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End-User Control In Web-Based Electronic Services: A Case Study

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Abstract

This paper reports a case study of end-user control in delivery of Web-based electronic services. The case study concentrates the adoption of a Web-based electronic system being implemented in processing student's admission applications on a Web site. The end-user's control interface provides information on the detail existing in the Web-based electronic service. This insight into end-user synthesis in developing effective control in Web service environment relates to ease of use in doing the task. To assume the leverage of end-user control strictly on the basis of the Web service usage would limit the purpose of understanding. Rather it is suggested that it would be better to develop an approach to study the end-user ease of use interface in doing the task with the user's perception towards Web-based interactivity.

Keywords

Web-based electronic services, user control in Web-based electronic services, task control.

1. Introduction

The paper reports a study conducted within the international student recruitment department of the University of Australia (not the real name). The department has introduced a Web-based electronic service processing system to process all student applications. The users of this system are the university staff processing the applications directly on Web and students making admission applications. The service process can be completed on the Web site. Currently the staff is resisting the adoption of Web-based electronic services because it does not offer adequate control on task management. The case study examines the control factors in Web-based electronic service emanating from the end-user context.

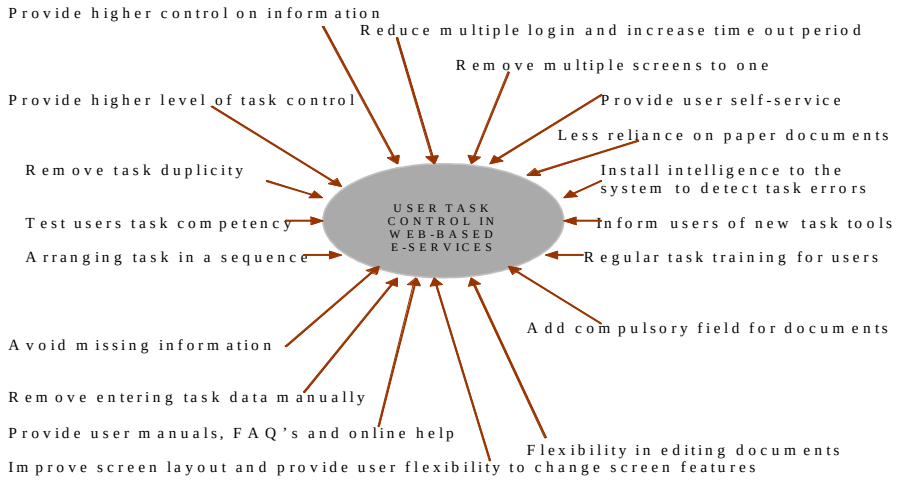
Effective user interface design is critical in the End-User Information System (EUIS) environment (Regan and O'Connor, 1994, Goodhue 1998, Sandhu and Corbitt 2002). The level of control a user has in conducting a Web-based electronic service task affects the users' experience and subsequent usage. Control is a construct that reflects situational enablers or constraints to behavior (Ajzen 1985). Venkatesh (2000) argues that control relates to an individual's perception of the availability of knowledge, resources, and opportunities required to perform a specific behavior. Similarly, end-user control in Web-based e-service environment may be defined in terms of the degree of effort the user has to exert to complete a task (Sandhu and Corbitt 2002).

In order for the user to have a higher degree of control, users expect the system to be flexible to meet the task requirement. In this environment Web electronic service software is merely a tool to get business tasks done. On the contrary accomplishing the purpose of the task is not an end in itself; rather it demonstrates users' parameters in doing the task. The use of Web-based electronic software should be transparent to users, and it should not distract users' attention from the business task (Regan and O'Connor, 1994). Working with EUIS software should feel natural, not require special concentration (Regan and O'Connor, 1994).

Unfortunately, the significance of this point is easily lost among IS developers, when developing systems (Sandhu and Corbitt 2002). Technical experts need to gather all information about the user interfaces and integrate it with the software tools for the best results (Sandhu and Corbitt 2002). "How much" and to "what extent" is for debate. Effective user interface focuses attention on two basic human factor principles: (1) to learn a software program, users develop a conceptual model of the interface; and (2) a software program should allow users to control the dialogue.

