ERP Systems: Training Quality and Resultant Use Quality Perceptions

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ABSTRACT

Training methods used during ERP package implementation remain largely unstudied in Information Systems literature. This paper investigates the "product quality" of a training program developed at an Australian university implementing PeopleSoft, to develop a definition of training quality. By examining use quality characteristics and assessing user perceptions against training results, conclusions are drawn indicating that high quality training leads to positive user perceptions of an ERP system.

INTRODUCTION

Enterprise Resource Planning (ERP) systems, Information Systems (IS) which have been growing in both popularity and use since the early 1990's (Kumar and Hillegersberg, 2000) are generally considered quality systems by both their developers and the world at large. This quality is in the form of product quality, one of many available definitions. Much research into IS quality is concerned with this concept of product quality (Eriksson and Higgins, 1994) and this can be applied against the quality of training. However, the product-based view, which is also considered in much ERP literature, does not consider the multitude of user issues associated with ERP implementation and acceptance.

Use quality, strongly related to user perceptions of a system, remains largely unstudied in the context of ERP systems and it is the intention of this paper to relate the product quality of ERP training back to user perceptions and therefore ERP implementation quality rather than the more traditional views. It is intended to prove that high quality training leads to positive user perceptions and therefore high use quality of ERP systems. Mahapatra and Lai (1998) acknowledge that for successful ERP implementation, training is of great importance therefore these results are applicable to any manager involved in such an endeavour. It should also be noted that this paper investigates the perception of ERP system quality rather than the quantifiable actuality.

DEFINITION OF TERMS

Enterprise Resource Planning systems can be described as "configurable information systems packages" which integrate information and processes across organisational functional areas (Kumar and Hillegersberg, 2000). While the motivations for ERP implementation are quite well studied, there is a significant lack of research in the area of outcomes when examining issues of user acceptance, user training, and more specifically, university environments and successes achieved (Sieber et al., 1999).

It is essential to define training, a term widely understood as a means of transferring knowledge from one party to another. This study will refer to training as a formal effort to transfer IS knowledge, required by users to perform essential tasks (adapted from Nelson and Cheney, 1987a). Many variables such as end-user ability have been cited as impacting training effectiveness, however this study will investigate training quality. Currently, no best practice ERP training approach exists although researchers such as Markus and Tanis (2000) and Brown and Vessey (1999) have proposed general implementation frameworks. This lack of training focus is possibly due to the lack of training research in terms of IS theory development and relation to organisational concepts (Kozlowski and Salas 1997; Nelson and Cheney 1987a).

Quality

Many definitions of quality exist and quality, especially when applied to IS, seems notoriously difficult to clarify. As stated earlier, this paper will discuss how the intrinsic "product quality" of ERP training can lead to good "use quality" of an ERP system. Product Quality can be defined as part of a "multifaceted concept" focussing on a precise and measurable variable (Garvin, 1984) whereas Use Quality concerns how well the system serves the user and fulfils their varied requirements (Eriksson and Torn, 1991).

Eriksson and Higgins (1994) give a user-based definition of quality as such: "The quality of a product depends upon how well it fits patterns of customer preferences". It is acknowledged that this interpretation of quality is the most difficult to measure and new means of assessment must be found (Swanson, 1997). The definition is most appropriate for this study, as user perceptions are under investigation rather than the quantifiable, product-based definitions adopted by many researchers.

METHODOLOGY AND PROJECT BACKGROUND

The topic was investigated based upon data collected for a research project in which the impacts of training and ERP interfaces upon user acceptance were investigated. The research site, PROJECT20001, involved implementation of selected "Financials" modules of the PeopleSoft ERP product at an Australian university. An external consulting company performed as an implementation partner, providing technical support and validated implementation methodologies.

PROJECT2000 adopted stringent training procedures as one of the primary means of achieving high levels of user acceptance. These procedures involved introductory sessions, focussed work shops and hands-on training. Other techniques adopted (such as advertising and removal of the old system) will not be investigated in this paper. At the time of investigation, the first released modules have been widely accepted by the majority of business system users and it is intended to demonstrate the strong link between the quality of the training and the high rate of user acceptance.

Data was collected for an Honours research dissertation and the data has been revisited for this paper (Mayer, 2000). The data was gathered by attending a variety of PROJECT2000 training sessions and then conducting follow-up structured interviews with the attendees. Post-training session survey data from the attendees was also analysed. The trainers themselves were formally

interviewed to assess how the training product was developed and their personal input and history.

