

Efforts of Showa Pharmaceutical University toward Pre-training for Clinical Pharmacy Practice and Its Assessment

Kazuhiro WATANABE* ¹⁾, Masayoshi HIROHARA ¹⁾, Ayako TERATA ¹⁾, Kazuki KUSHIDA ¹⁾, Akihito TAKANO ¹⁾, Ryoko CHIBA ¹⁾, Tomoji OSAWA ¹⁾, Junichi KITAJIMA ¹⁾, Fuminori SHIBUYA ¹⁾, Jun TODA ¹⁾, Yukihiko HAGIWARA ¹⁾, Hajime HAMASHIMA ¹⁾, Tomoyuki HAMAMOTO ¹⁾, Ryuji FUKUMORI ¹⁾, Yoshie HORIGUCHI ¹⁾, Kyoji TAGUCHI ¹⁾, and Tatsuji IGA ²⁾

¹⁾Education Center for Clinical Pharmacy Practice, Showa Pharmaceutical University

²⁾Showa Pharmaceutical University

(Received August 30, 2010 ; Accepted October 21, 2010)

At Showa Pharmaceutical University (SPU), a total of 183 classes in Pre-training for Clinical Pharmacy Practice (Pre-training Program) have been implemented by applying the "Kusabi-shaped education" system. This aims to enhance student proficiency by offering a course in which subject contents are built up gradually beginning in the second year and by allowing students to study the same subject several times. To assess the efforts SPU has made in the Pre-training Program, fourth-year students in academic year 2009 were surveyed using questionnaires on the following topics: the degree of satisfaction, difficulty, and level of intellectual curiosity regarding the Pre-training Program; which course subject students would most like to learn about; and the depth of understanding of each course subject.

The degree of satisfaction, difficulty, and the level of intellectual curiosity for the Pre-training Program were evaluated highly in general. Throughout the Pre-training Program period, the subject that students most wanted to learn about was "Training in Communication with Patients and Collection of Information from Patients/Instruction on Dosage and Administration". The depth of understanding of each course subject increased after completing the program.

Key Words: Six-year pharmacy curriculum, Pre-training for Clinical Pharmacy Practice, Kusabi-shaped education system, Student questionnaire survey

Introduction

With the recent advancements in medical technology and the separation of dispensing from medical practice in Japan, the New Pharmaceutical Education System ("six-year pharmacy curriculum"), in which the undergraduate course is lengthened from four to six

years, has been in place since 2006. This six-year pharmacy curriculum places emphasis on promoting educational specialties such as medical pharmacy, bioethics, and communication studies as well as on fostering the development of pharmacists with clinical competence who are proficient in actual medical

¹⁾ Education Center for Clinical Pharmacy Practice, Showa Pharmaceutical University, 3-3165 Higashi-Tamagawagakuen, Machida-shi, Tokyo 194-8543, Japan.

²⁾ Showa Pharmaceutical University, 3-3165 Higashi-Tamagawagakuen, Machida-shi, Tokyo 194-8543, Japan.

* Correspondence should be addressed.

E-mail: kazunabe@ac.shoyaku.ac.jp

practice. The six-year pharmacy curriculum was established as a "Model Core Curriculum for Pharmaceutical Education" (Model Core Curriculum) in order to allow students to acquire certain knowledge, techniques, and attitudes as a pharmacist by the time they graduate from pharmaceutical university¹⁻³⁾.

At Showa Pharmaceutical University (SPU), a new curriculum was set up in response to this Model Core Curriculum. In addition, the educational system for Pre-training for Clinical Pharmacy Practice (Pre-training Program) was developed by establishing the Education Center for Clinical Pharmacy Practice, which consists of laboratories of four pharmaceutical specialties and the laboratory of the Pharmacist In-service Training Office.