2. Conceptual Framework

The following discussion is based on theoretical concepts in analyzing the emerging evidence and its implication in end-user Web-based electronic service adoption from the user control-centered perspective. Rogers (1983) argues that attributes that have an indirect effect on innovation adoptions may also play an important role. User control attributes may influence the user adoption decision of Web-based e-service. The Technology Acceptance Model (TAM) of Davis (1989, 1993) represents an understanding of IS usage and acceptance behavior (Davis, Bagozzi and Warshaw 1989). TAM has been applied in a variety of end- user studies on world-wide-Web (Heijden, 2000; Gefen and Straub, 2000; Steer, Turner, Spencer, and Godfrey, 2000; Moon and Kim, 2001; Wright and Granger, 2001). Applying the TAM model to investigate the end-user control may provide insight into what makes Web-based e-service usefulness and user friendliness. TAM focuses on two such beliefs: perceived usefulness (PU) and perceived ease of use (PEOU), it may be suggested that integrating end-user control factor in TAM may have an influence on users' acceptance of Web-based e-service (e.g., Venkatesh 2000; Davies 1999; see Fig. 1). In TAM study (Davis 1989) "control over work" factor was retained, although it was ranked fairly low and argued to be an important aspect of usefulness. In other studies (e.g., Venkatesh 2000; Taylor and Todd 1995; Ajzen 1991) control is treated as a perceptual construct in understanding user behavior.



Sandhu and Corbitt (2002)
Figure 1: User Task Control

Emerging evidence subjectively points towards the end-user control factor in defining the current problem with in the Web-based electronic service framework. The users were experiencing considerable degree of constraints in managing electronic task. These were the early perceptions that were gradually shaping user attitude towards the new system (e.g., Karahanna et al 1999). Attitude towards using a technology was omitted in TAM (Venkatesh 2000), albeit the users' early attitude towards controlling the system (not vice versa) played a pivotal role in its adoption and consequently it's diminishing usage. Research with the model found that the users' experienced working within fixed standards and personalizing task features on individualized basis were not available. There was a gap between users personalizing the task (which though rested in systems control features and not with the users') and the scope of electronic service assisting the user with the task. The users determined that these early perceptions of the new system being without ease of use. Senior management, when implementing the system, worked on the concept of standardizing the Web-based electronic service output. This developed into end-user resistance in adopting the Web-based electronic service within the set parameter. The end-user found the control factor as inheriting within the system and not with themselves (i.e. end-users) and this made the electronic task difficult to perform. The end-users based their expectations on reasonable experience in the past when task control inherited with the user and not the system. To some extent the users felt isolated from the system and the disparity believed to be growing.

Regan and O'Connor (1994) suggest several techniques for developing and reinforcing the users' conceptual model of the interface. These include using metaphors, avoiding modes, ensuring consistency, making the interface user driven, and making the interface transparent. Providing user with the consistency in interacting with the metaphors that convey the same meaning enhances user control over the electronic service task. In this paper we will focus on easing user task interface in the Web-based environment (see figure 1).

3. Research Method

The problem facing the international admission department was that the staff were not adopting the Web electronic service in processing student admission applications; instead they were continuing with the old system that is a traditional paper based service. Printing documents, storing them in folders, and processing correspondence with students through traditional mail were central to the workflow system. Reliance on the paper-based service tended to duplicate and increase task load leading to errors and confusion.

As a result of this, the department lag behind in providing good service to its clients (students), resulting in considerable backlog. The department introduced the Web electronic service to catch up with the increasing backlog and to improve their service to students. The staff account for their resistance to adopt Web electronic service on the basis of factual information such as: it added additional load to their current task, there was a lack of confidence in Web electronic service, there was fear of providing wrong information on the Web, and there was a resistance to seeking help when required.

This case study examined evidence from multiple sources of documentation, open-ended interviews, and participant-observation (Yin, 1994). The discussions and interviews were open-ended, the researchers in the beginning provided the topic, and the respondents were probed their opinion about the events. The respondents were asked to explore their understanding of exercising control in the Web-based e-service system.

Each interview was taped and subsequently transcribed for analysis. A reasonable approach was taken to verify the responses with information from other sources. The respondents were encouraged to provide their own insight into the problem and this was later converged with responses from other respondents and sources. The researchers avoided following sequence of certain set of questions only, as it would have limited the scope of study and may not provided important and rich information.

4. Case Analysis

A. Task Control

The users were asked about their perception of task control in Web-based e-services. The degree of control related to what the users' were able to do and what they couldn't, and the amount of effort exerted in doing a similar task offline. There were strong pretexts among users to draw comparisons when the Web-based e-service system didn't meet its expectation. The following statements from a number of participants support this.

