

Designing On-line Learning Systems using Participation

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Abstract

The review of literature pertaining to systems analysis and design and the design of systems for on-line teaching and learning has identified some “gaps” and shown the need for participation in educational system design. This paper presents research which was conducted to develop an approach for the design of educational systems involving the participation of student and academics in the design of educational on-line learning systems.

Keywords

Participation, on-line learning, ETHICS and design.

INTRODUCTION

The on-line learning phenomenon has become more widespread in recent years with many learning institutions adapting ways of incorporating modern technology into learning skills and objectives to facilitate students learning. On-line learning is becoming an ever-increasing way of facilitating education to students who are unable to attend a traditional on-campus university as well as supporting on-campus teaching.

However, it is almost impossible to remove the participation and involvement of users and stake holders from the design of a system, at some point, users will have some degree of input into the system, whether it just be deciding upon the budget or determining the key functionality of a system.

But in terms of designing an on-line education learning systems the nexus between student and academic is very important, the issue is how can this nexus be taken into account when an on-line education learning systems are being designed.

BACKGROUND

Historically, the main example of the participational approach is the ETHICS **E**ffective **T**echnical and **H**uman **I**mplementation of **C**omputer based **S**ystem) method. The work on ETHICS was undertaken by Prof. Enid Mumford of the Manchester Business School, UK (Mumford, 1983a). It is this participational (also referred to as a socio-technical approach) approach that focuses upon people and procedures. This socio-technical approach is defined as "one which recognises the interaction of technology and people and produces work systems which are both technically efficient and have social characteristics which lead to high job satisfaction" (Mumford, 1983b).

The use of participation allows users to have some level of participation in the system development life cycle, this participation often take the form of single representatives. The user participant is often called upon after the major decisions have been taken, this limits the user participation of involvement within the system development (Nurminen, 1988). But how was the ETHICS method developed and what impact has it had upon the development of the SIM-ETHICS method.

The original ETHICS methods were developed in the UK in the late 1960's to deal with the impending information revolution (Mumford and Ward, 1968) of the 1970's. The early conceptual models of ETHICS were concerned with:

- ensuring users were satisfied with their jobs and trying to determine the impact that computers could have upon their job; and
- the perception that computers were perceived as agents of change within organisations.

These principles were used as the foundation of the formalised ETHICS method. Around this time Mumford (1969) examined the impact of implementing computers within organisations, and determined that the successful introduction of technical changes required:

- the use of interdisciplinary planning teams, particularly when goals and objectives are being defined;
- awareness of the fact that technical changes have secondary as well as primary consequences; and
- planning does not take place in a static situation.

The original systems that were being evaluated using this approach were office computer systems and the impact that their introduction would have upon office clerks (Mumford and Banks, 1967). Much of this earlier research was based upon trying to determine the impact of these newer technologies upon organisations. This earlier research was more focused upon trying to describe the impact of these new technologies. By the late 1970's many of these areas were becoming formalised and we started to see models being developed (Legge and Mumford, 1978) to describe complex issues, an example is shown by Figure 1.

