A Feasible Strategy of Promoting Nursing Informatics by End User Computing
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Abstract
The purpose of this study was to analysis the end user computing strategy and experiences in promoting the nursing informatics in Taiwan. In February 2004, an 8-day NI technology training campaign was hold in Taipei for 60 clinical nurses. The Excel VBA was used as the tool to teach the clinical nurses, who never wrote any program but were very interested in informatics, Three projects were determined after detailed discussion and evaluation of clinical needs and technical feasibility between the nurses and the technical support team, which was composed of one experienced informatics professor and one clinical NI assistant. A qualitative analysis was used to interview the three pairs of programming clinical nurses and their direct supervisors with a structured but open questionnaire. Representative concepts were categorized from the data till all were categorized. The concepts were organized under three categories: the purposes, the benefits and the challenges of system development. According to this study, the end user computing strategy with the Excel VBA was successful so far.

Key words: Nursing Informatics · End user Computing

Introduction
The Nursing Informatics (NI) has long been recognized as a specialist in nursing for at least one decade in the world [1] but the NI progress in Taiwan is still on its way to catch up. Many nurse leaders don’t realize the true values of NI, where NI nurses could play active roles in system designing · choosing · testing · implementing · researching · maintaining · and evaluating [2] and still use the traditional model of counting on the information department for their information needs. As predictable, the traditional model has failed us in both information and clinical needs.

Staggers and Thompson [3] definite the informatics nurse specialist to be capable of using informatics theory, concept, methods and tools to analyze information needs and systems; designing, choosing, implementing and evaluating informatics system; using data structure and decision mechanism to help patient, nurse and other health care givers; improving human and computer interaction; and promoting and enhancing the nursing knowledge. However, in Taiwan, NI is not well understood by most nurses, including nurse leaders. There has been no enough NI training in all nursing schools. Chou [4] and Chuang [5] found the computer literacy in Taiwan were still not good enough. Therefore, we need to develop a clear and useful strategy to demonstrate what the NI nurses could achieve, to promote the NI programs.

This strategy could not only effectively demonstrate values of NI but also need to be economic since our national health insurance program has made many hospitals cut their nursing budgets and personnel. Interestingly, our national health insurance program also makes the nurse leaders start to consider the NI programs since they understand they still need to maintain and to improve the nursing quality and efficiency and the only solution might come from the NI.

Therefore, we came up with the strategy of end
user computing (EUC), which empowers the end users with right and economic tools to fulfill their information needs. Brancheau & Brown [6] defined end-user computing as the adoption and use of information technology by personnel outside the information systems department to develop software applications in support of organizational tasks. There were some successfully cases using EUC strategy to develop informatics systems. Such as Kuo YL, Huang, YH et al. [7] developed maternal and newborn discharge planning support system for the foreign mothers and their babies. Hou IC, Chang P, Chuang PY [8] developed a MICU nursing assignment support system.

Since we have tested the EUC strategy to promote the NI in Taiwan with the tool of Excel VBA since 2004 and have observed 3 successful projects from one local hospital and 2 medical centers with a very limited budget from their nursing departments, we believe it should be very important for us to study the experiences of these three projects. Therefore, the primary objective of this study is to analyze the values and challenges of the EUC in promoting the NI.

**Materials and Methods**

In February 2004, an 8-day NI technology training campaign was hold in Taipei for 60 clinical nurses. The Excel VBA was used as the tool to teach the clinical nurses, who never wrote any program but were very interested in informatics, about the system analysis, design and programming because the Excel has been the most popular tool used by our nurses for data collection, management, and analysis, and the VBA might be the most easy programming language for new beginners to learn. After training courses, one head nurse and two nurse supervisors decided to promote the NI in their hospitals and to encourage their clinical nurses to join the practical development projects. Three projects were determined after detailed discussion and evaluation of clinical needs and technical feasibility between the nurses and the technical support team, which was composed of one experienced informatics professor and one clinical NI assistant. These projects were the Shift Planning Support System in PICU, the ICU Daily Inpatient Status Reporting Support Systems, and the Maternal and Newborn Discharge Planning Support Systems. The sample screen shots from three systems were shown in Figure 1, 2 and 3.

![Figure 1](image1.png) ![Figure 2](image2.png) ![Figure 3](image3.png)

This study was done in July 2005 by the clinical NI assistant, who was experienced in Excel VBA and has played a coordinating and facilitating role during the system development since the very beginning of these three projects.

A qualitative analysis was used to interview the three pairs of programming clinical nurses and their direct supervisors with a structured but open questionnaire, including five items of basic personal data, and 18 questions of the use of Excel and other personal productivity software, the system development process, as well as the experiences and problems occurred during the process. All answers were documented, refined, categorized, and then reviewed and signed by each interviewee in one week after the interview. Representative concepts were categorized from the data till all were categorized.

**Results and Discussion**

All programming nurses used their spare time after work to develop the systems, which took eight to 20 hours per week during a period of ten months. The nurse supervisors averagely aged 40 years old,
had worked in hospital for 20 years and had graduate
degrees. The programming nurses averagely aged
27, had worked for 6 years and had a college degree.
The relationship between the programming nurse and
supervisor among three groups was close and trustful.
All of them were familiar with the Excel and trained
with the Excel VBA but only the junior nurses took
the job of programming.