We need more control…we can get report, but that's only in numbers, whereas the other databases has more information providing us with more control over information…this makes the work easier…(Participant A)

Information that is important to the user and specific in nature and delivered in a meaningful form would make sense and was considered to be useful and easily remembered, other than that it

brings complexity to the user task. The importance of this point was expressed by one of the participants:

Due to time out period that disconnect from the system, the user has to reenter all the information once again…this creates duplicity of information for us...as the same user is reapplying again and it is hard to differentiate between the same application...(Participant B)

The users' experienced that the ease of use of the new Web-based system offered little control in terms of managing the information flow, and demanded complete control and flexibility over information in doing the task, anything short of that resulted in an attitude of resistance towards further usage. Similarly Rogers (1983) claims that adoption is a function of variety of factors, including relative advantage and ease of use of the innovations (Adams, Nelson, and Todd 1992). The relative advantage in controlling the information was essential among users.

Regan and O'Connor (1994) suggest that there should be consistency when users' interface with the system reinforcing the users conceptual model of software. Consistency in a Web-based task environment relates to screen layout for different tasks to the personalizing of the screen features, to an understanding users' interaction with different features on the screen, and thus to offering control in the task that was necessary and which was either unknown to the user or missing and thus the control factor had little or no prominence in the systems development (e.g. Sandhu and Corbitt 2002).

Giving the user with control on the Web-based electronic system necessitated the demand for a Web-based electronic platform that would provide the user with control leverage in accomplishing the task. Making the interface user-driven is considered necessary to support the user's work environment and goals (e.g. Goodhue 1998). A task analysis could reveal not only what users want to do and how, but also factors such as the amount of variability in processing sequences, exception conditions, problems, and interfaces with other systems or manual procedures. It was believed that such a feature, if available, would have added to the ease of doing the task and offered usefulness (Davis, 1989; 1993).

General models of employee behavior suggest that behavior is determined by clarity of role, ability to perform, and motivation to perform (Zeithaml and Bitner, 2000). Similarly, user behavior in a service production and delivery situation will be facilitated when (1) users understand their roles and know how they are expected to perform, such as clearly defining their task; (2) users are able to perform as expected, that is the minimum standard expected to do the task; and (3) there are valued rewards for performing as expected (Schneider and Bowen, 1990), that is users will be motivated individually and collectively for their achievements. While working with both systems users had forgotten their actual roles within both the systems. One participant disclosed this:

When marketing managers were told to handle an inquiry, the reaction was, it wasn't their job (Participant B)

B. Data Control

There was confusion among employees in the Case Study in understanding who was responsible in controlling and delegating the task originating from a Web-based environment. This demonstrated that either the users were shifting their task to their sub-ordinates or they didn't understand their contribution and responsibility in the Web electronic task system. No minimum

standard was set for each task; rather the complete service output was viewed as a final delivery of service. This also reduced the sense of ownership, and the minimum standard expected of doing the task. It was not known whether the users' were proficient in using the Web electronic service database system. This was assumed on the basis of their past experience and interface with the paper-based system. Working with a database system requires a certain level of expertise for which the users' were not tested. It may not have been possible for the users to understand the essential requirements of the task and what was expected from it. One participant noted:

We can't change or edit letter templates, can't do anything, everything is fixed...whereas the other system lets you do (Participant C)

These were some basic useful control characteristics that the system should contain to enhance ease of use (e.g. Venkatesh 2000). Understanding systems usefulness from the users' perspective was of little importance even when further upgrading the system. Some features if tested before deployment may have enhanced the systems capability to meet users' expectation and usefulness (Davis 1989). Users were in control when they were able to switch from one activity to another (i.e. from one screen to another), change their minds easily, and stop activities they no longer want to continue. Another participant noted:
When I am in between different tasks I am logged off...have to login number of times...due to time out period, loose work when login back…it's irritating… (Participant D)

Users were disconnected from the system within the idle-time period, especially between multiple tasks. Instead users were given the option to cancel or suspend the task any time they wished without causing disastrous results. Further consequences of disconnecting users from the system also formed a lower impression among users to disconnect early from the system before the system disconnected, and hence this resulted in lower usage, even though the usage could have been increased between tasks. There was fear among the users providing wrong information to the clients. One user noted:

We are afraid to providing wrong information to our clients.… (Participant E)

When users are in control, they should be able to explore the system without fear of causing any irreversible mistakes (Regan and O'Connor 1994). If the users' were offered positive, reinforcing learn-by-exploring environment to use system for its usefulness and effectiveness it may have improved user task ability. Mistakes should not cause serious or irreversible results. Another participant went a step further and said:

They do not seek help when needed… (Participant F)

This user did not want to take the responsibility for the mistake and ask for help because of fear.

