Integration of Teaching and Learning ICT Literacy and Herbal Information in the 21st Century

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Abstract

In the 21st century, Information and Communication Technology (ICT) acts as an important role to support learning of the core content. In Doctor of Pharmacy curriculum at Silpakorn University, ICT literacy and core content about herbal information were integrated to support learning herbal medicine. Several tools were introduced to collect and applied herbal information. To design and implement an herb database, the Relational Database Management System (RDBMS) was taught. Microsoft Office Access was used as a tool to create an herb database. The concept of normalization, tables, relationship, queries, forms and reports were educated. In Knowledge Management (KM), the process of transfer tacit knowledge to explicit knowledge and the reverse process were introduced. Students could find herbal information from reliable sources and put it into the Knowledge Unifying Initiator for Herbal Information (a version for pharmacy students, KUIHerbRx). The concept of an electronic book (e-book) was introduced to students. A set of tools were suggested to use for creating an e-book and publishing it to the e-book library. Herbal information was used as a sample to construct an e-book. The concept of Infographic could be applied for disseminating of herbal information. The graphic representation was successful to make audience easy to understand herbal monographs. These tools were used in practice classes in both informatics and herbal medicine courses. Students gained twofold from the integration, i.e., the knowledge including skills in ICT literacy and herbal information.

Keywords: Information and Communication Technology, Herbal Information, Pharmacy, Integration, Informatics.

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Introduction

In the 21st century, only competency in professional courses in a curriculum is not sufficient for providing excellent services. Several competencies have to be included in a curriculum. The Information and Communication Technology (ICT), changes the global. There is a significant economic relevance of using ICT for the quality health care (Saranummi, 2005). Health professionals, including a pharmacist are needed who are well-educated in health informatics. To improve skills in informatics for pharmacy students, a set of health informatics courses are prepared (Steckler, Brownlee, Urick, & Farley, 2017). This set of informatics courses involves the study, design, and implementation of information as well as information systems in pharmacy. In the pharmacy curriculum of Silpakorn University, core competencies of informatics for all pharmacy students are implemented in two courses, i.e., Basic Computer Applications in Pharmaceutical Sciences, and Health Informatics. These two courses are both lecture and laboratory classes and set for the second, and third year students, respectively. Several informatics skills are introduced to students, e.g., managing, searching, evaluating, and disseminating of health information. Health data, information, and knowledge can be originated from several sources such as patients, medicines, laboratory tests. For medicines, these may be both modern and traditional medicines. Herbal data, information, and knowledge are commonly applied in traditional medicines. In this paper, several topics in ICT are designed to integrate with herbal data, information, and knowledge. Students should gain twofold, i.e., ICT literacies and ways to apply these knowledge and skills for finding, managing and disseminating herbal data, information, and knowledge. This paper is organized as follows. In section 2, topics for supporting herbal medicine are given. In section 3, ICT tools for integrating with knowledge in herbal medicine are presented. Section 4 provides the results from using tools for teaching and learning. Finally, conclusion and future work of this paper are described in the last section.

Topics for Supporting Herbal Medicine

Several topics are taught in informatics courses, i.e., basic foundation of information technology, computer hardware and software, using Internet browsers to finding reliable pharmaceutical and health data, applying office software to solve pharmacy-related problems. Statistical knowledge and skills are introduced to students. The concept of disseminating and using software for publishing health information are provided. In addition, professional software is also set to teach pharmacy students. Various problems in health can be used as examples. In this paper, three topics were selected to integrate with knowledge of herbal medicine, i.e., data and information management, knowledge management, and information dissemination. Details of these topics are described as follows.

Data and Information Management.

This topic introduces concept of data and information to students. This is an important topic for modernized pharmacy education (Breeden & Clauson, 2016). Relational model of the database is usually used as a common model for teaching. In practice class, data of herbs are used for teaching and learning. The concept of normalization of database tables is given. Skills of implementing data into a database and processing data to information are also advised in practice class. Pharmacists are usually assigned

to manage and/or analyze data in a database. For example, in a hospital, data about medicinal usage are usually analyze to improve clinical and economical outcome.

