A B S T R A C T

This article reports a health planner's experience in using program planning software and the contextual factors that influenced her perceptions. The software examined (EMPOWER) is designed to support program planning for prevention of breast cancer through mammography screening. Use by a health professional in an urban hospital was examined through a case study approach. The user was interviewed at 3, 6, and 12 months following initial use. Transcripts were coded using Roger's characteristics of an innovation as a framework for categorizing the user's perceptions. Contextual factors identified as important in influencing her perceptions were open-coded and themes identified. The user referred to three contextual factors in describing characteristics of the innovation: implementation factors, user background, and work and community environment. The successful dissemination of software will depend not only on characteristics of the innovation, but also on situational circumstances that must be changed by, or accommodated in the technology.

A B R É G É

Cet article rend compte de l'expérience d'une planificatrice en santé qui a utilisé un logiciel de planification de programmes, et des facteurs contextuels qui ont influencé sa perception. EMPOWER, le logiciel en question, est conçu pour aider à planifier des programmes de prévention du cancer du sein par dépistage mammographique. On a fait une étude de cas pour examiner son utilisation par une professionnelle de la santé dans un hôpital urbain. On a interviewé l'utilisatrice à des intervalles de 3, 6 et 12 mois après le début de son utilisation. On s'est servi des cinq caractéristiques d'innovation de Roger comme cadre pour coder les perceptions de l'utilisatrice. Les facteurs contextuels considérés comme ayant une importante influence sur ses perceptions ont été codés et des thèmes identifiés. L'utilisatrice a fait référence à trois facteurs contextuels pour décrire les caractéristiques d'innovation : conditions de mise en oeuvre, antécédents de l'utilisatrice et environnement au travail et au sein de la communauté. L'adoption du logiciel va non seulement dépendre de ses caractéristiques d'innovation mais aussi des conditions qui doivent être modifiées ou prises en compte par la technologie.

The Health Planning Context and its Effect on a User's Perceptions of Software Usefulness

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Research findings related to the effectiveness of health promotion and disease prevention activities have burgeoned in recent years. As a result, some researchers believe that many public health issues could be solved through better application of current research evidence.¹

Difficulty accessing and applying this knowledge, however, has the potential to stifle progress in achieving many public health goals. To support the diffusion and application of research in health planning, health professionals require an effective and accessible medium for planning health programs. Information technology and computers have the potential to address the diffusion, collection and application of research and community knowledge. The computer has been identified as an "enabler" for integrating prevention and health promotion into ongoing clinical and community care.^{2,3} Computers have been used in health promotion programming to: 1) simulate estimates or outcomes applying different theoretical assumptions, 2) practice new skills; 3) access information from data bases, literature, and experts, and users; and 4) present selected information in a time, speed, and format controlled by the user.⁴⁻⁷

Although a number of studies have begun to address the issue of software and information technology (IT) planning, development, adoption and use in health

assessment and health planning,⁷⁻¹² a number of important issues remain. These include: 1) institutional barriers affecting the dissemination and adoption of new technology for relaying health information,² 2) use of information technology and electronic media in disseminating research information,¹³ 3) effects of practice context on using information technology,^{14,15} and 4) the capability of information technology to support application of health promotion theory.^{11,16} This case study describes the implementation of program planning software and the contextual factors that influenced the experiences and perceptions of one health professional using the software. The software used in this study, EMPOWER (Expert Methods of Planning and Organizing Within Everyone's Reach), is designed to support program planning related to the prevention of breast cancer through mammography screening. An understanding of how contextual factors and user perceptions influence software use will help guide health planners in selecting and adopting software systems, and will facilitate the future design and introduction of software into health planning.