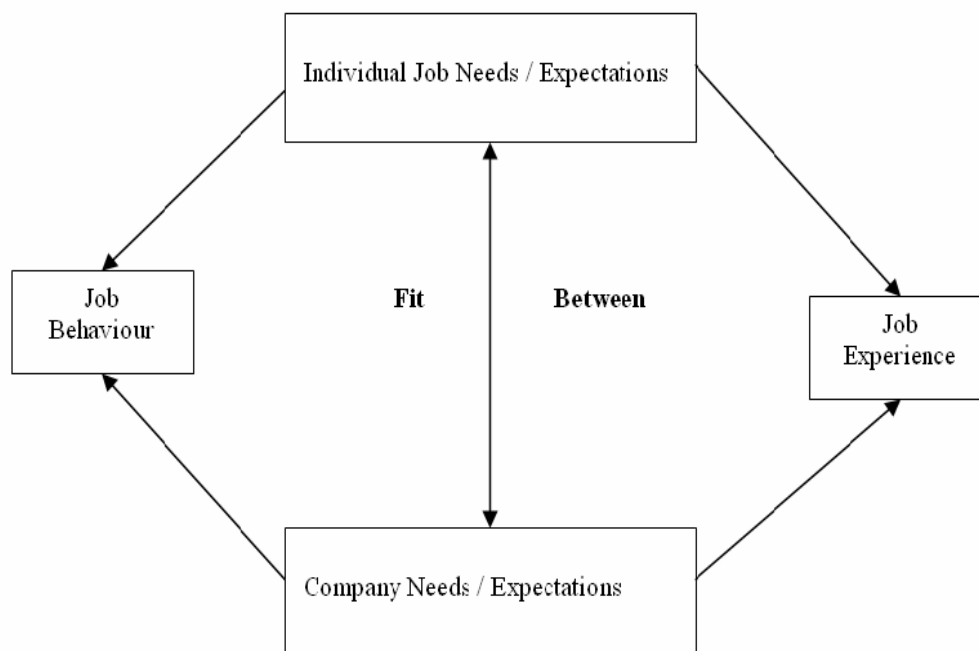


Figure 1. Conceptual model describing the benefits of technology

A continuation of the research saw development in the key area of participation and how different forms of participation could be used within the ETHICS method. Mumford (Mumford and Henshall, 1979) defined the following levels of participation:

- *Consultative* - This is when an existing body, e.g. steering committee, is used to implement the change process. This committee would then consult users on the effect that change will have upon them;

- *Representative* - This is when a cross selection of users affected by change, are brought together into a design group. This ensures that representatives effected by change have the same powers in the committee as those bringing about change; and;
- *Consensus* - This is when all the staff impacted by the change are involved in the design process. Representatives of the staff are elected to form the design committee.

The research to date by Mumford is now encapsulated in the ETHICS methodology (Mumford and Weir, 1979) to implement system design. The earlier ETHICS methodology consisted of seven stages, which are (Mumford and Weir, 1979):

- *Step1 - Diagnosis:* Determine the information required for the diagnosis of human needs, collected through the use of questionnaires. The results of the survey are analysed to determine user needs, the new system should be designed to meet user requirements, as far as possible.
- *Step2 - Socio-technical system design:* Define the human objectives, which the new system should achieve, based on the social diagnosis of step 1.
- *Step 3 - Setting out alternative solutions:* Define the possible social and technical solutions in order to achieve the desired requirements of step 1 and step 3.
- *Step 4 - Setting out possible socio-technical solutions:* Combine the separate social and technical solution into a combined list of solutions.
- *Step 5 - Ranking socio-technical solutions:* List the social-technical solutions which achieve the objectives set in step 2 and cater for the human needs as defined within step 1.
- *Step 6 - Preparing a detailed work design:* Develop system specifications and work plans for the top choices from step 5
- *Step 7 - Accept the best possible social technical solutions:* Evaluate the plans from step 6 and implement the best possible socio-technical solution.

Committees of individual users, managers and IT staff would be the ones who would conduct the different stages of the ETHICS methodology. The original ETHICS methodology was extended to take into consideration such issues as availability and reliability of the systems once they have been introduced. The introduction of new technology into an organisation can also be thought of as a human issue, relating to (Mumford, 1995):

- *User requirements:* New technology directly affects users. There is little evidence that managers have recognised the need of using IT to change the way they do business. User requirements should be incorporated fully into the system design from the start so that the system that is designed actually complies with user requirements; and
- *User job satisfaction:* The way in which computer a system usually has a direct affect upon the user and the way they use the system. If the user is unsatisfied with the system they will become less motivated and users will take longer to carry out tasks, or might not even use the system at all.

The ETHICS method was used in a wide variety of organisations to test its applicability and further develop the methodology. ETHICS has been used to develop unusual systems such as an expert system for Digital Equipment Corporation, the XSEL system was developed for their sales office to help configure DEC hardware system for customers (Mumford and MacDonald, 1989). The ETHICS principles were also used to determine the value system of large organisations (Mumford, 1981).

Over a period of time the ETHICS methodology was expanded to fifteen levels (Mumford, 1986), the stages are:

- *Stage 1 - Why Change?* Determine whether there is need for change.
- *Stage 2 - System Boundaries:* Identify the boundaries of the system that has to be developed.
- *Stage 3 - Description of existing systems:* Determine how the existing system works looking at issues such as the sequence of events within that system.
- *Stage 4,5,6 - Definition of key objectives and tasks:* From the analysis of the system determine what the key tasks and objectives are and related information.
- *Stage 7 - Diagnosis of efficiency needs:* Determine possible weak links in the existing system.
- *Stage 8 - Diagnosis of job satisfaction needs:* Determine users perception of the current system in regards to job satisfaction. This would be carried out via the use of questionnaires. The results of the questionnaire would be drawn into the actual system design.
- *Stage 9 - Future Analysis:* An analysis of the future requirements of the system is undertaken, this is to ensure that the system design covers possible areas of potential change.
- *Stage 10 Specifying and weighting job satisfaction:* Rank the key objectives based upon the analysis of stages 7,8 and 9.
- *Stage 11 Organisational design of the new system:* Develop a design of the system that focuses upon the issues identified relating to efficiency, job satisfaction, etc (this runs in parallel with Stage 12).
- *Stage 12 - Technical Options:* Determine the technical aspect of the system including issues such as hardware, software, human-computer interface, etc.
- *Stage 13 - Preparation of a detailed work design:* Prepare the system plan in more detail e.g. defining data flows, responsibilities, etc.
- *Stage 14 – Implementation:* Oversee the implementation of the work design plan.
- *Stage 15 – Evaluation:* Evaluate the new system to ensure that it complies with the required objectives.