Knowledge Management (KM).

The KM is the cycle of transfer tacit knowledge from experienced persons to explicit knowledge and reload this knowledge into other persons to make them ready to work efficiently. This topic is usually concerned in pharmacy education, especially in higher education (Watcharadamrongkun, 2012). In the practice class, students transfer their knowledge of some medicinal plants and exchange with other students.

Information Dissemination.

Pharmacists should prepare information about medicines (including herbal medicines) as well as provide reliable information to other healthcare professionals, patients, and related persons (McClung, & Archer, 2014). Information may formal documents in working places or online documents on the Internet.

ICT Tools for Integrating with Knowledge in Herbal Medicine

To train pharmacy students have informatics skills on the three topics, some ICT tools are used. We will describe a set of tools for each topic in informatics courses.

Tools for Data and Information Management.

A desktop Relational Database Management System (RDBMS) which is important for data gathering, management and analysis (Pardo, Miller, & Chiulli, 2017), is selected to teach students. The concept of normalization of database tables is introduced in the lecture class and will be implemented in the laboratory class. Students have basic knowledge in herbal medicine, e.g., plant anatomy and physiology, taxonomy, and clinical application of herbal medicine. In this topic of learning, students should be able to transform their knowledge in herbal medicine into a relational database model. Common attributes about herbs should be assigned into attributes in tables. Students are able to input data of medicinal plants into a database. Moreover, basic analyzing and finding information they would like to know, will be given.

Tools for knowledge management.

A specific Web-based tool namely, KUIHerbRx, is used for learning and teaching knowledge management for herbal medicine (Lertnattee, Chomya, Rodtook, Methasate, & Lueviphan, 2017). With this tool, each student can contribute his/her knowledge about medicinal plants. Students can fulfill information of herbs. Evidence-based information should be contributed into the KUIHerbRx. Images of herbs and their products can be uploaded to the system. Students should take photographs by themselves and use a set of software to prepare images for uploading. Information about herbs will be shared among students.

Tools for information dissemination.

In this topic, two sets of tools are used. The first set is for creating an e-book. The other set is applied for constructing an infographic page. For a simple e-book, the concepts of select topics, create text about herbal information, prepare a set of images, are introduced. Using a word processor to create contents of a book. To make it easy to access, the table of content should be included in a book. The ways to export the document to the pdf format are also suggested. The concept of infographic, which presents information and knowledge in the form of visual graphic representation, is valuable in health care (Turck, Silva, Tremblay, & Sachse, 2014). This topic is included in informatics courses. Herbal monograph of each medicinal plant is presented in one page. Various tools are used for creating infographic page, e.g., piktochart, maps, and time series. Methods to upload and/or publish these documents into a website are also taken into account.

Results from Using Tools for Teaching and Learning

Examples of results from using tools for teaching and learning are described here. We used results from the 3rd pharmacy students in the academic year of 2017.

Tools for Data and Information Management.