Seeing the screen features helps users to visualize, rather than have to recall, how to proceed. Both the presentation of features and the user interaction should be transparent (Regan and O'Connor 1994). One participant noted that:

If any information is missed, there is no way to check, there are no compulsory fields to inform of missing information… (Participant G)

Whenever possible, the users should be alerted for missing information. Such features, if present, may offer a better control to the user in using the system.

C. Screen Design

The dialogue between users' and the Web interface provides feedback whenever possible. Users may be prompted to perform an action with visual feedback, audible feedback, or both. The flexibility offered in terms of choosing color, emphasis, and other presentation techniques show users which choices they can select, when a choice has been selected, and when a requested action has been completed. Such features introduce usefulness and ease of use in users' task (e.g. Goodhue 1998). One participant disclosed this in one of the interviews:

Screen is fine, fonts are too small, and its hard trying to fit everything in one page…people whose first language is not English would like the fonts to be bigger in size... (Participant H)

This point is important that the Web-based system was not designed and developed keeping in mind the diverse user category. The composition of user category was local and international. Different user understood the Web-based task differently based on their competency of English language. It may have reflected on user experiencing a diminishing interest in the information presented that was difficult to read.

Users had been using the data entry screen and those features were compared to be friendly. A data entry screen (form) such as a database input screen created complexity for the user when such friendly features were not available on the Web-based system. The screen design though allowed input of data into a system but its interaction behind the user screen was not understood. Screen design principles are related to paper-based form designs (Regan and O'Connor 1994). The screen design assesses many principles of screen design, such as character size, spacing, and ease of use (Davis 1989). One participant stated:

Site needs to be improved with better features and functionality that will make it easier for us to use… (Participant I)

D. User Support

The users constantly voiced their need of the system as something that was easier to use. Consequently further down the system, it got more complicated, not in terms of doing the task but in a way that was rigid in offering control over the task. What then constitutes user friendliness? Many end users list performance support aids (Regan and O'Connor 1994). One participant reported such aids as unknown or missing:

Mine has been chucked out...haven't seen one… (Participant J)

When using a software program, the user inevitably comes across situations when they (i.e. users) don't know what to do when faced with a problem (Regan and O'Connor 1994). Sometimes error messages are confusing and not meaningful. Users frequently find software manuals, even when well written, of limited value in solving the problem. The reason may be due, at least in part, to the fact that these manuals generally contain everything that anyone would ever need to know about a software package. But they help little in solving problems of different user categories. Since new users have limited experience on which to discriminate, or even formulate their questions, it is often difficult to locate the applicable sections of the manual. The level of control in overcoming the problem situation in the task may require careful understanding of the user expertise based on the user category (i.e. novice, intermediate, or advanced) (e.g. Sandhu and Corbitt 2002).

The department in this Case Study outsourced its major development work for Web-based electronic systems. Outside programmers had a technical perspective rather than a user perspective, and as a result, the central focus of designing the system for the user was forgotten. It did not include well-written descriptions of the system and directions on how the end-user could accomplish specific tasks. System developers knew the system well; the assumption that others (i.e. users) could use it equally easily was a common misconception. Manuals may effectively document how things are supposed to work, but they omit the exceptions, what can go wrong, and what to do about it. Increasingly, large software development projects are separating the responsibility for documentation writing from the program writing by hiring a technical writer to work with the programmer. At the time of the study an outside consultant was brought in and worked closely with the department IT Manager in developing an electronic workflow. That documentation it was hoped was then likely to be more easily understood by the end-user.

There is no internal search engine, if there was one it would have helped in the task… (Participant K)

When the documentation is part of the software program, it is considered a help facility (Regan and O'Connor 1994). On-screen help facilities offer assistance to the user at the time the problem occurs (Aberg and Shahmehri 2000). Some systems have a specific function key that lists help options alphabetically, requiring the user to specify the type of assistance needed. Other, context-sensitive help facilities assume that the user needs assistance at the point where the help is asked for, such as the role of human Web assistants (Aberg and Shahmehri 2000). Such systems then automatically take the user to information that relates to the task in progress. A search engine with in the Website offering this functionality would have positive effect on users (Zeithaml et al. 2000). These help features were missing in the system studied in this case. Such support features not only offer the user with better control over the task it also forms a positive perception among users in using those aids for subsequent tasks. In other words, they were being developed at the same time the system was developed and were being integrated with task operations.

