

*Using an Informatics Course to Support an Herbal Medicine Course for Learning
Herbs with Volatile Oil*

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Abstract

Phytochemistry is the one of subjects for pharmacy students. The subject is linking about herbs and its chemical compounds which contain pharmacological activities. The contents of phytochemistry are describing the structures of the large number of secondary metabolites found in plants, the functions of these compounds in human, plant biology and environment, and the biosynthesis of these compounds. In the academic year 2016, the third year pharmacy students, who planned to learn phytochemistry on the topic of volatile oil, were assigned to search and gather herbal information about 29 herbs containing volatile oil. This assignment was a part of an informatics course, namely, Health Informatics. The objectives of the assignment were to prepare the students' informatics skills and review their basic knowledge about aromatic herbs for the phytochemistry lesson. To accomplish the goals, the Knowledge Unifying Initiator for Herbal Information (a version for pharmacy students, KUIHerbRx) was used as a tool for collecting the students' opinions. Furthermore, we analyzed the input opinions given by the students. The results of analysis showed the students' interests, responsibility and ability in collecting reliable herbal information. The completed students' assignments exceeded the teachers' expectation in term of the number of contributed opinions. The most interesting herb was Dill (*Anethum graveolens* L.). The highest number of opinions given by one student was 33 opinions. The most interested topic was medicinal indication. This work offers the method of using an informatics course for improving informatics skills and preparing for phytochemistry lessons in the future.

Keywords: Informatics, Phytochemistry, pharmacy school, medicinal herbs, volatile oil

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Introduction

Informatics is one of the most important skills in the 21st century for everyone, including healthcare professionals. Healthcare professionals use information technology increasingly (Garde, Harrison, Huque, & Hovenga, 2006). Informatics competencies for healthcare professionals have become crucial due to the increasing presence of technologies in the workforce environment. Incompetent informatics skills affect the healthcare professionals' ability to perform optimum responsibilities. For this reason, the informatics education for healthcare professionals should be managed to the curriculum sufficiently. Pharmacists are one of healthcare professionals who contact with the patients. The knowledge about patients, medications, disease states, and the medication-use process are necessary to pharmacists. Pharmacists are expected to update their knowledge and provide the trusted information to patients. For finding the up to date and reliable information, informatics and information technology play a pivotal role to support the pharmacists' work. The pharmacy informatics were defined as "the scientific field that utilizes a systems approach to medication-related data and information including its acquisition, storage, analysis, and dissemination --in the delivery of optimal medication-related patient care and health outcomes." (Fox, Karcher, Flynn, & Mitchell, 2008). The knowledge and skills about information technology and informatics are needed to incorporate into the pharmacy students' curriculum.

Herbal medicine is increasing in popularity worldwide (Verma & Singh, 2008). Pharmacists directly responsible to serve knowledge about herbal medicine to patients, such as proper uses of herbal medicines and interaction with other pharmaceutical products. Pharmacy students need basic knowledge of herbal medicine, phytochemistry and pharmaceutical uses of herbs. The knowledge involved herbal medicine has been provided to the pharmacy students. The schools of pharmacy have a responsibility to offer the related knowledge in herbal medicines to pharmacy students.

The Faculty of Pharmacy, Silpakorn University's curriculum was designed the courses involving in both informatics and herbal medicine, the detail of each course were explained below. To prepare the students' informatics skills and review their basic knowledge about aromatic herbs for the phytochemistry lesson in near future. The results from the assignment given in Health Informatics course were analyzed. This work offers the method of using an informatics course for improving informatics skills and preparing for phytochemistry lessons in the future.

Informatics Course for Pharmacy Students

Due to the information technology play dramatically role in health professional. Pharmacists are expected to have informatics abilities. The informatics courses for pharmacy students in the Faculty of Pharmacy, Silpakorn University's curriculum were designed, one for the third-year students called "Health Informatics". The contents of Health Informatics course are involved in basic principles of health informatics; informatics skills; comparing and contrasting health information from different disciplines; concepts of how health information is stored, organized, retrieved and used; applications of basic health information in hospitals, clinics, public health settings, pharmaceutical industries and government units. The basic informatics skills for pharmacy students are to search and gather the reliable information using

information technology, to evaluate the obtained information, to share data and collaborate with other members in the same class and to create the report or presentation. The pharmacy students learned and practiced the informatics skills from the course.