The Microsoft Office Access was used as a main tool for data and information management. The concept of normalization was introduced in the lecture class. Two examples were explained in the lecture class, i.e., databases of a commercial company and an herb database. The herb database was also used in a practice class. Students were trained to create tables, relationship among tables, create forms for inputting herb data, and create report for a set of data we would like to print out. Moreover, building queries for analyzing herb data was also emphasized. Examples of using Microsoft Office Access to create an herb database were shown in Figure 1 and Figure 2.
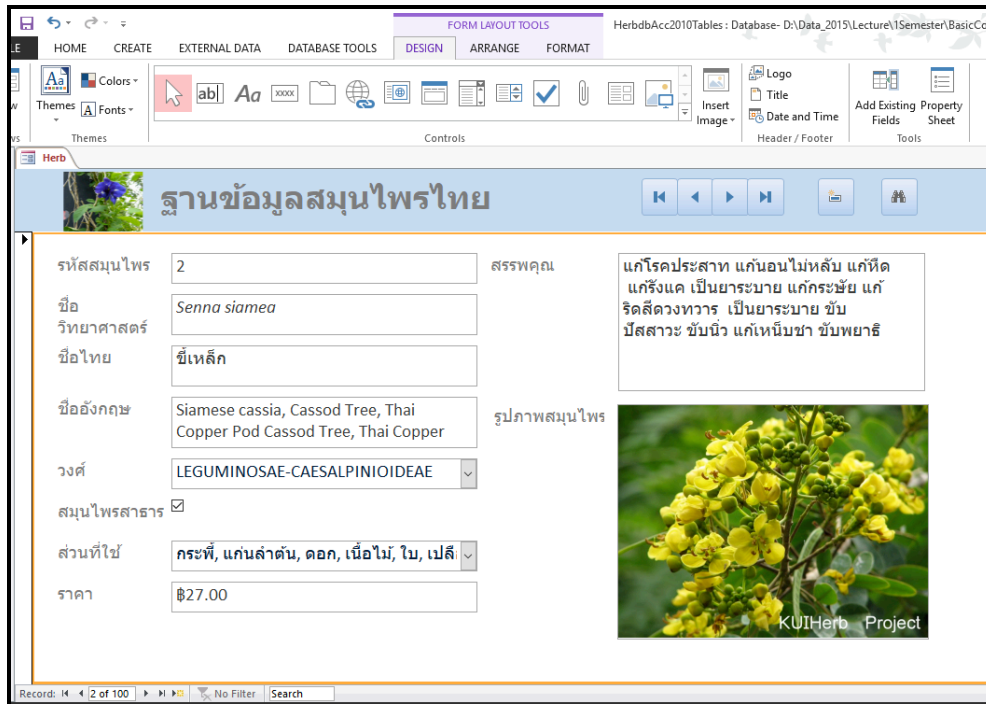
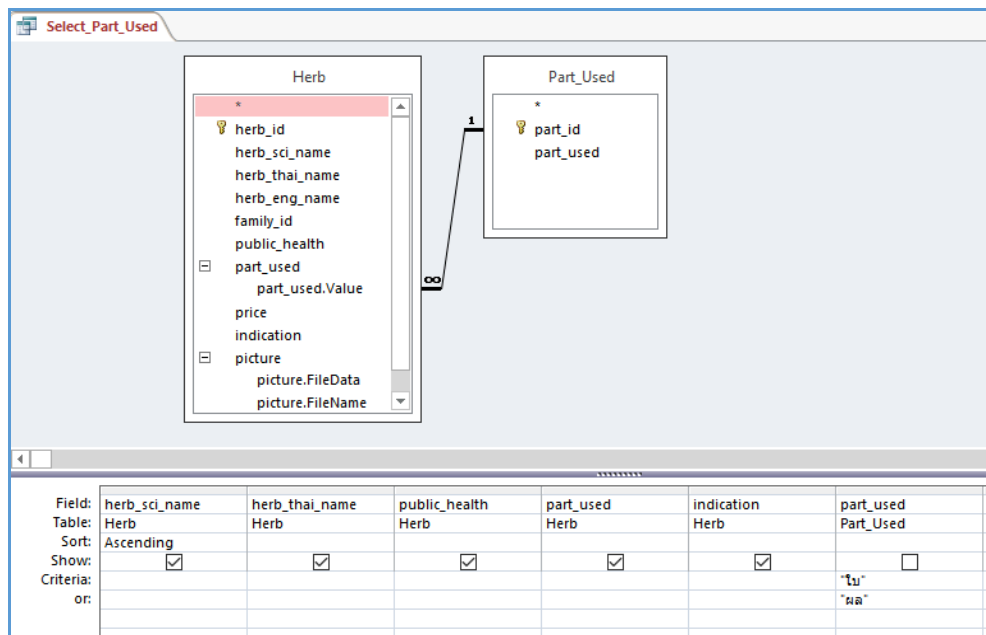Figure 1: Design and implementing an herbal database.

Figure 2: Analyzing data in an herbal database.

Tools for Knowledge Management.

