The ‘Technology Push' and The User Tailored Information Environment

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Abstract

The authors of this paper wholeheartedly support the International Scientific Forum ‘Toward an Information Society for All’ initiative. We aim to contribute to discussion of the 'users' trajectory towards an Information Society for all as defined in ‘Toward an Information Society for All: HCI Challenges and R&D Recommendations’ (Stephanidis et al, 1999). A broadening of the definition of user requirements for the user tailored information environment, is suggested, to include off-line support for those members of the community who do not have the personal capital to support participation in the Information Society. These individuals are often reluctant to become involved in Information Technology and lack confidence. They find it threatening and difficult and frequently lack the resources to see ahead to the benefits that will accrue. These issues should be addressed if we are to 'push' the use of Information Technology into these previously excluded populations. This paper discusses theoretical approaches to the problem and drawing on experience gained while working with two such user groups, proposes an initial framework of measures to support their take-up of Information Technology.

1. Introduction

This paper addresses the challenges involved when attempting a ‘technology push’ for groups in the community who have no points of reference with Information Technology (Arnold and Vink, 1999).

It draws upon experience gained while working with two very different non-technology enabled user groups, elderly visually impaired people and those running small family hotels in Oxfordshire, UK. Although very different, both groups were involved in making the transition from non-computer literacy into the world of Information Technology and represented individuals with varying degrees of commitment to change and motivation. Similarity emerged in terms of the support needed for them to participate in the Information Environment even though their personal resources for dealing with learning were different.

Our experience shows that we cannot assume compliance in learning in these groups in which many are reluctant to participate in the Information Environment and are unable to envisage the advantages in doing so.

The central question is how can we increase user confidence to make the transition towards the world of Information Technology. This question is related to concepts of acceptability,

usefulness, or utility. Davis et al. (1989) has developed a technology acceptance model (TAM), which is based on the theory of reasoned action (TRA) describing the determinants of consciously intended behaviours (Ajzen & Fishbein, 1980). According the TAM actual system use is dependent on the behavioural intention of the users to use. This intention is created by a positive attitude towards the system which stems from a cognitive evaluation process based on beliefs and norms.

According to Davis 'perceived usefulness' and 'perceived ease of use' are strong beliefs in the attitude forming process. Perceived usefulness is defined as the prospective user's subjective probability that using a system will increase his or her job performance within an organisational context. Perceived ease of use is defined as the degree to which the prospective user expects the target system to be free of effort (Davis, 1993).

This model might be valid for interactive technology, which will be used in organisational contexts. However, for the use of information technology TAM appears to be too simple, i.e. more factors might play a role. Prospective users of information technology have more freedom to choose between various applications. They are interacting with information technology in a wide range of contexts, and often lack adequate user support. In their cognitive evaluation process various beliefs and norms will play a role. For example, an important assessment has to be made about expected task demands and their coping capabilities. Does the user feel that the job can be done using Information Technology? Of course personal user needs (e.g. the need for achievement) should also be taken into consideration. Furthermore, the characteristics of the prospective application should be evaluated with regard to the task in hand, e.g. accessibility, usability, security, and reliability should be weighed up.

One could argue that two hypotheses are being made by the user: 1) the effort and the use of the application will result in the desired performance, and 2) the desired performance will lead to the rewards expected (cf. expectancy-value theory; Vroom, 1968). The user is also influenced by his/her social environment. If they are surrounded by people who are already using information technology, they are likely to experience an additional push to become a IT user.

This paper sets out recommendations for supporting the transition of non-technology enabled people into the Information Environment. In particular, to increase the users' capabilities to the point at which they feel confidence in the use of Information Technology. Furthermore, a widening of the scope of user requirements is suggested to include the technical, emotional and physical support of new computer users.

2. Non-Technology Enabled User Groups

2.1 Case1: Those running small family hotels

One author was employed by The Southern Tourist Board, UK, in the project 'Tourism Means Better Business' (Zajicek et al, 1998), to investigate reasons for the disappointing uptake of Information Technology among people running small hotels, hereafter referred to

as small operators or operators, in the Oxford area. The aim of the project was to increase the effectiveness of the hospitality industry in Oxfordshire by the introduction of Information Technology to small family run hotels. It was motivated by the belief that increased use of Information Technology, for example gathering customer information and manipulating it in order to target groups with special room rates etc., would increase room occupancy in these establishments. The number of guests staying in the Oxfordshire area would be increased and thereby generate more tourist based income for the whole area. Operators were offered PCs at a subsidised rate and encouraged to use standard office software, database, spreadsheet and word processor. They were interviewed in their hotels to determine their attitudes to Information Technology, what problems they faced in coping with it and to what extent they had adopted it.

Results of the study showed that 60% of small operators welcomed the chance for more training in the use of Information Technology, although many felt they do not have enough time to attend courses as they have to be at work to cater for drop in trade. In many cases they had actually bought a computer and attended courses on office software familiarisation. However the information they acquired by attending courses was difficult to relate to the computerisation of their own business. Those attending day courses found it difficult to move forward with the knowledge gained from the course. They were taught how to use software on computers set up in the training establishment. They became proficient in the use of the software on the machines provided, but did not develop a sufficiently strong framework of the general concepts behind computer organisation to enable them to function on their own. The user group comprised mostly individuals with very low levels of formal education. They did not possess the analytical/learning skills needed to organise their own learning of software and use of the computer. They lacked confidence in learning from their mistakes and had no conceptual framework in which to work.