For the purposes of this paper, definitions of IS quality were investigated and assessed with respect to the two areas under investigation: training and ERP "usefulness" (leading to acceptance). Appropriate models were adopted and modified where necessary to give a definition of training quality, and the actualities of PROJECT2000 were assessed against the models. Finally, links were drawn between training quality and use quality.

QUALITY MODELS

Product Quality

Garvin (1984) identifies eight dimensions of product quality which are useful to assess against a given product. While a training program can be considered a product, it is noted that certain dimensions are highly inappropriate and therefore unable to be assessed. Performance and reliability cannot be paralleled but this model is useful in developing a definition of training quality by assessing the remaining categories. In several cases, the definitions of the dimensions have been largely modified. The dimensions have also been ranked, the order below demonstrating what is considered the most to the least important to achieve training quality.

1. Conformance

This attribute considers how closely related this training product is to other products that exist on the market; those that trainees may have previously experienced. A high degree of program conformance may lead to higher levels of user acceptance due to familiarity with the environment (Nelson and Cheney, 1987b).

2. Aesthetics

This dimension relies on the overall appearance and "slickness" (smoothness) of a training product. How is it delivered? How professional are the Training Managers (TMs)? Are they well versed in their domain and training knowledge? Other questions can be more concerned with the physical side of things: Are TMs well dressed? Is the training environment clean? Is equipment new or clean and enticing to use? Are any provided materials well-set out and easy to read?

The above questions all have very subjective answers, however much like quality, most trainees will agree that good aesthetics are instantly recognisable (for further discussion of this topic, refer to Mayer (2000). The overall aesthetics of a product depends on various attributes, also incorporating some of the concepts included under the heading of "serviceability" such as competency and courtesy.

3. Perceived Quality

This dimension is closely related to aesthetics however deals less with specific attributes of the training product and more with an overall evaluation. This is typically based upon what the trainee knows about the history of the TMs and product: do they have an established reputation and can the trainee trust them to deliver what is promised? Reputation and affiliation – from where the training product has arisen – are of prime importance.

4. Features

Features include a training product "extras", that is, characteristics outside the product's basic purpose. These may include gifts for the trainees, lunches, anything designed to ensure trainees are more than pleased with the experience and the accessories it brings.

Training Quality Dimension	Training Process Features	Quality Dimension Impact
1. Conformance	"Classroom" approach (Ralphs, 2000) Material delivery, hands-on Reliance on technology of minimal concern	Positive
2. Aesthetics	New equipment, professional trainers Shared TM, trainee nervousness → rapport	Positive
3. Perceived Quality	Organisational staff as trainers → high trust levels	Positive
4. Features	Training manuals, refreshments	Positive
5. Durability	Style retained for several sessions	No discernable impact
6. Serviceability	Helpdesk, manuals found non-effective Co-worker support most effective means	Negative

Table 1: Features of an ERP Training Product

5. Durability

Durability is concerned with the "life" of a training product, that being how long it may be used without becoming outdated or inappropriate to the training situation. For example, a PeopleSoft training product developed for Release 1 will no longer be appropriate in ten years if the expectations of trainees have changed.

A training product cannot "fail" in the typical product sense, but it can be "repaired" in terms of updates to the style of teaching, delivery and circumstances. A highly durable training product results in time and cost savings for the company with ownership, therefore the desired durability of a training program must be assessed against its use life before it is fully developed.

6. Serviceability

Garvin (1987) defines serviceability as speed, competency and courtesy related to service repair. For training, a different approach is required and serviceability can be loosely related to the effectiveness of future training support. The above-mentioned attributes of speed, competency and courtesy with which post-training session support is provided has greatest impact on user perceptions.

Training Quality Defined

The above analysis leads to the working definition of training quality, which is derived from product quality definitions and an analysis of the research data for PROJECT2000. A quality training product is ideally established by a reputable organisation, delivered by a trained team of professionals in a pleasing environment. It offers a balance of features while conforming to expected session perceptions and ideally, has an appropriate life and good follow-up procedures.

As mentioned earlier, this definition relies on very subjective attributes as it can be argued that a pleasing environment to one person is certainly not what the second trainee desires. The difficulty is in finding a balance of what is most pleasing and appropriate for all trainees in each dimension mentioned, and assessing these against differing user perceptions may give an overall picture of how the training quality has been perceived in a specific situation.