In the new curriculum at SPU, site-visits to hospitals, insurance pharmacies, and special-needs schools, Problem Based Learning (PBL), and humanism education through the tutorial system have all been integrated into the courses for the first-year undergraduate students. At most pharmaceutical universities, the Pre-training Program delivers 122 classes (90 minutes per class) specified in the Model Core Curriculum in the second semester of the fourth year. In contrast, SPU has applied the "Kusabi-shaped education system,"^{4,5)} a system which aims to enhance student proficiency by building up course contents step by step and allowing them to take the courses in a cycle. Thus, SPU has conducted the program by first giving introductory lectures for the Pre-training Program to second-year undergraduate students in their second semester and then offering lab courses of the Pre-training Program in the second semester of the third year.

This paper reports SPU's efforts to develop the Pre-training Program as well as the results of a student survey conducted in the form of questionnaires to evaluate these efforts.

Methods

1. Establishment of the Pre-training Program Curriculum

The Pre-training Program at SPU was implemented by assigning 15 classes each to "Introduction to Clinical Pharmacy" and "Introduction to Pharmaceutical Health Care" to offer a total of 30 classes (30 days) as introductory lectures for the Pre-training Program in the second semester of the second year. The Pretraining

Program course was also offered in the second semester of the third year, in which 18 practical training sessions were assigned to the "Pre-training Program Introduction (Hop)" course. In these classes, six subjects were covered in 6 days. Subsequently, in the first semester of the fourth year, 57 classes consisting of lectures, exercise sessions (small group discussions: SGD), and practical training sessions were offered as the "Pre-training Program Fundamentals (Step)" course, and 19 days were assigned to this course. In the "Pre-training Program Applied (Jump)" 78 classes of lectures, SGD, and practical training sessions were offered (26 days in total) (Table 1).

The faculty of the Education Center for Clinical Pharmacy Practice at SPU was mainly in charge of educational guidance for the Pre-training Program. This was provided based on a cooperative structure by pharmacists belonging to the Pharmacists Association in Machida and Sagamihara (Machida-shi Yakuzai-shikai and Sagamihara-shi Yakuzai-shikai) as well as designated pharmacists who worked at the pharmacy practice facilities contracted to SPU. When the practical training sessions were offered in a group setting, which consisted of approximately 20 students, two or three of the pharmacists mentioned above were assigned to a group as instructors. Furthermore, Standardized or Simulated Patients (SP) were used in practical training sessions for "Training in Communication with Patients and Collection of Information from Patients/Instruction on Dosage and Administration," which was given in a group setting.

2. Methodology of the Student Survey on the Pre-training Program

In the academic year of 2009, 214 fourth-year students were surveyed employing a questionnaire to analyze the Pre-training Program at SPU from a pedagogical standpoint. Students completed two sets of questionnaire. The first (pre-questionnaires) were completed on the first day of each Pre-training Program course offered in the first and second semesters of the fourth year, and the second (post-questionnaires), on the last day of each course.

The pre- and post-questionnaire items covered the following five topics: (1) the degree of satisfaction with the Pre-training Program in general; (2) program difficulty; (3) intellectual curiosity about the program; (4) course subjects that students most desired to learn in

Table 1. Course subjects and number of classes assigned to the Pre-training Program at SPU