Herbal Medicine Courses for Pharmacy Students

In Thailand, the herbal usage has increased sharply since the government policy. The pharmacists also should have knowledge of herbs and herbal products. The Botany and Phytochemistry courses were included in the undergraduate pharmacy's curriculum from Faculty of Pharmacy, Silpakorn University. The Botany course was designed for the second-year pharmacy students. About the Phytochemistry courses were divided into 2 subjects, named Pharmacognosy I and Pharmacognosy II. Pharmacognosy I was set for the third-year pharmacy students and Pharmacognosy II for the fourth-year students. The laboratory courses of these 2 subjects were paralleled with the lecture courses. The contents in Pharmacognosy I consisted of Phytochemistry, the chemical groups of natural compounds such as Alkaloids, Terpenoids, Flavonoids, Anthraquinone glycosides, Volatile oils and related substances and so on. In each topic, the pharmacy students have to learn about natural sources, chemical constituents, physico-chemical properties, biosynthesis pathways, extraction methods, pharmacological activities, methods for quality assurance, important products on the market. While the contents of Pharmacognosy II contain the knowledge for quality control and quality assurance for herbal raw materials and herbal products.

Experimental Designs and Tools

We designed the assignment in the Health Informatics course to practice the students' informatics skills and to prepare the knowledge for further phytochemistry class to the third-year pharmacy students. The volatile oils and related substances topic in Pharmacognosy I course was used as an experiment. The 158 third-year pharmacy students who enrolled in the Health Informatics course and planned to learn phytochemistry on the topic of volatile oil, were assigned to search and gather herbal information about 29 herbs containing volatile oil. Each student was responsibility at least one herb for finding reliable information about each herb in Thai language. To accomplish the goals, the Knowledge Unifying Initiator for Herbal Information or KUIHerb (a version for pharmacy students, KUIHerbRx) was used as a tool for collecting the students' opinions (Lertnattee, & Chomya, 2014). KUIHerb is a web-based tool using for Knowledge Management (KM) to exchange herbal information between the users who have experience in herbal medicine. The web-based technology is a potential tool to support collaborative learning (Liaw, Chen, & Huang, 2008). The topics provided to the students is indications, precautions, extra-information and herb names in local or other languages. All information should be had the references. Additionally, the photos of the herbs and the products containing the herb should be taken by the students themselves. In case of they could not find the real herbs or products, the link of websites containing the herbs photos or product photos were added. The students could participate the other students' opinions by voting to support the contributed opinions. The completed assignments had to finish in 2 weeks later and the reports were sent to the teachers via electronic mail. Furthermore, we analyzed the input opinions given by the students. The results were shown in next topic.

Results and Discussion

The input opinions given by the students were analyzed. The results showed the total number of contributed opinions including votes given by the students was 1058. The most interesting topic for the students was herb medicinal indications, 247 opinions and then the herb names, 218 opinions, respectively. While the minimum number of input opinion was the herb images topic, 9 opinions and then the product images, 11 opinions were contributed. The low number of contributed opinions on these two topics showed the students could not take the herbal and product photos by themselves. One problem was the students could not find the real herbs or real products to take photos. The number of votes was 106, showed the students shared the obtained information and would like to participate in other members' opinions. The number of contributed opinions on each topic was shown in Table 1.

Table 1: The number of contributed opinions given by the students in each topic.

Topic	Number of opinions
Indications	247
Precautions	61
Extra-information	94
Herb names	218
References	190
Herb images	9
Herbal product images	11
Links	122
Votes	106
Total	1058

To evaluate the students' responsibilities, each student had to log in using the given password to add the opinions or vote into the KUIHerbRx2017. The number of contributed opinions of each student were analyzed. The result showed the highest number of opinions given by one student was 33 opinions. To observe the students' interesting along the 29 aromatic herbs given, the input opinions in all topics of each herb were examined. The most interesting herb for students was Dill (*Anethum graveolens* L.) due to 92 contributed opinions were given. The aromatic herb which lowest input opinions was Holy Basil (*Ocimum tenuiflorum* L.), with 13 input opinions. Figure 1 showed the photos of Dill from external links from KUIHerbRx2017.