METHOD

The case study method was used to examine the implementation and use of EMPOWER by a health professional in an urban hospital. A case study approach is considered an appropriate method for studying a phenomenon in its natural setting by employing multiple data collection techniques to uncover the complexity and richness of a phenomenon. It has been previously applied to research that explored and generated hypotheses regarding the

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development and implementation of computerized information systems.¹⁷⁻¹⁹

The EMPOWER software leads the user through a series of linear stages in designing educational and policy interventions for mammography screening. It is based on the Precede-Proceed model of program planning in health promotion,²⁰ and includes six stages: 1) situational assessment, 2) social assessment, 3) epidemiological assessment, 4) behavioural and environmental assessment, 5) educational and ecological assessment, and 6) administrative and policy assessment. EMPOWER has been described in detail in a separate article.²¹

The organization selected was responsible for developing and evaluating a program to increase breast cancer screening rates in the community, as part of a province-wide initiative to increase mammography screening rates. The software user was responsible for developing and implementing the program, and had been a hospital employee for more than three years. She was a health educator who had many years of community health experience and had implemented other health-related programs in the same community. As a result of these setting characteristics, the case provided both an opportunistic and "ideal" setting in which to examine questions of adoption with an innovation of high relevance to our user.

Our role in the project was as participant observers. We were directly involved in installing the software and in training and assisting the user. Combined with observation notes, we interviewed the user at 3, 6, and 12 months after introduction of the software. The three, one-hour interviews were conducted by a senior member of the study team who had extensive experience in health planning. The interview was designed to elicit information about the application of the software. Questions focussed on the user's experience in using the software and how she perceived the software helped or hindered particular planning tasks and goals. Probes were designed to allow her to explain and justify her conclusions through an open discussion.

To generalize the case-specific results, diffusion theory²²⁻²⁴ was used as a framework for categorizing the user's perceptions

about EMPOWER. Using Roger's five characteristics of an innovation, statements were coded as follows: 1) relative advantage (advantage of using the software in comparison to other technologies), 2) compatibility (software's consistency with the values, beliefs and goals of the project and planning), 3) complexity (ease or difficulty in using the software), 4) trialability (opportunity to test the software), and 5) observability (visibility of software's value in planning prior to full-scale adoption).²⁴

Contextual factors identified by the user as important in influencing her perceptions of the characteristics described above were open-coded and major themes identified. All data were triangulated with observation notes from community and advisory group planning meetings.

RESULTS

The user comments reflected all five of Rogers' perceived characteristics of an innovation: relative advantage, compatibility, trialability, complexity, and observability. In explaining her perceptions of the innovation, we found that she referred to three important contextual factors: 1) implementation, 2) user background, and 3) work and community environment.

Implementation

The user found EMPOWER a struggle to learn quickly, and had difficulty in determining where it could immediately help her planning efforts (complexity and observability). She pointed to specific implementation factors that influenced these conclusions. First, the location of the software at work instead of home affected her ability to learn the software.

This is really practical but I don't have the program at home. I've taken the [Precede-Proceed] book home because it's portable. That's kind of too bad because sometimes that's when my mental space is available to me and I don't have that during work time.

Second, the user noted that the timing of the software's introduction reduced its value (compatibility) since it had been introduced at least a month after she had begun working on the project. She commented that by that time, the plans were

almost completed, and it was difficult for her and her colleagues to revisit early stages. Finally, she expressed a need for more training to learn the software language and understand its various functions (trialability).

People need to learn it properly first so they become comfortable using [the software with] little projects. This project is large to learn in that sense. It would be good to have a couple of case studies as you would from a book.

User background

The user explained and justified a number of perceptions about the software by referring to her planning and educational background. She viewed her cognitive and working styles as inconsistent with the software's structured process. She described herself as a non-linear, visual thinker and identified her approach to program planning as "organic" and "holistic".

It's more natural for me to start with a couple of structural things. I'm one of these people that has to have some structure—but I do a whole bunch of unstructured things and then bring it back and attach it to some kind of framework...I don't see allowance for that [in the software].

Although she concluded that the "big picture" provided by the software was valuable, she felt the software needed to be more "action-oriented", and was dissatisfied with its emphasis on reflection and planning (compatibility).

Although the user's familiarity with the Precede-Proceed model increased her motivation to use the software, it also produced expectations that were not met. For example, she was disappointed that a fully featured evaluation module had not been incorporated into the software. In addition, it was difficult for her to understand how the model had been translated and transformed in the software processes. These shortcomings diminished her perceptions of compatibility and relative advantage of the software as compared to the paper-based planning methods.

Work and community environment

The user made numerous references to several work and community factors in her

assessment of the software. Many of these factors and her assessment of the software had to do with the formalized logic in the software, and its heavy reliance on only research data in planning.