The following points encapsulate the off-line support needs of small establishment operators.

- Training should be stepped at different levels with a clear indication of what will be taught and at what level.
- Training should be organised at a time to suit the operators.
- Operators welcomed home based learning wherever possible since they are effectively tied to their establishments.
- Teaching material in several media, video, on the web over the telephone and face to face would be welcome.

The following hotel based support was welcomed by operators:

- The use of videos, Web materials and home tutorials to introduce Windows and the concepts behind computers.
- Step-by-Step videos, Web materials and home tutorials for home teaching about computerisation of their business.
- Teaching material supported by home visits by PC experts to see how operators are using their computers and to suggest ways forward.
- Network of operators from similar establishments to contact from work and develop supportive relationships with.

The following centrally based support was welcomed by operators:

- Help line manned by PC experts open at set times for advice and step through instructions.
- Stepped courses with a clear definition of the skills that will be learnt, the skills required to benefit from the course and expected progression.
- Central organisation of a network of operators from similar establishments.

2.2 Case 2:Elderly visually impaired people

Mary Zajicek is leader of the Speech Project at Oxford Brookes University where a study was performed to evaluate the use of BrookesTalk (Zajicek et al, 1999), a Web Browser for the blind and visually impaired, by non-technology enabled elderly people with a serious visual impairment.
These people were self-selected in the sense that they (or their family on their behalf) requested a copy of BrookesTalk after hearing about it through the media.

Evaluation of their use of BrookesTalk was performed on-line by means of email based questionnaires and by telephone. It was found that 65% of the group were unable to get up and running with BrookesTalk. They found it difficult to conceptualise the workings of a computer application. The nearest model to computer software that they could find, in order to draw comparisons, was a VCR. Many users assumed that you just had to know which button to press and it would 'work'. The concept of having a dialogue with the computer and learning to use its language was new to many participants. Many problems encountered were also due to a lack of conceptual models of the World Wide Web (Zajicek et al, 1999) and a lack of understanding of the relationship between function keys and functions.

BrookesTalk has limited functionality compared with standard visual browsers operating as it does with twelve function keys. The Microsoft Corporation has recently funded a project to integrate BrookesTalk's web summarising capabilities with Microsoft Explorer. This will provide increased functionality such as bookmarks and email and increase the complexity of use. This will benefit young technology-enabled blind people who will gain access to the functionality of Internet Explorer through BrookesTalk. However this approach compounds the problems of the elderly who require less functionality in order to learn. As a result of the study with the elderly a simplified version of BrookesTalk is under development with stepped familiarity points which allow users to consolidate their knowledge every time a new facility is learnt.

Researchers interviewing elderly users over the telephone found that they did not have the skill or confidence to try out functions to see how they work. Impaired memory is a disadvantage in exploratory learning. Elderly users were therefore not able to employ the usual suck-it-and-see method for finding out how things work and to build up a conceptual model of a system.

3. Recommendations

The users described in Section 2. do not possess the necessary personal capabilities to enable

them to benefit from the Information Technology Environment. Their learning skills in this medium are underdeveloped and they do not have a strategy for learning in a concurrent software environment. As a consequence their confidence is low. Recommendations made by the International Scientific Forum imply that the solution for non –technology enabled users lies in the provision of simple easy to use interfaces. We argue that this group of users requires a technology bridge integrating familiar learning support mechanisms such as help lines or mentors and stepped learning. The users described above were superficially speaking disadvantaged for different reasons. However from a theoretically point of view they were all lacking the necessary capabilities to cope with information technology. And therefore the remedy for getting them going was similar. Currently user support requirements for the 'technology push' is not well understood and more study is required. However the following comprise some preliminary suggestions:

1. Impose a sequential structure on the concurrency of the system being learnt, albeit temporarily, in order that the main concepts can be absorbed.

2. Provide a sequence of topics/functions to learn with manageable steps between them

3. Insist on total familiarity with one topic/function before the learner moves on to the next

4. Plan the acquisition of competencies to reinforce users' developing conceptual models

5. Learning for these people is by 'demand'. They are not skilled at absorbing large amounts of information and organising it to fit their needs. The information should be pre-packaged, but flexible to their needs.

6. Provide off-line support, on the users' own terms wherever practicable, at the time and place of their choice.

7. Facilitate user driven learning. Provide flexibility so that wherever possible users can follow their own learning trail.

8. Base learning on exercises related to the users' sphere of interest to facilitate awareness of what is possible.

9. Visit the user to see how they are using the system and make suggestions for progression.

10. Use different media for presenting information so that users can choose the most appropriate for them.

4. Conclusions

We see that those who use Information Technology are usually those who have the confidence to explore the system which they are trying to use where complex functionality can be discovered by cruising menus and trying things out.

If we are to 'push' technology use onto individuals who are currently excluded, we must interpret user requirements capture and system design in the widest sense to include outreach

and whatever support measures that are needed. In addition current technology acceptance measures do not, at first sight, appear to include sufficient contextual factors to be able to contribute to an understanding of this group. The sphere of application in which they are useful should be extended.

The challenge ahead is to come to a greater understanding of the needs of non technology enabled people, so that we can support them in joining the Information Technology Society. It is vital that those who are rapidly becoming marginalised in society through their lack of understanding of Information Technology should be included. There is a danger that by enhancing usability and inclusivity in the Information Technology Environment, we further disadvantage those that are not included. Those who are outside and reluctant to join in should be drawn in on their terms.

5. References

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