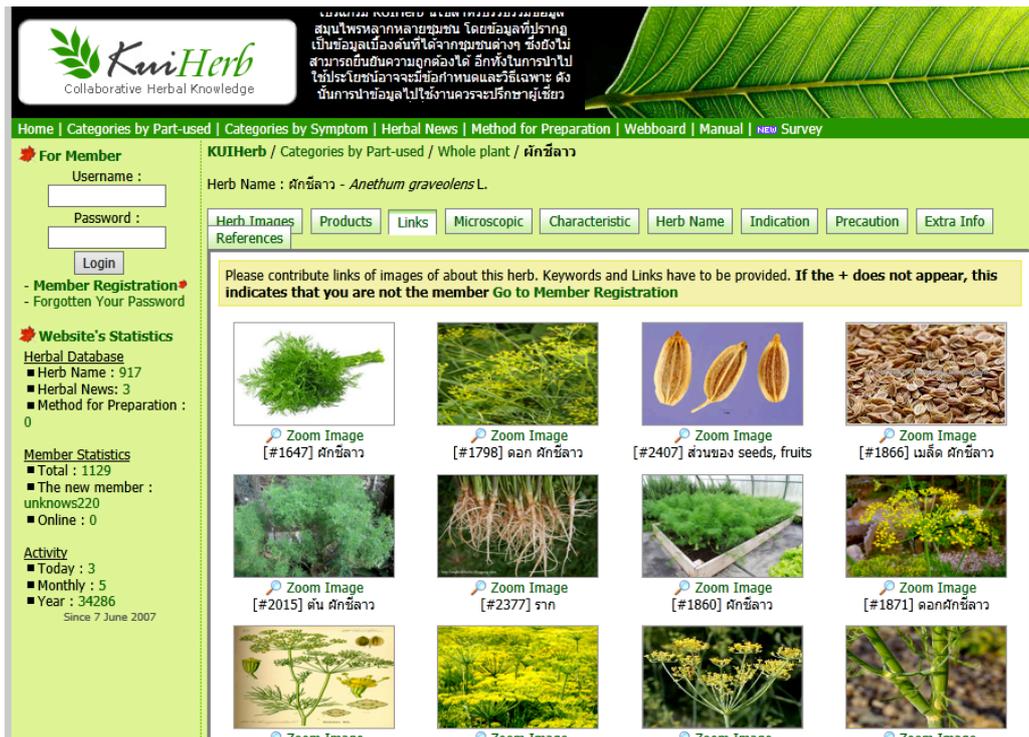


Figure 1: The Links of Dill (*Anethum graveolens* L.) from KUIHerbRx2017.

We evaluated the students' abilities, the contents of input opinions were checked. The results showed the students had abilities to search reliable information and then evaluate the obtained information and gather the data. The reliability of the contributed opinions was evaluated by the related input opinions in the reference topic. The input opinions in the reference topic were 190 opinions, while each reference opinion could be referring to many contributed opinions on other topics. Figure 2 showed the input opinions in the medicinal indications topic of Dill from KUIHerbRx2017. The number in parentheses at the end of each opinion refer to the reference opinions in the reference topic as shown in Figure 3.

Home | Categories by Part-used | Categories by Symptom | Herbal News | Method for Preparation | Webboard | Manual | **NEW** Survey

For Member
 Username :
 Password :
 Login
 Member Registration
 Forgotten Your Password

Website's Statistics
 Herbal Database
 Herb Name : 917
 Herbal News: 3
 Method for Preparation : 0
 Member Statistics
 Total : 1129
 The new member : unknowns220
 Online : 0
 Activity
 Today : 0
 Monthly : 7
 Year : 34288
 Since 7 June 2007

KUIHerb / Categories by Part-used / Whole plant / ผักชีลาว
 Herb Name : ผักชีลาว - *Anethum graveolens* L.

Herb Images
 Products
 Links
 Microscopic
 Characteristic
 Herb Name
 Indication
 Precaution
 Extra Info

Please contribute your opinions about part used, indications on both folk and modern medicine and methods for preparation. Click VOTE for voting the opinions in a list OR Click +Contribute your opinions for the medicinal uses. **If the + does not appear, This indicates that you are not the member, please click Go to Member Registration**

