional evaluation approach is necessary extending the original framework by the specifics of Blended Learning Services. Thereby, two of the major difficulties encountered stem from the intangible nature of the service and the customer's being a necessary part of the equation by his integration into the process (Chesbrough and Spohrer 2006; Grönroos and Ojasalo 2004). If one applies this to Blended Learning Services, it not only means that the end result will be hard to gauge and define but also that the students' (e.g. by their motivation and characteristics) are a determining factor for the overall success of the training and have to be considered within a comprehensive examination of productivity.

The following productivity framework aims at systematically compiling input, throughput and output factors in order to then measure and improve productivity (through optimizing the factor combination) in the following steps. In the scenario of Blended Learning Services, productivity is influenced by both the provider and the learner. Since the two parties differ in terms of their specific input factors, one should

differentiate by input perspective. At the same time, the output can be regarded as uniform on account of it being generated by a combined effort of provider and customer, even though their intentions might be different. It can be taken for granted that the provider has an interest in the customer's favorable assessment of the training and in the goal attainment of the class. In addition, there should be a differentiation between the perspective of the individual student and that of the firm. It seems necessary to not only map the individual characteristics of the students but also the information relevant to the company's input and output (e.g. number of employees trained).

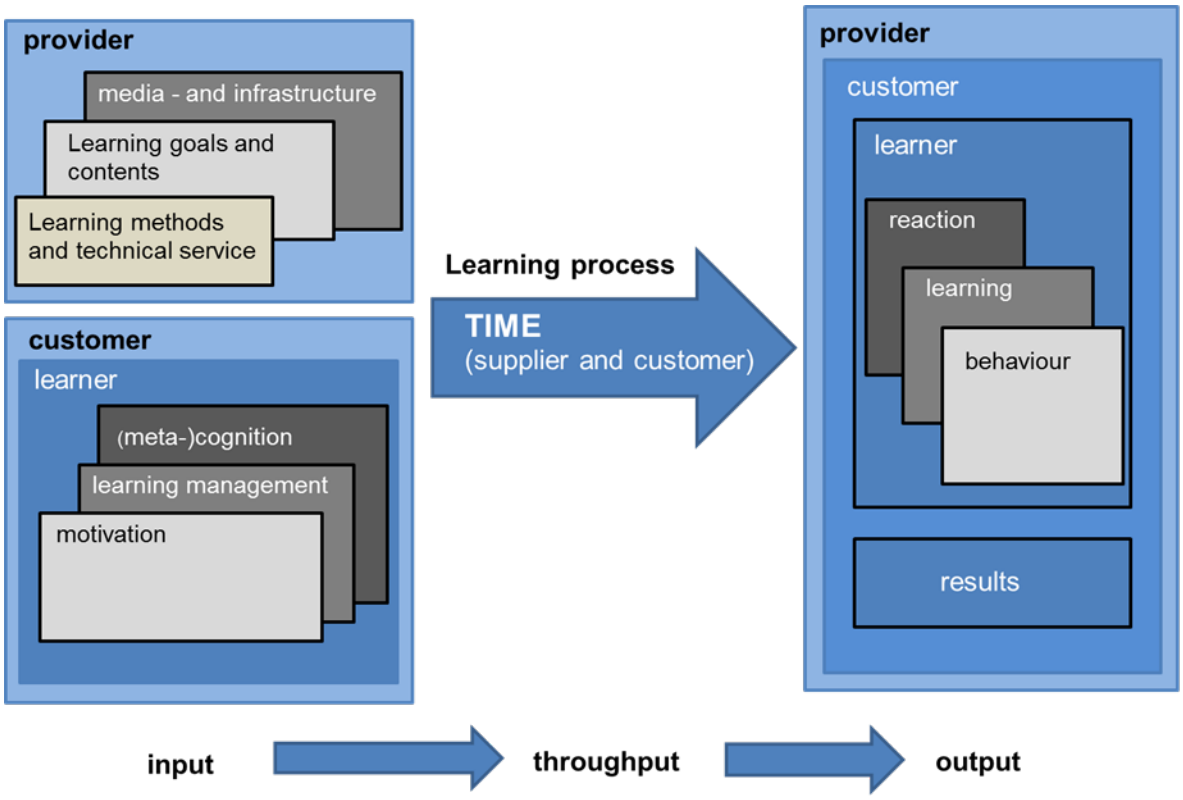

Figure 1. Productivity Framework

2.1 Input from the Provider's Perspective

Taking into account that the information system plays a pivotal role in imparting knowledge in a Blended Learning scenario, it seems obvious that information technology should be one of the contributing factors in an explanation of output in a measurement of productivity. The model of DeLone and McLean (DeLone and McLean 1992; Delone and McLean 2003; Seddon 1997) has become the dominant framework for measuring the goal-attainment of information systems (Urbach, Smolnik and Riempp 2009). This model has been extended in recent years, and it maps a causally determined relationship between factors such as quality of the system, information, and service, which are conducive to success, and the net benefits of an

investment in information systems (Delone and McLean 2003). Even though this conceptual approach comes not without its fair share of detractors (Seddon 1997), there is ample empirical evidence that a causal relationship between the different factors and individual and organizational success does in fact exist (Delone and McLean 2003).