The SOLE Model

Through examination of several quality models, it was decided that the SOLE Software Quality Model ((Eriksson and Torn, 1991), (Eriksson and Higgins, 1994), (Lindroos, 1997)) would be of most use in assessing the components associated with ERP package quality and the associated training. Three quality factor

classes, IS Business Quality, IS Use Quality and IS Work Quality form the basis of the model and are further split into analysable elements (Eriksson and Torn, 1997). However, it should be noted that this model is "theoretical and rather abstract".

The part of the SOLE model relevant to ERP systems implementation involves Use Quality, and this is directly associated with user perceptions of the system and how well the system serves the user (Lindroos, 1997) which matches the earlier identified user-based quality definition.

Use Quality

Use Quality in the SOLE model (Eriksson and Torn, 1991) is broken down into two requisite parts: requirement quality and interface quality, which can be further divided into ease-of-use and ease-of-learning. With an ERP system, both quality attributes are often neglected from an implementation point of view as an ERP already has both an interface and implied requirement fulfilment.

TRAINING PRODUCT QUALITY ANALYSIS

By using the dimensions modified from Garvin (1987) and applying the derived definition of training (product) quality, an assessment of a real-world training process may be made. PROJECT2000's training method incorporated a variety of tools and techniques to successfully distribute the necessary information to all trainees. This information primarily consisted of system usage techniques rather than methods of customisation. The following table indicates key impacts.

The above assessment demonstrates that a highly appropriate training product was developed for PROJECT2000. TMs and trainees interacted on an equal basis, allowing a flow of communication and understanding between the two groups based upon their similar goals and interests. The conformance and aesthetics dimensions were well fulfilled, definitively enhancing the perception of the training sessions and most trainees rated the sessions as "very good" (Mayer, 2000).

Following the training sessions, all survey respondents had a very high perception of ERP systems. They had been given appropriate system overviews and a working knowledge of how they would be expected to use the system. After system implementation, trainees still conceded that the ERP system was of good quality, and many acknowledged that their current complaints and frustrations would likely disappear with time and experience. Not all parts of the system were yet implemented at the time of analysis, and it is interesting to note that all employees interviewed had a high degree of faith in both the ERP and the development team that missing functionality would eventually be successfully implemented. This faith can be related to quality perceptions, of both the system itself and the delivery team, which included all TMs.

From this analysis, it can be seen that the majority of requirements were fulfilled therefore a high quality training package was developed for PROJECT2000. Links can be drawn between specific characteristics of training quality and use quality which is assessed below.

USE QUALITY ANALYSIS

Customisation of ERP systems is the traditional approach to fulfilling requirement and interface quality provisions. The ERP project studied took a serious approach to determining user requirements, however few customisations were actually performed. The following analysis demonstrates that based upon typical measures, users should have been left with a poor impression of the
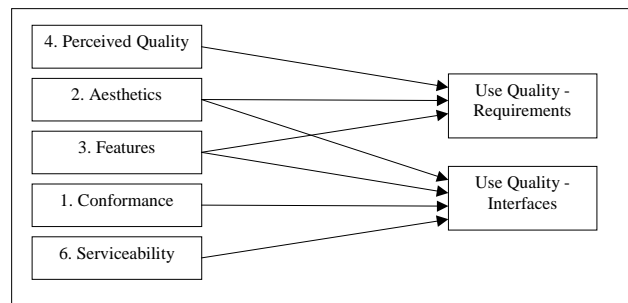

Figure 1: Linkage between training quality and use quality.

new system. This then leads into examination of the use quality perceptions which result.

Requirements

By their very nature, ERP systems discourage requirements modification (Soh et al., 2000). Customisations are typically limited to choices of which fields or screens to use, rather than modification of the internal processes and calculations and reports can be customised.

PROJECT2000 stated up front that the ERP implementation was to be used not only to deliver a new integrated system, but to "force" process change across the university (NABS, 1999). Therefore, to analyse how well the system serves the user (Eriksson and Torn, 1991), the best method of assessment is to examine the standard system.

PeopleSoft is designed to meet the "average" users' needs, a typical user being any person from anywhere within the world without consideration of cultural, governmental or business constraints. The system is based upon best-practice techniques however there is considerable contention as to whether these methods suit any real-world user (Davenport, 1998). The system is not designed to meet business changes and upgrading the ERP is often extremely expensive for any client who performed customisations. However, the essential attribute of security (Eriksson and Torn, 1991) is well met by the system (dependant upon initial user set-up).