Properties Show all (37) | Previous 1 - 20 Next

Part Used	Indication	Method of Preparation	Vote Score
ต้น	แก้ไอ ปารุงธาตุ แก้อาการท้องเสีย แก้คลื่นไส้ แก้ท้องอืด แก้ท้องเสีย		2
ใบ	ช่วยในการทำงานของกระเพาะอาหาร ม้าม และตับ (7)		2
ลำต้น	ช่วยป้องกันโรคมะเร็งในกระเพาะอาหาร และลำไส้ รวมถึงโรคมะเร็งอื่นๆ บรรเทาอาการท้องเสีย และอาหารเป็นพิษ ป้องกันโรคริดสีดวงทวารหนัก (6)		2
ผล	ช่วยแก้การไอ(12)		2
ผล	แก้ท้องอืด(12)		2
ผล	ขับลม ปารุงธาตุ แก้อาการท้องอืด แก้ท้องอืดท้องเฟ้อ แก้จุกเสียด		1
ราก	แก้กระหายน้ำ แก้กระหายน้ำ แก้กระหายน้ำ		1
ผล	ปารุงกำลัง แก้เส้นท้องพิการ แก้ท้องอืด แก้คลื่นไส้ ขับปัสสาวะ แก้ท้องเสีย ลดความดันโลหิต ลดไขมันในเส้นเลือด ลดระดับน้ำตาลในเส้นเลือด		1
เมล็ด	ปารุงกำลัง ขับลม แก้เส้นกลางท้องพิการ แก้ชีพจรอ่อน		1
ใบ	แก้การปัสสาวะขัด	ใช้ใบสดประมาณ 50 กรัม นำมาต้มกับน้ำดื่ม	1
ใบ	แก้การท้องผูก แก้การปัสสาวะขัด		1
ผล	ช่วยเพิ่มรสชาติของอาหาร(4)	นำมาบดโรยบนมันฝรั่งบดหรือสลัดผัก	1
ทั้งต้น	ช่วยขับเห็บ(12)		1
ผล	ช่วยแก้การระคายเคือง(12)		1
ผล	ช่วยปารุงปอด(12)		1
ทั้งต้น	ช่วยแก้การบวม(12)		1
ผล	ช่วยทำให้ท้องอ่อน(12)		1
ใบ	ช่วยขับกลิ่นคาวปลา(4)	นำมาโรยบนอาหารประเภทปลา	1
เมล็ด	ช่วยขับลม แก้ท้องอืด แก้คลื่นไส้ แก้ท้องอืด แก้ท้องอืด แก้ท้องอืด		1
ใบ	เพิ่มปริมาณของน้ำนมสำหรับคุณแม่ที่เพิ่งคลอดบุตร (12)		1

Figure 2: The contributed indications of Dill (*Anethum graveolens* L.) from KUIHerbRx2017.

Home | Categories by Part-used | Categories by Symptom | Herbal News | Method for Preparation | Webboard | Manual | **NEW** Survey

For Member
 Username :
 Password :
 Login
 Member Registration
 Forgotten Your Password

Website's Statistics
 Herbal Database
 Herb Name : 917
 Herbal News: 3
 Method for Preparation : 0
 Member Statistics
 Total : 1129
 The new member : unknowns220
 Online : 0
 Activity
 Today : 0
 Monthly : 7
 Year : 34288
 Since 7 June 2007

KUIHerb / Categories by Part-used / Whole plant / ผักชีลาว
 Herb Name : ผักชีลาว - *Anethum graveolens* L.

Herb Images
 Products
 Links
 Microscopic
 Characteristic
 Herb Name
 Indication
 Precaution
 Extra Info

1. ศัญญา ดิวีเสษและคณะ. ผักชีมีปริมาณแคลเซียม. โรงพิมพ์องค์การสงเคราะห์ทหารผ่านศึก. กรุงเทพฯ. 2542.

2. สรรพคุณผักชีลาว[Online].22/2/2560.Available from:https://medthai.com/ผักชีลาว

7. ผักชีลาว [Online]. 2010; Available from: URL: http://www.phargarden.com/main.php?action=viewpage&pid=171

4.สรรพคุณและประโยชน์ของผักชีลาว[Online].22/2/2560.Available from:http://kaijeaw.com/ผักชีลาว

5.greenshopcafe.ผักชีลาว.[ออนไลน์][22/2/2560]Available from: URL: http://www.greenshopcafe.com/mobi/greennewss.php?id=1161

6. Puechkaset. ผักชีลาว สรรพคุณ และการปลูกผักชีลาว.[ออนไลน์][22/2/2560] Available from: URL: http://puechkaset.com/ผักชีลาว

3.ผักชีลาว.[ออนไลน์][22/2/2560] Available from: URL: http://www.phargarden.com/main.php?action=viewpage

8. puechkaset. ผักชีลาว [Online]. [cited 2560/2/22]; Available from: http://puechkaset.com/ผักชีลาว

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Figure 3: The contributed references of Dill (*Anethum graveolens* L.) from KUIHerbRx2017.

The results showed the assignment given in the Health Informatics course could fulfill the purpose of the work to practice the pharmacy students' informatics skills and to review the basic knowledge of medicinal herb for the near future phytochemistry course. The completed students' assignments exceeded the teachers' expectation in term of the number of contributed opinions.

Conclusion

From the results, the assignment given in the Health Informatics course could prepare the students' informatics skills. The students' ability in searching and gathering the reliable herbal information was shown in the results. Moreover, the students' responsibility could be evaluated. The assignment also showed the students' interest involved in aromatic herbs. Furthermore, the assignment also supported herbal medicine course for learning herbs with volatile oil. The students, who learned Botany course in the second-year, could review their knowledge about herbal medicines and ready for future learning in phytochemistry lesson. The data given by students were checked for finding the students' weak points and misleading to correct them in the phytochemistry course. The assignment was given to the students in the Health Informatics course also supported self-learning to the students. This work offers the method of using an informatics course for improving informatics skills and preparing for phytochemistry lessons in the future.

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