Course	Class	Lecture	Exercise	Practical training	Total
Pre-training Program introductory lectures	1 Introduction to Clinical Pharmacy	15	0	0	15
	2 Introduction to Pharmaceutical Health Care	15	0	0	15
	Subtotal	30	0	0	30
Pre-training Program Introduction (Hop)	1 Pharmacy Law and Dispensing	0	0	3	3
	2 Preparation and Dispensing of Tablets and Inspection of Prescriptions	0	0	3	3
	3 Dispensing of Powdered Medicines and Inspection of Prescriptions	0	0	3	3
	4 Dispensing of Syrup and Inspection of Prescriptions	0	0	3	3
	5 Sterile Techniques and Mixing Injectable Drugs	0	0	3	3
	6 Communication Skills and Manners as a Pharmacist	0	0	3	3
Subtotal	0	0	18	18	
Pre-training Program Fundamentals (Step)	1 Team Medicine	3	6	0	9
	2 Preparation and Dispensing of Tablets	1	1	2	4
	3 Dispensing of Powdered Medicines and Syrup	1	1	3	5
	4 Sterile Techniques and Mixing Injectable Drugs	1	1	3	5
	5 Preparation and Dispensing of Ointments and Hospital Preparation	0	0	1	1
	6 Inspection of Prescriptions and Prescription Inquiries	2	4	3	9
	7 Management and Supply of Medicines in the Pharmacy	3	3	0	6
	8 Risk Management, Malpractice	2	4	0	6
	9 Training in Communication with Patients and Collection of Information from Patients /Instruction on Dosage and Administration	2	4	6	12
Subtotal	15	24	18	57	
Pre-training Program Applied (Jump)	1 Preparation and Dispensing of Tablets and Ointments and Inspection of Prescriptions	0	2	6	8
	2 Preparation and Dispensing of Powdered Medicines and Syrup and Inspection of Prescriptions	0	2	6	8
	3 Sterile Techniques and Mixing Injectable Drugs	0	2	4	6
	4 Therapeutic Drug Monitoring (TDM)	1	2	3	6
	5 Training in Communication with Patients and Collection of Information from Patients /Instruction on Dosage and Administration	0	3	9	12
	6 Medical Insurance System and Pharmacy Preparation	3	7	5	15
	7 Risk Management, Malpractice	2	0	0	2
	8 General Overview of Pre-training Program	0	0	21	21
Subtotal	6	18	54	78	
Total		51	42	90	183

the Pre-training Program; and (5) the depth of understanding of each subject in the Pre-training Program course.

In the questionnaires, students were asked to respond to the following items for the first three topics: (1) "I am satisfied with this Pre-training Program," (2) "I think the degree of difficulty of this Pre-training Program is appropriate," and (3) "I am becoming more interested in pharmacist practices and want to acquire further knowledge". Each item was evaluated using the following five-point Likert scale: "5. Strongly agree", "4. Agree", "3. Neither agree nor disagree", "2. Disagree", and "1. Strongly disagree".

Regarding question (4) about course subjects that students most desire to learn in the Pre-training Program, both pre- and post-questionnaires were given to students in each Pre-training Program course offered in the first and second semester of the fourth year. The closed-question method was adopted in the pre-questionnaires: students were allowed to choose one of the subjects of each course in answer to the question,

"Which subject do you desire to learn about the most?" In the post-questionnaires, students were asked to choose one subject among those of each Pre-training Program course in answer to the question. "Which subject do you desire to learn more about in the future?"

Regarding items such as (5) Changes in the rate of understanding for each subject in the Pre-training Program course, students completed both pre- and post-questionnaires for each Pre-training Program course offered in the first and second semesters of the fourth year, and the results were compared. Regarding questions and answer styles of the questionnaires, Specific Behavioral Objectives (SBOs), in which each subject in the Pre-training Program course was listed, were presented, students were asked, "How well do you think you understood each subject in the Pre-training Program course?" This was assessed based on the following five-point Likert scale method: "5. Completely" (= 5 points), "4. Acquired" (= 4 points), "3. Neither acquired nor not acquired" (= 3 points), "2. Not acquired" (= 2 points), and "1. Not at all acquired" (= 1 point).

In addition, sex and preferred future career path (first choice) were investigated as the background factors of participants.

IBM SPSS Statistics 18.0 were used for statistical analysis of the results, and the paired student's *t*-test was used to compare the mean scores of evaluation for item (5) "Depth of understanding for each subject in the Pre-training Program course". The significance level was set at 5% ($p < 0.05$).

Responses to the questionnaires were anonymous and students' consent was obtained after explaining to them that any personal information arising from the results of this survey would be carefully protected and the results themselves would not be used for any purpose other than this research.

Results

1. Results of the Survey on the Pre-training Program

1) Characteristics of students surveyed

We surveyed 214 fourth-year students in the academic year of 2009 at SPU: 130 women (60.7%) and 84 men (39.3%). The preferred future career path (first choice) was to work in a pharmaceutical department of a hospital pharmacy for 60 students (28.0%), in a community pharmacy or drug store for 47 (21.9%), in the pharmaceutical industry for 33 (15.5%), and in other settings for 7 (3.2%); 67 students (31.3%) reported that they had not yet decided their future career path.