In the context of Blended Learning, the provider is responsible for three factors which affect learning benefits and customer satisfaction.

Media and infrastructure (system quality): Technical or infrastructural inputs which are supplied by the provider in order to convey information to the customer. According to DeLone and McLean (1992), the coordination of different systems, integration into the application environment, and the focus on the user (e.g. printed papers, PowerPoint presentations) play a role too. Examples of this category are IT tools such as web-based-courses (eg.(Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson and Swan 2008; Lemak, Shin, Reed and Montgomery 2005)), virtual learning communities (e.g. (Ozkan and Koseler 2009; Salleh, Mendes and Grundy 2011) or mobile learning approaches (e.g. (Kim, Mims and Holmes 2006).

Learning goals and contents (information quality): Content of the training and the didactic underpinning. This refers not only to the information to be conveyed but also includes the choice of editing of content for different types of media, and the integration and coordination of different learning channels. Gupta and Bostrom (2009) stated that most research designs ignore critical aspects of the learning context (Alavi and Leidner 2001; Gupta and Bostrom 2009). The authors claim that the learning context, i.e. learning goals (skill, cognitive, affective, meta-cognitive) and epistemological perspectives (behaviorist, cognitivist, constructivist), is often neglected but plays a major role in the explanation of learning success (Gupta and Bostrom 2009).

Learning method and technical services (service quality): Due to the hybrid nature of the Blended Learning framework there are relevant inputs beyond the information system, and thus the framework has to encompass input factors from traditional teaching approaches. This is hardly problematic as the original framework has been modified by adding the element of system quality which already implies that the net benefit can be affected by non-system-oriented factors of influence (Pitt, Watson and Kavan 1995). Gupta and Bostrom (2009) maintain that the learning method can be considered an important determinant of learning success. It comprises the composition

of the team, the adequateness of IT in supporting communication and structuring processes, and the instructor's teaching methods. Additionally, the interaction between student and teacher is believed to be critical for the success of the training (Hillman, Willis and Gunawardena 1994). Thus, the role of the instructor has to be explicitly taken into account, his approachableness and his ability to impart knowledge.

For the purpose of an exclusive consideration of productivity relevant factors, intermediate dimensional tiers such as use and user satisfaction may be disregarded when measuring productivity.

2.2 Input from the Consumer's Perspective

We are suggesting a breakup within the input perspective. Therefore, the consumer's perspective is divided within the dimension into 1.) customer and 2.) learner, considering the special characteristics of Blended Learning Services. On the one hand, the customer comprises the company which is booking and paying the Blended Learning Service. The company has expectations which might diverge from the learner's expectation to the service, e.g. time-efficient provision vs. time-intensive explanations from the lecturers. On the other hand the learner is determining the learning success by his individual characteristics and expectations. Both of these perspectives have to be considered within a productivity framework for a comprehensive evaluation. Especially in terms of behavioral improvements, expectations and evaluations by the company are necessary (Kirkpatrick and Kirckpatrick 2005).

In general, learning is an interactive process. That is why success can only be attained by a sufficient interaction between the learner and fellow students, instructors, and the course material itself (Hillman et al. 1994; Moore 1989). Considering the input of individual students does not lead to reproducible results (Gupta et al. 2008). This seems to suggest that the learner should be considered as an external factor in the measurement in order to at least be able to make some relative statements about learning success in its various dimensions.

In the following a general classification is supposed to condense the conceivable variety of measurement parameters. Pintrich and De Groot (1990) identify the following criteria as critical for learning success:

Metacognition: Ability to plan, supervise, and adapt one's own cognition.

Cognition: Ability to learn, remember, and understand.

Management and control of own efforts: Ability to maintain learning effort in adverse environments (interruptions during training, difficult conditions.)

Motivation: Willingness to put into action one's own strategies and capabilities.

Expenditure of time: Amount of time needed for preparation, follow-up, and processing.

Taking into account the learner's properties given above may help to arrive at an assessment of learning success and to make it comparable. The challenge lies in being able to quantify factors such as motivation.

2.3 Process

In addition, Gupta and Bostrom (2009) proposed in their model to consider the learning process more carefully. They argue that the process is a strong moderating factor in a social system and needs to be understood (Gupta and Bostrom 2009; Poole and DeSantis 2004). So far, the investigation of learning processes is missing from IS, while in education, process research has focused too much on a post-hoc analysis of results or opinions of the researcher (Rohrbeck, Ginsburg-Block, Fantuzzo and Miller 2003).

Originating in the discipline of service science, the Unified Service Theory by Sampson (2006) defines a service production process as a procedure that relies on both customer inputs and supplier inputs. Both parties contribute to the service result, depending on their characteristics, individual service provision and respective anticipation of results (Parasuraman, Zeithaml and Berry 1985). In the production of material goods, the factor "time of production" lies exclusively with the manufacturer (supplier). This is different for services: Both parties have to expend time in order to ensure the successful completion of the service. Therefore, relegating the framework of "customer" to input factors is not dynamic enough, not adequate to services and probably misleading.