First, she reported that some groups in the hospital setting were not supportive of the project, the software and the Precede-Proceed model on which it was based. For example, a number of participants preferred planning models other than Precede-Proceed, and viewed those alternatives as more appropriate for the project.

At the same time, she felt the software's logic model and its epidemiological data were powerful persuasion tools for the planning groups. For example, she used the epidemiological information (i.e., prevalence and incidence) to convince skeptical medical groups that the community-based program should be a hospital priority.

Second, she felt that using the software was "slowing" down important project momentum by creating a reflective planning group, when an action-oriented group was needed (compatibility). She also noted that the software did not provide features to allow her to understand and build community groups through analyses of political situations (compatibility). She felt that EMPOWER was designed to focus on the use of research evidence in planning and ignored the need to manage political and organizational knowledge. For example, the software failed to support day-to-day needs, such as a contact manager for keeping track of participants and group membership.

Third, community participants perceived that breast cancer was an important and obvious problem and expressed impatience with the "academic content" (compatibility) of EMPOWER. The user perceived the software as being too comprehensive for use with working groups that focus on specific action-steps and implementation activities. She felt that these groups were less interested in an academic perspective and instead required a set of rules and specific directions to lead them through the planning tasks. As a result, she concluded the software would be useful in an academic setting and at higher levels of government, but that it was too academic for her setting, which required a more sim-

plified, detailed and expedient approach to planning

DISCUSSION

The results of this case study suggest that implementation, user background, and the work/community setting are key contextual factors that influenced the user's perceptions regarding characteristics of the software innovation. These included a lack of organizational support for the project, the project's advanced planning stage, the user's "holistic" approach to planning, and the action-oriented nature of community groups.

Results highlight the successes and challenges involved in learning and applying information technology in a health planning setting. We found that the software provided a broader conceptual view of the project for the user, and guided her to consider specific issues in planning and program development of which she had been previously unaware. Her general assessment of the software was positive despite some difficulty in using the software within the specific project and time frame. This suggests that relative advantage can still be achieved when the software facilitates user learning and changes in practice, and when the software is malleable enough to accommodate user and work circumstances.

Despite these benefits, however, the software could not meet specific day-to-day needs, and its linear approach failed to incorporate the planner's organic planning style. The success of software application rested heavily upon contextual factors that required change either through application of the technology, or accommodation by the technology. As a result, there is a clear trade-off between a rigid and malleable technology. A malleable technology may be easily transformed to fit situational circumstances and may be successfully implemented, but it will not likely produce change in practice. On the other hand, a rigid technology may have the capability to dramatically challenge and alter health planning practice, but it may force a loss of situational specific techniques, and in many cases, could be entirely rejected.

Our ability to generalize from this single case study is limited. Future research

should examine different users, settings, and technologies to contribute to our collective understanding of the process of health planners' adoption and implementation of software innovations.

Planners responsible for selecting and implementing information technology in their practice should consider the following recommendations:

- 1) Software compatibility with factors related to implementation, the planner's background, and characteristics of the setting are important in influencing use. To ensure success, a planner must consider his or her basic planning approaches. It should be recognized that software compatibility also depends on work environment and community group characteristics. To facilitate use, the software either must be compatible with specific planner- and work-related circumstances, or it must be malleable enough to allow modification.
- 2) The software should be evaluated for its capability to induce change in work practices in order to yield both short- and long-term relative advantage. This highlights the tension between (a) an innovation's compatibility with existing circumstances and capability to automate tasks, as opposed to (b) its difference from existing circumstances and capability to alter practice.
- 3) Experiential training is necessary to learn the basic software functionality and provide time to test the software (trialability) and observe its potential (observability), while overcoming the barriers to learning (complexity). During this learning phase, users must be shown where the software process is fixed or malleable in order to understand how the software might automate or transform practice.
- 4) Software that is modular and has a combination of both strict and flexible interfaces has a better chance of being compatible and having relative advantage. Modularity allows gradual trialability and observability of software parts, allowing the user to pick easier modules for quick adoption and success, while later choosing other modules that significantly alter work prac-

tices. This is advantageous in the ever-changing and action-oriented environment of health planning. Combining strict and flexible interfaces allows first-time planners to start with a generic, structured process and later switch to flexible and organic navigation of the software.

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BIBI

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