The number of valid responses to the questionnaires was as follows: 213 (response rate, 99.5%) respondents for both pre-questionnaires completed in the first semester and second semesters of the fourth year, and 214 (100%) respondents for both post-questionnaires conducted in the first and second semesters of the fourth year.

2) Degree of satisfaction with the Pre-training Program

The results for the degree of satisfaction with the Pre-training Program are shown in Fig. 1. In the first semester of the fourth year, 40 students (18.7%) strongly agreed and 108 (50.5%) agreed with the statement "I am satisfied with this Pre-training Program". In the second semester of the fourth year, 45 students (21.0%) strongly agreed and 128 (59.8%) agreed with this statement. The response rate (RR) for the combination of "5. Strongly agree" and "4. Agree" were 69.2 and 80.8% in the questionnaires completed in the first and second semester of the fourth year, respectively (Fig. 1).

3) Degree of difficulty of the Pre-training Program

The results for the degree of difficulty of the Pre-training Program are shown in Fig. 1. In the first semester of the fourth year, 45 students (21.0%) strongly agreed and 116 (54.2%) agreed with the statement, "I think the degree of difficulty of this

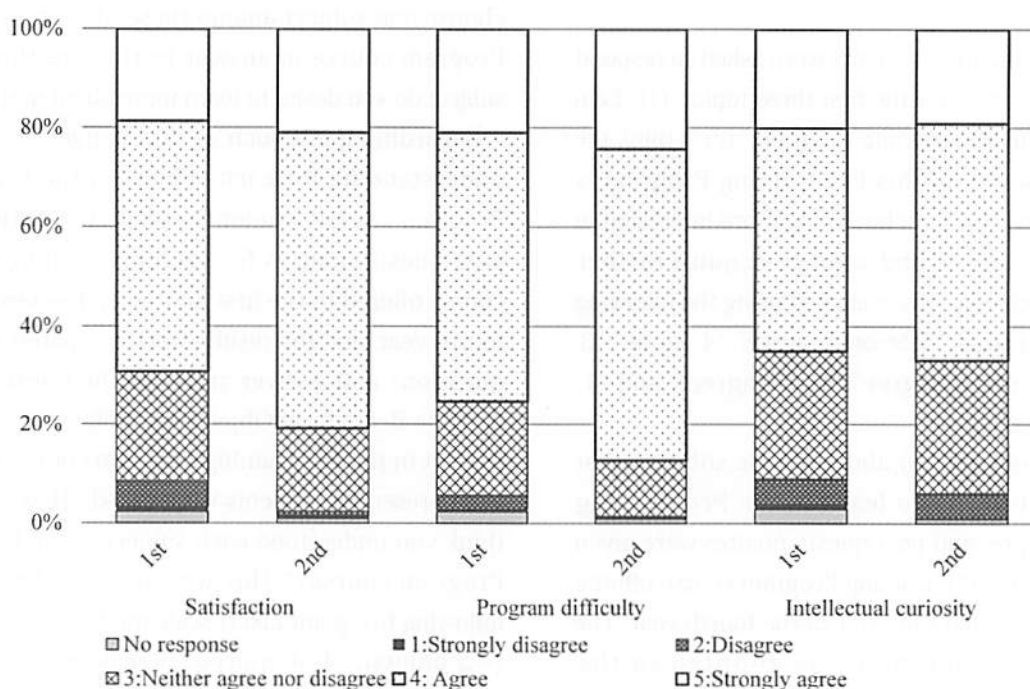


Fig. 1. Degree of satisfaction, difficulty, and intellectual curiosity regarding the Pre-training Program

Pre-training Program is appropriate". In the second semester, 52 students (24.3%) strongly agreed and 135 (63.1%) agreed with this statement. RRs were 75.2 and 87.4% for the first and second semesters, respectively (Fig. 1).