Regarding service productivity, we encounter similar processes as in interaction: Both supplier and customer have "mental models" (Hacker and Melzer 2009) of how much time they want to devote to it. This means there is bound to be a clash between the customer's productivity model on the one hand and the supplier's on the other. But

there is no direct process of coordination concerning marginal conditions. The supplier is under the impression that he can determine his share of time according to his own productivity model. That means he often unwittingly burdens the customer with a portion of the time of production. The customer, in turn, adheres to his own productivity model. Since he is a natural person, his model does not exclusively fixate on monetary criteria.

Production time is thus shared by customers and suppliers, depending on their specific readiness to invest time in the provision process (Sampson and Froehle 2006). This is an aspect of major importance in the field of service productivity, since time can be considered as a significant cost driver (Heskett and Schlesinger 1994). Consequently, saving time is of constant interest in the field of service science, especially in combination with IS (e.g. (Bohmann and Krcmar 2006).

Moreover, Gupta and Bostrom (2009) argue that antecedents of appropriation have to be considered such as faithfulness, attitudes and consensus. Furthermore, they argue for the consideration of appropriation support, i.e. meta-cognitive, procedural or strategic factors. Finally, they recommend including individual aptitude, meaning motivational factors, self-efficacy and other traits (gender, race).

2.4 Output

From the standpoint of the supplier, the end result of a service can be conceived as the output of a combination of internal and external factors (Grönroos and Ojasalo 2004). The service thus consists of the transfer of knowledge and competencies, an output than can be regarded both from the customer's and the supplier's perspective. The necessary inclusion of the customer in the creation of educational services leads to a situation where the inputs are different but the output is identical from both perspectives.

When measuring output and learning success, didactics focuses on the attainment of specific learning goals. Depending on the nature of the goal, different methods of evaluation are employed (Kirkpatrick et al. 2005; Phillips 1996; Swanson, Holton and Holton 1999). A popular measuring method was introduced by Kirkpatrick's four-step measurement model for the determination of the output and impact of trainings. The model is based on four hierarchical levels of evaluation:

Reaction: Degree to which the desired reaction to the training is achieved.

Learning: Skills acquired, attitudes, and knowledge imparted.

Application of knowledge: Transfer of knowledge into work life.

Business success: Degree to which the outcome of a training impacts organizational strategy on a global level. Since the focus of the study is on aspects of productivity, the fourth step exclusively refers to quantative outputs. It is only afterwards that monetary aspects are scrutinized, according to the model's extension by Philips (1996).

Although the assumption of a causal relationship between the different levels has drawn some criticism, the general classification seems to make sense. It takes into account both the students' immediate reactions (especially in the context of desired customer satisfaction) and the concrete learning success and application of knowledge (the foundation for a subsequent measurement of utility).

3. Conclusion and Outlook

In the framework of the present article, we came up with a productivity framework for Blended Learning Services which takes into account research results from various disciplines, i.e. business economics, didactics, psychology and information systems. Thereby, a comprehensive productivity framework could be developed, supporting researchers in identifying and integrating their specific measurement factors. Moreover, for the first time, the productivity framework was integrated into recent research results, helping to focus on Blended Learning Services from a business perspective. The prior lack of differentiation between different input perspectives has been rectified by introducing the customer/learner input perspective. For the first time there is a proper acknowledgement of the complexity of the input process. In addition, Pindrich's important psychological approach has served as a stepping stone for a systematization of the student's factors of influence. The supplier's side has been developed the IS model for the categorization of the BLS service outputs. In addition Gupta's BLS model was used to integrate BLS specific knowledge into the productivity framework. Thus, there has been an integration of IS and didactic research. Since perception-based experiences and factors of influence are crucial for the student's learning curve, relevant processes in the systematic delivery of Blended-Learning Services have been taken into account. In addition to the introduction of a dichotomy of input factors, the output perspective has been based on seminal works by Kirkpatrick and Phillips, which deal with different dimensions of success.

A major impetus of this article has been systematization. Not least through a proper incorporation of existing research, we have pointed out opportunities for a productivity-oriented identification of success factors and especially resource-intensive and costly areas in the design and delivery of educational services. This entails hitting upon certain potentials for the use of information technology and increasing productivity.

Yet this approach will have to be refined and the categories operationalized and supplemented with adequate measuring methods. Furthermore, it should be looked into how the final measuring model has to be adapted to different fields such as corporate and collegiate trainings. The model can be used to compare educational trainings, to develop and evaluate targeted measures and improve their productivity. But we would have to solve some crucial problems:

- Quantifying factors such as learning success and acquisition of competencies, especially against the backdrop of varying numbers of participants.
- Taking into account the difference between the perceived and the actual learning curve.
- Operationalization of certain student features which are hard to gauge, e.g. the ability to identify and comprehend contextual relationships.

When transferring the systematization into a measuring model used in practice, one should consider very critically which factors can be determined with reasonable effort. But the productivity framework put forth in the present article will serve as a first step on the way to a productivity oriented measuring and explanation model for Blended Learning Services.

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