

Orientation to Community Pharmacy by online education amid the COVID-19 pandemic: Teaching and learning reflections

Yunn-Fang Ho^{1,2,*}, Ling-Ling Hsieh², Wo Kin Chao² and Yao-Chin Huang³

¹ Graduate Institute of Clinical Pharmacy, College of Medicine, National Taiwan University, Taipei, Taiwan

² School of Pharmacy, College of Medicine, National Taiwan University, Taipei, Taiwan

³ Healthfriend Pharmacy, Taipei, Taiwan

Received September 13, 2020

Revised October 11, 2020

Accepted October 13, 2020

* Corresponding author

Graduate Institute of Clinical Pharmacy,
College of Medicine, National Taiwan
University, No. 33, Lin-Sen South Road,
Taipei 10050, Taiwan
E-mail: yfho@ntu.edu.tw

ABSTRACT

In response to the unanticipated COVID-19 pandemic, a novel distance *Orientation to Community Pharmacy* course was held during the 2020 Spring semester. This report, by examining weekly activity and attainment of this unusual educational experience, aimed to (1) describe the design and implementation of the distance teaching, (2) recognize the similarities and differences in community pharmacy practices among regions of same cultural tradition, and (3) present teaching and learning reflections. The delivery of teaching was mostly through flipped classrooms by taking the advantage of digital social networking platforms. Both the student and the instructors expressed satisfactory views toward course implementation, although effort-demanding. The student stated to have benefited greatly from the course. The instructors felt rewarding, probably attributable to the student's positivity and punctuality. These pedagogical experiences should be of relevance to future distance course designs.

Key words: community pharmacy, COVID-19, pharmacy education, undergraduate course

1. Introduction

The unprecedented coronavirus disease 2019 (COVID-19) pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has had far-reaching impacts on health care (Fauci et al., 2020; WHO, 2020), socio-economic (Nicola et al., 2020), and educational systems worldwide (Sahu, 2020). The outbreak was initially declared as a Public Health Emergency of International Concern (PHEIC) on 30 January 2020, and subsequently characterized as a pandemic on 11 March by the World Health Organization. Border control in Taiwan has been instituted early on and even hurriedly applied to overseas full-time students from Macau and Hong Kong (Ministry of Education, 2020). The entry suspension remained active throughout the whole 2020 Spring semester. Face-to-face and online teaching modes to run in parallel became inevitable for undergraduate classes during the semester if overseas students did not return prior to the hast official announcement of admittance hold-up.

The *Orientation to Community Pharmacy (OCP)* course at the National Taiwan University (NTU) has been offered since 2002 Spring semester (Ho et al., 2013). It is now a 2-

credit didactic course for undergraduate third-year pharmacy students, aiming to instill students with concept and basics of community practices and to help alleviating pharmacist practitioners' load in precepting students taking the introductory-level *Community Pharmacy Practice Experiences (CPPEs)* course later (Tang et al., 2016; Ho, 2017). The modes of delivery in teaching *OCP* have been typically by lectures, combined with small group discussions plus field-visits to pharmacies, role plays or group presentations, certain pre-class reading assignments as well as designated textbooks, and formal written examinations.

Distance learning through live audio or video networking platforms should be the means of choice to avoid education disruption while containing the spread of the COVID-19 pandemic (UNESCO, 2020). A discrete online *OCP* course linking Taipei and Macau had thus been imparted to ensure one learner's right to education, although a conventional face-to-face classroom for dozens of students was still in place during the 2020 Spring semester. This report aimed to (1) describe the design and implementation of the *OCP* distance teaching, (2) recognize the similarities and differences of the regional community pharmacy practices among Taipei, Macau, and Hong Kong, and (3) present

Table 1. The program and platforms for the *Orientation to Community Pharmacy*.