4) Degree of intellectual curiosity about the Pre-training Program

The results for the degree of intellectual curiosity about the Pre-training Program are shown in Fig. 1. In the first semester of the fourth year, 43 students (20.1%) strongly agreed and 96 (44.9%) agreed with the statement, "I am becoming more interested in pharmacist practices and want to acquire further knowledge". In the second semester, 41 students (19.2%) strongly agreed and 102 (47.7%) agreed with this statement. RR was 65.0% for the first semester and 66.9% for the second semesters (Fig. 1).

5) Course subjects that students most desired to learn about in the Pre-training Program (Table 2)

Table 2 shows which subjects in the Pre-training Program students desired to learn about the most. In the pre-questionnaire of the first semester of the fourth year, the most popular course was "Training in Communication with Patients and Collection of Information from Patients/Instruction on Dosage and Administration," followed by the "Management and Supply of Medicines in the Pharmacy," "Preparation and

Dispensing of Tablets," and "Dispensing of Powdered Medicines and Syrup." According to the post-questionnaire in the same semester, the "Preparation and Dispensing of Tablets" was the most popular, followed by "Training in Communication with Patients and the Collection of Information from Patients/Instruction on Dosage and Administration," and "Sterile Techniques and Mixing Injectable Drugs". On the other hand, in the pre-questionnaire completed in the second semester of the fourth year, the "Preparation and Dispensing of Tablets and Ointments and Inspection of Prescriptions" was the most popular, followed by "Training in Communication with Patients and the Collection of Information from Patients/Instruction on Dosage and Administration," and the "Dispensing of Powdered Medicines and Syrup and Inspection of Prescriptions". In the post-questionnaire of the same semester, the most popular subject was "Training in Communication with Patients and Collection of Information from Patients/Instruction on Dosage and Administration," followed by "Sterile Techniques and Mixing Injectable Drugs" and "Therapeutic Drug Monitoring(TDM)".

6) Depth of understanding of each subject in the Pre-training Program course (Table 3)

Table 3 shows how the depth of understanding of each subject in the Pre-training Program course changed after taking the Pre-training Program course. The mean

Table 2. Course subjects that students most desired to learn before and after taking the Pre-training Program in their fourth year

Course	Class	Pre-questionnaire mean score	Post-questionnaire mean score
Pre-training Program Fundamentals (Step)	1 Team Medicine	2.8±0.8	3.3±0.7 *
	2 Preparation and Dispensing of Tablets	2.7±0.8	3.4±0.7 *
	3 Dispensing of Powdered Medicines and Syrup	2.6±0.8	3.4±0.7 *
	4 Sterile Techniques and Mixing Injectable Drugs	2.6±0.8	3.4±0.7 *
	5 Preparation and Dispensing of Ointments and Hospital Preparation	2.1±0.9	3.2±0.7 *
	6 Inspection of Prescriptions and Prescription Inquiries	2.5±0.8	3.3±0.8 *
	7 Management and Supply of Medicines in the Pharmacy	2.1±0.8	3.2±0.6 *
	8 Risk Management, Malpractice	2.2±0.8	3.2±0.6 *
	9 Training in Communication with Patients and Collection of Information from Patients /Instruction on Dosage and Administration	2.2±0.9	3.3±0.8 *
Pre-training Program Applied (Jump)	1 Preparation and Dispensing of Tablets and Ointments and Inspection of Prescriptions	3.0±0.7	3.7±0.6 *
	2 Preparation and Dispensing of Powdered Medicines and Syrup and Inspection of Prescriptions	3.0±0.7	3.6±0.6 *
	3 Sterile Techniques and Mixing Injectable Drugs	3.0±0.7	3.6±0.8 *
	4 Therapeutic Drug Monitoring (TDM)	2.2±0.8	2.7±0.8 *
	5 Training in Communication with Patients and Collection of Information from Patients/Instruction on Dosage and Administration	2.7±0.8	3.5±0.7 *
	6 Medical Insurance System and Pharmacy Preparation	2.7±0.8	3.2±0.8 *
	7 Risk Management, Malpractice	2.7±0.8	3.1±0.7 *

score of evaluation for the depth of understanding in all subjects in the Pre-training Program was 3 or below in the pre-questionnaire but increased to 3 or more in the post-questionnaire. Thus, for all subjects, a significant increase in understanding was observed after taking the Pre-training Program course ($p < 0.001$) compared to before the course.