The concepts were organized under three
categories: the purposes, the benefits and the
challenges of system development.

- The purposes of system development

  Nurse Supervisor: the current work took too much
time

  Two out of three nurse surprises said the primary
purpose for the project was to cut the time needed for
the current work. They expected the informatics to
help their nurse members to improve the work flow
and to work more efficiently.

  Programming clinical nurse: assigned by nurse
supervisor

  Two programming nurses were assigned by
their supervisors but both were interested in
informatics.

- The benefit of system development

  Nurse Supervisor: the systems were
appreciated by the administrator

  At the beginning, nurse director didn’t realize
what extent the EXCEL VBA could do for their nurse
members since no similar experience had been
reported. However, after the system prototype was
developed and put under pilot testing, the hospital
administrators were surprised of the results and
appreciated very much for their work, and then
express stronger and more positive support for the
projects. Supervisor A said: “at the beginning, I
don’t think the administrator will show his support
since we were running short in the nursing manpower.
However, after the system successfully developed, he
clearly expressed his appreciation to the department
of nursing, and made us very happy!” Supervisor B
said: “Our director thinks this system was good and
hopes the system could be promoted to be used in
other units. She also actively assigns other nurses to
learn the EXCEL VBA.”

  Programming clinical nurse: to be recognized
as having extra capability except nursing.

  Having a sense of achievements.

  All three programmers were clinical nurses.
After system development they said they were proud
of both the system and themselves. Nurse C said: “I
found that I could be a programmer!” They were
also very happy that their efforts were well
recognized by their supervisors and even, hospital
administrators. Nurse A said: “The director of our
information department thought the system was great
and immediately support a new computer to her
unit.” Nurse C said: “After the director of nursing
department saw the system, she wanted to promote
the system to other units.”

- The challenges during system development

  Nurse Supervisors: not been able to provide
technical support to programming clinical
nurses

  Though all three nurse supervisors had learned
the EXCEL VBA in the training classes, they had no
time to practice the programming themselves.
Therefore, they needed the technical support team to
assist their nurses in order to resolve the technical
problems. They also worried how to maintain the
systems in the future if no more nurse could be
trained. Supervisor A said: “If the programming
nurse or myself left the position, who will be going to
maintain the system?” Supervisor C said: “When
there was a programming problem, I don’t know
how to solve it. What I can do is to ask the
technical support team for help. Programming is
difficult for me. I will never learn programming.”
Supervisor B said: “We have the problem in printing the results and we don’t know how to solve it. We try to ask the programmer in the information department in my hospital. They were not familiar with EXCEL VBA and they couldn’t help us. I hope there would be a programming supportive group in the future. It will help us very much.”

Programming clinical nurse: Time is not enough! Too much work at the same time!

Three programming clinical nurse said they have to take too many jobs at the same time. They still had the clinical shift during the system develop period. That made them not be able to concentrate on programming. One of them also has a child to take care of. Nurse A said: “I have to take care the patient. Beside I have to develop the system in my off day. Sometimes I have to do the administration. I can not sleep well. And I have to take care of my family and my child with a sense of guilty.” Nurse C said: “I need to sleep well after the night shift and this makes me not be able to work on the project.”

Conclusion

The nurses’ experiences and feelings in NI in these three projects were complicated.

Comparing with the clinical nurses, the supervisors have better understanding of the potentials of NI in nursing and how to implement the systems. But they were always busy in administration and hardly program by themselves. Therefore, they assigned one staff who was interesting in computers to learn the programming skill. They had a high expectation for the programming nurse in the system development. This was their first try to develop information system without help from the information department. How to transfer their experiences and implicit domain knowledge to programming logic was indeed a big challenge. The most important and basic requirement was to make the original work more efficient, which was accomplished in these three projects. The nurse supervisors kept discussing the progress with the programming clinical nurses during the system development. This was one important factor for the success of their system we believe.

The programming clinical nurses’ perception of the system development was innocent at the beginning. As the time passed by and the project progressed, they soon had the difficulty. They were highly expected by the nurse supervisors but could not be understood by their peers, who thought these nurses were weird! They felt tired and stressed. But they were also easy to be encouraged by their supervisors. They kept learning from the technical support team and, most importantly, by themselves! When the system was successfully developed, they found their effort was highly appreciated. This made them proud and happy. They also started to think about the design of new projects.

The technical support team played a very important role in these three projects. This role assured the nurse supervisors the right system to develop. Most of the time, the technical support team would demo the programming codes to system developing nurses and help debugging. The challenge was for the technical support team to understand what the nurse supervisors’ needs. For an example, the team spent a lot of time to understand the nurse scheduling rules, which were easy for programming nurses.

According to this study, the end user computing strategy with the Excel VBA was successful so far. This is the first time that clinical nurses demonstrate their potentials and capability to develop the systems by themselves in Taiwan without the help of their information department. This was indeed the milestone for the development of NI in Taiwan. We would encourage the nurses, who were interesting in
NI to develop the system by themselves though the Excel VBA is not the only solution.

**Acknowledge**

Really Appreciate Shin-Huey Wung, Yin-Lin Kuo, Chin-Shu Lin, Shih-Tzu Cheng, Shu-Li Wang and Ya-Hui Huang’s positive attitudes to share their experiences with us.

**Reference**