E. User Motivation

Martin (1991) suggests that many information systems carry a lot of data but little information. Information if not controlled and presented to the user in a meaningful way may create complexity in the user task. There is a tendency among users to reject data from information systems when it has little chance of helping them make decisions. When information received by the users that was incomplete or was missing, the users' attitude towards the system was negative, for example:

It is inadequate in conducting the task…the system is not 100% ready… (Participant L)

The users were helpless in exercising the degree of control that was very much needed in doing the task. In that situation making sense of incomplete or missing information was increasing the task load and adding to the user frustration.

The task features (see Figure 1) were expected to improve the level of user control in doing the task. This may not be the ultimate balance of the overall task management but may develop into a specific area that can be applied in knowing if the electronic task meets with the user control requirement. Demonstrating the need of such requirement in task control may also point towards how easy or how difficult it is to perform the task on electronic platform depending on the user

category. Zipf (1949) developed a model of human behavior that presumes humans have a desire to escape sustained effort. Zipf's formal hypotheses were that "as task becomes more difficult, fewer humans attempt that task". The more difficult the task (effort and time), the more the number of people abandoning that task will rise after they have started. This may apply to some extent on the task control factor, when the user cannot exercise a certain degree of control that is needed in doing the task and may abandon it completely. In such situations the user might also find known ways to do the task, this will depend on the effort the user is willing to exert in completing the task.

Usually the effort exerted in having control over the task may change due to the location (or situation) of the task. One participant revealed:

At home I am more motivated in using the system, as I am relaxing; at work I am hurrying as I have to do this quick…do that… (Participant M)

Users won't exert the same level of effort in doing different tasks, in different locations (or situations) and there will be a degree of variance in the effort exerted. Seemingly if the control factor is fixed some users might complete the task others might drop out if it were difficult. If the control factor were variable (i.e. can be adjusted) the chances of completing the task among different user categories (i.e. novice, intermediate, advance) might increase. It may not be true but may prove to be a guiding factor that can be considered when implementing systems. We may debate "what is the degree of control the users demand", the answer to this may not be straight forward and would differ from system to system; from users to users; and from task to task.

There may not be a general scale (not yet) that can be applied across the Web-based electronic systems platform. This can only be understood as the system is developed and pilot tested among different users to discover which component functionality offers the optimum degree of control in doing the task. This information can then be integrated into the system and later checked for measuring the degree of control performance that is needed by the users in the task. Effective control in doing the task also requires investment of time and different inputs that are needed in completing the task. This may require an analysis of the system that such characteristics exist in the Web-based electronic platform facilitating the task process. The complete task process that is completed electronically will require an infrastructure that will support the different phases of the task.

5. Conclusion

The preceding discussion based a case study where the management attempted to improve user-control over task in Web-based electronic service environment. The development in technology was designed to provide users with ease of use and better control over the task. The system control was expected to enhance information control, reduce paperwork, remove duplicity in task, organize task sequence, reduce manual records, and improve task efficiency. Delegating better control on the task in different user categories needed careful understanding of the Web-based electronic systems infrastructure. This necessitates outlining the scope of the system and what is expected of it in the service process.

Systems undergo changes and restructuring as part of the systems development life cycle and delineating the improved control structure in upgrades that meets the users' requirement is of

relevance. It is important to remember the degree of control users have in doing the task. Often the degree of control is less or more than expected. Getting the right balance in user control will require an understanding of the task and technology processes. For this purpose there should be a close coordination between the systems development team and the end-users of that system. Detailing the task process and developing the system from the perspectives of the user is important. Often this criterion is easily forgotten when developing the system. Significantly improvement in task control structures will equally outline what the system is capable of doing with in its parameters. At times certain tasks may require human coordination that is beyond the scope of the software interface, in such situation user's involvement in developing the service may require moderate amount of inputs and depending on that will be the output.

The control factor that is available is of relevance as to what the user can do within the given parameters. Similarly the control factors existing within the Web-based electronic service will perform those functions that are built in and based on what the users want to achieve within the flexibility. There may be scope for varying the structure depending on the users control requirements. In order to have the control structure varied the system should be capable of being restructured, which at times may be difficult or too expensive. To accommodate restructuring in the system will require a consecutive restructuring in the users control application. Sometimes this might complicate things further; but there are aspects of the technology that can absorb complexities leaving the user with the simpler task. Such aspects if illustrated in systems development may improve control structures in the system and in user application.

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