Discussion

Universities have been making various attempts and efforts to introduce distinctive Pre-training Programs that cover the following seven subjects: "(I) pre-training for pharmacy practice" in the Model Core Curriculum for Pharmacy Practice: (1) Introduction to the Pre-training Program, (2) How to Read Prescriptions and Basic Points

Table 3. Changes depth of understanding for each subject in the Pre-training Program course before and after taking the program

Course	Class	Pre-questionnaire		Post-questionnaire	
		No. of Students	(%)	No. of Students	(%)
Pre-training Program Fundamentals (Step)	1 Team Medicine	10	4.7	3	1.4
	2 Preparation and Dispensing of Tablets	29	13.6	48	22.4
	3 Dispensing of Powdered Medicines and Syrup	29	13.6	29	13.6
	4 Sterile Techniques and Mixing Injectable Drugs	15	7.0	30	14.0
	5 Preparation and Dispensing of Ointments and Hospital Preparation	17	7.9	22	10.3
	6 Inspection of Prescriptions and Prescription Inquiries	14	6.5	11	5.1
	7 Management and Supply of Medicines in the Pharmacy	33	15.4	6	2.8
	8 Risk Management, Malpractice	23	10.7	6	2.8
	9 Training in Communication with Patients and Collection of Information from Patients /Instruction on Dosage and Administration	39	18.2	38	17.8
Did Not Respond	5	2.3	21	9.8	
Pre-training Program Applied (Jump)	1 Preparation and Dispensing of Tablets and Ointments and Inspection of Prescriptions	44	20.6	23	10.7
	2 Preparation and Dispensing of Powdered Medicines and Syrup and Inspection of Prescriptions	33	15.4	25	11.7
	3 Sterile Techniques and Mixing Injectable Drugs	30	14.0	45	21.0
	4 Therapeutic Drug Monitoring (TDM)	27	12.6	32	15.0
	5 Training in Communication with Patients and Collection of Information from Patients/Instruction on Dosage and Administration	42	19.6	46	21.5
	6 Medical Insurance System and Pharmacy Preparation	11	5.1	19	8.9
	7 Risk Management, Malpractice	19	8.9	10	4.7
Did Not Respond	8	3.7	14	6.5	

for Dispensing a Prescription as it is Written, (3) Prescription Inquiry, (4) Management and Supply of Medicines in the Pharmacy, (5) Risk Management, (6) How to give Instructions on Dosage and Administration/Communication Skills and Manners as a Pharmacist, and (7) Summary of Each Subject⁶⁻⁸⁾. At SPU, the Pre-training Program covers 81 days (183 classes in total, 90 minutes per class), and subjects necessary for pharmacist practice such as Community pharmacy Work, In-pharmacy Formulation, and Therapeutic Drug Monitoring (TDM) are offered in addition to the seven Pre-training Program course subjects. According to a questionnaire survey that the "Investigation and Research Panel on Pre-training Program and Program System" of the Council on Pharmaceutical Education gave to pharmaceutical universities nationwide in January 2010⁹⁾, the average number of classes taken in the Pre-training Program was 111.6 per student and the average number of days assigned to the program was 37.1. Hence, SPU constructed a Pre-training Program curriculum containing many more classes than are

offered on average at other pharmaceutical universities across the country. This could be achieved because, at SPU, in-service training as a pharmacist, which mainly involved prescribing practices, was offered repeatedly in different terms and was to be taken by students in a cycle. In the present study, we analyzed the pedagogical effect of the Pre-training Program curriculum based on the "Kusabi-shaped education" system and arrived at several conclusions.