Interfaces

PeopleSoft's developers promote the product as having an easy to learn and use interface, something readily agreed with by interviewed users. It is also acknowledged that the system is fast to use (dependant upon university network connections). However, PeopleSoft fails to fulfil the categories of adaptability to the user's style, and many complaints have been registered regarding scrolling features and the multitude of screens. Some provisions exist for user-interface customisation (the "Favorites" tool a notable example) but the dimension of flexibility remains largely unsatisfied. Users have also complained about the system-provided error messages, often cited as too ambiguous or technical to be of use.

Both of the above categories demonstrate a deficiency in the fulfilment of typical use quality attributes and based upon this assessment alone, it would be predicted that the system fails to include IS use quality. User perceptions of the system should lie in the negative dimension, especially as an ERP is not designed for a specific business environment. However, PROJECT2000 users have generally agreed that the system serves their needs quite well and acknowledge that current concerns are merely part of the "settling in" process. Users are generally satisfied with the interface and functionality provided, and are actively using the new system.

A high level of use quality is presumed to have been achieved.

Swanson (1997) examines numerous quality dimensions and incorporates several of the above attributes as part of meeting and/or exceeding of customer expectations to give IS quality. Given the positive system perception, it is apparent that the customer expectations have been met, therefore analysts must look beyond the traditional fields associated with use quality and examine the impact of other influences including training.

TRAINING QUALITY TO USE QUALITY

It is useful to draw together the training quality and use quality dimensions and this is demonstrated in Figure 1. Individual characteristics may be correlated on a very generic level to demonstrate tenuous links between the categories. As with most studies in IS, the below links cannot be quantitatively proved, however it has already been demonstrated that there are significant impacts on use quality perceptions, the most likely being training.

The analysis and explanation of these linkages has been proven in the PROJECT2000 situation. Note that the quality characteristic of durability has been omitted from Figure 1, as users are not concerned with the lifetime of a training product.

The dimension of aesthetics has perhaps the greatest impact on levels of use quality. The TMs, through their enthusiasm and professionalism, demonstrated their satisfaction with the interface and did not demonstrate any desire for change which the trainees might have noted had they been projecting their own desires. The high level of trust between the two groups could have resulted in positive impressions of system security and system speed. In-class computer faults which were later replicated in real-world environments maintained an impression of knowledge; the trainees were aware of the problems and knew how to deal with them.

Conformance relates to user comfort with the static interface. Due to the high level of comfort with the training environment, trainees were comfortable with the examples and situations presented during training, and therefore an up-front acceptance of the system interface is achieved.

Features of the training session also resulted in positive perceptions, primarily through the provided training notes. This manual again reinforced the idea of a static interface giving users no scope to demand change, and this includes disinclination of requirements and business changes.

The trust issue is again raised when considering perceived quality of the training product. Because trainees trusted the TMs, they implicitly trusted the business changes presented as something which had to happen for the good of the university. This is perhaps one of the key impacts of the quality training process.

Finally, while serviceability had a negative rating for PROJECT2000, its results can be seen in poor user impressions of error messages (relating to the interface category). If informed staff had been available via the helpdesk to explain PeopleSoft error messages, perceptions in both dimensions might be improved.

Therefore, it can be concluded that product quality influences use quality in at least one situation of ERP implementation. Further research and results are necessary to determine if this is the case for a variety of ERP projects, and comparisons with situations using alternative training forms such as intranets would be extremely useful (see Mahapatra and Lai, 1998). Assessment of the training quality definition developed is also necessary from a variety of perspectives outside of the ERP domain.

It is important to note that training quality is not the only contributor to high levels of user acceptance. A range of impacts occur from areas such as system support, advertising, personal skill, the ERP system itself and the business environment, each impact having various levels of influence. Regardless of the extent of the impact, each of these must be considered in addition to training when undertaking an ERP implementation.

Finally, it is useful to consider the impact of achieving good use quality. Salmela (1997) points out that IS quality, directly related to use quality, impacts business quality (loosely defined as the net value of an IS). This matches the ethos behind ERP implementation: it is intended to gain benefits (typically financial) for the implementing company.

CONCLUSION

By adopting a user-based definition of quality, an analysis has been made of training products in general. Through definition of training quality, assessable on the six dimensions of conformance, aesthetics, features, perceived quality, durability and serviceability, it has been demonstrated that high quality training can lead to positive user perceptions of a new system. Evidence has been provided from one ERP implementation site, allowing qualitative links to be drawn between the differing dimensions of product quality and use quality.

Future studies are necessary to validate both the training quality definition and the linkage to use quality. It is hoped that this paper is viewed as a useful reference for investigations of either nature.

* The name of the organisation has been disguised to maintain confidentiality.

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