The KUIHerbRx2017 was used for collecting and sharing herbal information and knowledge. Students should finding reliable herbal information. Several topics of herbal information were assigned to students, e.g., herb images (Figure 3), herb names (Figure 4), herb indications, precautions, toxicity, and additional information. Moreover, information and knowledge which students contribute to the system should be evidence-based information. Note that students were able to provide multi-lingual herb names. References used for each opinion should be provided.

Figure 3: Links to images in KUIHerbRx2017.

Figure 4: Links to images in KUIHerbRx2017.

Tools for Information Dissemination.

We taught students to use Microsoft Office Word to prepare contents of herbs. The tables of contents and hyperlink were included in a book. The example of content in the book is shown in Figure 5. When the book was finished, ways to publish the book to the e-book library were also advised. For infographic, several tools were used to create a page that described an herbal monograph. Students were suggested to used images and beautiful background to create an attractive page. The example of an herbal monograph was shown in Figure 6.

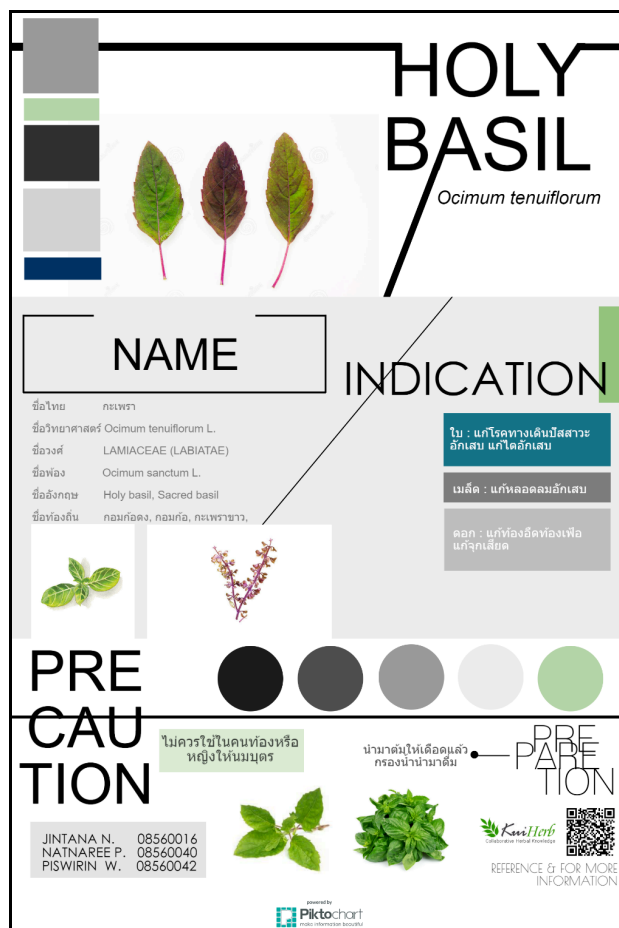Figure 5: An example of pages in an e-book.

Figure 6: An infographic page for an herbal monograph.

Conclusion and Future Work

In this paper, integration of ICT and herbal information were proposed to support pharmacy students, Silpakorn University. Several tools were introduced to create, manage, analyze, and publish herbal data, information including knowledge. For data and information management, the desktop RDBMS, was used as a tool to implement an herb database. The concept of normalization and skills in using this tool were educated. For knowledge management, the cycle of transferring knowledge between tacit knowledge and explicit knowledge was introduced. Students could transfer and exchange their reliable herbal information and knowledge in the KUIHerbRx. The concept of information dissemination was also taken into account. A set of tools for creating a simple e-book and infographic pages were introduced to students. Herbal data and information were used as examples. Methods for publishing a book or Web pages were given. Students gained twofold from the integration. Knowledge including skills in ICT literacy which could be applied to health data and information. In addition, student would be familiar with herbal data and information. Therefore, students could finding and managing herbal data and information which may be considered as supporting learning herbal medicine. In this work, only medicinal herbs were focused. Products from medicinal herbs will be concerned in our future work.

Acknowledgments

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