A common criticism of the ETHICS method is that it is impractical (Avison and Fitzgerald, 1995). The use of committees to make decisions means that unskilled workers could make decisions about very technical applications. The other argument against ETHICS is that it removes the rights of managers to manage, which could have dramatic impacts in the development of the system. To overcome some of these concerns of applicability of ETHICS a newer version of ETHICS was developed called QUICKETHICS (QUality Information from Considered Knowledge) (Mumford, 1993). It was developed to create and maintain managers interest (Avison and Fitzgerald, 1995) and it is broken down into four main areas:

- self-reflection;
- self-identification;
- group decision; and
- group decision.

Quite a common reaction to ETHICS is for people to say that it is impractical (Avison and Fitzgerald, 2006). Mumford (2003) argues that ETHICS places emphasis on identifying new approaches to tasks and problems and new relationships within and outside the organisation, this is the strength of ETHICS.

A PARTICIPATIONAL ON – LINE DESIGN METHOD

A new method was created for the design on on-line learning systems that involved a participational approach. The method developed was called MEAD (Leitch and Warren, 2008), this method has the following stages:

- Stage 1 - Recognise possible on-line learning issues;
- Stage 2 - Analyse current on-line learning issues;
- Stage 3 - Root definitions of relevant on-line learning system;
- Stage 4 - Model ideal on-line learning situation;
- Stage 5 - Comparison of ideal learning situation with current situation;
- Stage 6 - Identify feasible and desirable changes to the on-line learning system;
- Stage 7 - Create and implement a plan for changes to on-line teaching system.

The MEAD method was based upon a hybrid of two approaches, namely Soft Systems Methodology (SSM) and a participational (socio-technical approach based upon ETHICS principles).

The user participation aspect of MEAD was one of the most important features when deciding to use socio-technical approach as the basis of the method. It allows the inclusion of the different perceptions and opinions of stakeholders within the problem situation.

As this method is a student driven approach it is the opinions and values of that group that will formulate the analysis and design, not the perception of the designers or teaching staff, hence the importance of the participational approach.

As described before the MEAD method consists of seven stages, importantly the participation that takes place at numerous stages within the MEAD method, which are:

- *Stage 2 - Analyse current on-line learning issues;*
In stage two a participant survey and participational focus group session are both used. The survey provides the initial data for stage two and the focus group session provides initial validation of models. The participational aspect involved students, an independent facilitator and academics involved in the on-line learning unit.
- *Stage 5 - Comparison of ideal learning situation with current situation*
In stage five the real world models that are developed are discussed (a walkthrough scenario) with a on-line designer expert to assess their validity. The participational aspect involved both the academic or facilitator and an on-line design expert. The aim is to determine whether the requirements identified in this stage can be implemented in real life.
- *Stage 7 - Create and implement a plan for changes to on-line teaching system*
The completed design and implemented changes are presented to a focus group of on-line teaching and learning system users for their assessment and comments. The participational aspect involved students, an independent facilitator and academics involved in the on-line learning unit to finalise the on-line system design.

The MEAD method has been used at Deakin University, Australia to design the on-line systems for a number of undergraduate units within the Faculty of Business and Law. A great strength of the MEAD approach is the participational involvement of students, academics and designers. This approach does also have disadvantages, the use of the participational approach means that it takes longer to develop the on-line learning systems but at the end of the process the system better reflects the needs and requirements of all parties, so this disadvantage could also be seen as an advantage.

The other major issue actually reflects the findings of Mumford with her in ETHICS and the fact that there is resistance to change, in terms of the MEAD method it has been considered controversial in some quarters because of the direct involvement of students in the design of on-line learning systems.

CONCLUSION

The research has provided a new practical method called MEAD developed for the development of on-line teaching and learning systems based upon user (students) participational approach.

The MEAD method contains a high level of user participation in numerous stages of the method allowing on-line teaching and learning systems to be responsive to the student users. The approach allows for high levels of user involvement at specific stages of the method. This is to endeavour to improve the planning and analysis of on-line learning systems and try to achieve a system that works for the user.

The paper also shows that the research that was conducted in relation to ETHICS and the recent research conducted with MEAD have identified many similar issues.

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