First, as shown in Fig. 1, as a result of surveying the degree of satisfaction of pre-learning in our university, favorable evaluation by students was generally obtained in both the first and second semesters. The factors could not be specified, but we considered, as a likely explanation, that pre-learning contents in our university were of an appropriate level of difficulty for students and learning contents of pre-learning in our university stimulated their intellectual curiosity. We will conduct a further examination of the pre-learning contents in our university and examine a program to increase the degree of satisfaction of pre-learning for the future.

Second, according to Table 3, the depth of understanding of each subject in the Pre-training Program increased after taking the Pre-training Program. This was also applicable to the five subjects common to both the first and second semesters of the fourth year (Preparation and Dispensing of Ointments, "Dispensing of Powdered Medicines and Syrup," "Sterile Techniques and Mixing Injectable Drugs," "Risk Management," and "Training in Communication with Patients and Collection of Information from Patients/Instruction on Dosage and Administration"). Moreover, although not specified in Results, in response to an open-ended question in the pre-questionnaire conducted in the second semester of the fourth year, many students indicated that "it was very helpful that courses are offered repeatedly and they could take the same subjects in a cycle." In addition, in another questionnaire which was completed directly after the Objective Structured Clinical Examination (OSCE), more than 92% of students responded positively to the question about whether each subject in the Pre-training Program course helped to prepare for OSCE. Hence, in general, it appears that students could generally meet the learning objectives for the Pre-training Program at SPU. However, the depth of understanding of "Therapeutic Drug Monitoring (TDM)" offered in the second semester of the fourth year was significantly lower than that for other subjects, and this is an issue requiring attention in the future.

It should be noted that this student questionnaire survey assessed the Pre-training Program at SPU and not the Model Core Curriculum for Pre-training for Pharmacy Practice. In addition, the self-assessment performed by students was inherently subjective, so we must consider whether the survey items and methods of evaluating each item applied herein were appropriate. In addition, no reports describing a student questionnaire survey of pre-learning of practical business training in other Schools of Pharmacy remain noted, and there are no data to be compared with. Thus, this evaluation of the results has limitations. Despite such limitations, the present findings suggest that the Pre-training Program at SPU featuring a "Kusabi-shaped" education system has achieved a measure of pedagogical legitimacy.

REFERENCES

1) Ministry of Education, Culture, Sports, Science and Technology:

- <http://www.mext.go.jp/b_menu/shingi/chukyo/chukyo0/toushin/04021801.htm>, MEXT web, 18 February, 2004.
- 2) The Pharmaceutical Society of Japan, "Model Core Curriculum for Pharmacy Education," 2002.
- 3) Ichikawa A: Yakugaku-Kyouiku 6-Nensei no Jisshi mukete (in Japanese). *Medicine and Drug Journal*, 41, 1593-1597, 2005.
- 4) Ministry of Education, Culture, Sports, Science and Technology:
<http://www.mext.go.jp/b_menu/shingi/chukyo/chukyo4/gijiroku/03102101/001.htm> MEXT web 15 October, 2002.
- 5) Science Council of Japan:
<<http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-21-tsoukai-4.pdf>>, SCJ web 5 April, 2010.
- 6) Mihara K, Kojima K, Watanabe M, Yoshimoto T, Fujimoto M, Negishi M, Ko-shimizu H, Aburada M, Kawada T: Yakugaku-Kyouiku 6-Nensei ni Taiou-suru Jitsumu-Jissyu Jizen-Gakusyu no Kouchiku (in Japanese). *Medicine and Drug Journal*, 44, 1495-1501, 2008.
- 7) Tada H, Hatae T, Kuramoto K, Watanabe Y, Fukaya T, Suzuki K, Shoji T: Education of Pre-Clinical Training Programs on School of Pharmaceutical Science in Ohu University, *Journal of Drug Interaction Research*, 33, 23-27, 2010.
- 8) Research Report, Council on Pharmaceutical Education. "Yakugakukyouiku Jitsumu-jissyu no Jizengakusyu oyobi Sidou-taisei no arikata ni kansuru chousa" (in Japanese), Tokyo, 2010.