Week	Topic	Goal	Objectives	Online platform
0 (Feb. 21)	Pre-course discussion	To discuss, with pre-course agreements, the contents, mode of delivery, and evaluation standards of the distance course		• Line Group Call (https://LINE.me/en/)
1 (Mar. 7)	Community pharmacy and the COVID-19 outbreak*	To brainstorm pharmacists' roles during a PHEIC and to share information on outbreak containment measures in Taiwan and Macau	<ul style="list-style-type: none"> • Trends and impacts of global COVID-19 outbreak* • Pharmacists' roles during the PHEIC • A comparison of respective measures for outbreak containment in Taiwan and Macau 	
2	Essential knowledge and skills for practicing at community pharmacies	To identify domain knowledge and professional skills essential to be a competent pharmacist	On becoming a community pharmacist, <ul style="list-style-type: none"> • Abilities required • Knowledge and skills to acquire while being a pharmacy student • Differentiation of regional differences in practice pattern or standard: Macau vs. Hong Kong 	
3	How to establish a community pharmacy in Macau	To explore requisites and processes of establishing a community pharmacy in Macau	<ul style="list-style-type: none"> • Visits to Macau community pharmacies or recalls of past experiences with any neighborhood pharmacy • Requisites and processes for establishing a community pharmacy in Macau • Pharmacy design and core equipment: <ul style="list-style-type: none"> - hardware - software • Differentiation of regional differences in pharmacy laws and regulations: Macau vs. Taiwan 	
4	Dispensing practices in community pharmacies	To understand cores and procedures of good dispensing practices in community pharmacies	<ul style="list-style-type: none"> • Processes and features of dispensing prescriptions in community pharmacies • Similarity and difference: <ul style="list-style-type: none"> - <i>between</i> community and hospital settings - <i>among</i> Taiwan, Macau, and the U.S. • Implications of separating dispensing practice from medical practice 	
5	Professional communication and relevant skills	To recognize the importance and skills of professional communication	<ul style="list-style-type: none"> • Importance of professional communication • Skills for effective communication • Case scenarios – comments and discussions 	
6	Information technology (IT) in primary pharmaceutical care	To contemplate why, what, and how to employ IT in facilitating contemporary pharmacy practices	<ul style="list-style-type: none"> • IT and health informatics • Health informatics in pharmacy practices: <ul style="list-style-type: none"> - patient care - pharmacy routines - inventory control of pharmaceuticals and other products • Respective considerations of IT applications at: <ul style="list-style-type: none"> - community pharmacies - physician clinics • Confidentiality issues in using IT 	
7	Principles of pharmacy consultation services	To grasp principles of consultation services and to apply appropriately	<ul style="list-style-type: none"> • Purposes, scopes, approaches, and contents of pharmacy consultation services • Steps to thoughtful and effective consultation services in pharmacies • Do's and don'ts in providing consultations for: <ul style="list-style-type: none"> - patients, care givers, or consumers - healthcare professionals • Shared decision-making in pharmaceutical cares 	

(to be continued)

teaching and learning reflections for future improvements, by examining weekly activity and attainment of this unusual educational experience.

2. Methods

2.1. Course initiation and participants

Two faculty members and one pharmacy student met through online platforms on a weekly basis from March to July, 2020. Ten days prior to the start of the course, the student was informed of and agreed upon the customized course aims, flipped classroom approach, and evaluation

requisites through an online pre-course discussion (week 0; Table 1). Two community pharmacy practitioners were also invited to enrich or supplement real-world practical issues from the standpoint of either Hong Kong or Taipei on discretely arranged occasions.

2.2. Course design

The design of the distance course, including goals, syllabus, and textbooks were primarily based on the existing *OCF* with minor adjustments (NTU, 2020). To cope with distance teaching for one single student, modifications were made for teaching methods and evaluation criteria.

Table 1. The program and platforms for the *Orientation to Community Pharmacy* (continued).

Week	Topic	Goal	Objectives	Online platform
8	Pharmacy consultation services – A drill with simulated cases	To enrich consultation know-how by practicing commonly encountered case scenarios	<ul style="list-style-type: none"> Reviewing and commenting on the learner's responses to: <ul style="list-style-type: none"> A 29 year-old pregnant lady with a chief complaint of 'constipation': <ul style="list-style-type: none"> - definition of constipation - information collection for assessing consumer's needs - selection of an optimal over-the-counter product for the pregnant lady - when to refer to a physician Simulated videos of classmates' visit to consented pharmacies in Taipei: <ul style="list-style-type: none"> - strengths to learn - weaknesses to avoid - areas to improve 	• Line Group Call (https://LINE.me/en/)
9	Operation and management of a community pharmacy	<ul style="list-style-type: none"> To gain concepts of pharmacy operation and management <ul style="list-style-type: none"> • Pharmacy operation <ul style="list-style-type: none"> - technical know-how - establishing and maintaining customer profiles and patient medication records - sales promotion activities • Pharmacy management <ul style="list-style-type: none"> - human resources - drugs and other products - financial and accounting 		
10	Pharmaceutical care and the long-term care system	To know the long-term care system in Taiwan and the status of local pharmaceutical care services	<ul style="list-style-type: none"> • Long-term care system in Taiwan <ul style="list-style-type: none"> - aims and target population - the system - services and delivery • Community pharmacies and pharmaceutical care services <ul style="list-style-type: none"> - significance and current status - evaluation and care of patients with chronic diseases - drug dispensing and administration (<i>e.g.</i> through naso-gastric tubes) - inventory management in long-term care facilities 	
11	Pharmacy laws and community practices – A lawyer's perspective	To learn laws and regulations applicable to pharmacy practices in the community setting	<ul style="list-style-type: none"> • Pharmacy types and management • Pharmacy laws in Taiwan • Cases of violating pharmacy laws revealed in the local press <ul style="list-style-type: none"> - pharmacists - drugs 	U Webinar (https://u.cyberlink.com/products/uwebinar)
12	Pharmacy laws and community practices – Perspectives of pharmacists and customers	To discuss the applicability and practicality from the views of practitioners and the served	<ul style="list-style-type: none"> • Issues worth of discussing or debating <ul style="list-style-type: none"> - registration site(s) of a licensed pharmacist - regulatory approaches for prescription to over-the-counter switch • Broadening the horizon – pharmacy practices in the US and others <ul style="list-style-type: none"> - Same issue, different handling approach (<i>e.g.</i> emergency contraception) - To borrow talent from abroad (<i>e.g.</i> pharmacy-based immunization services; pharmacy technician certification?) 	Line Group Call (https://LINE.me/en/)
13	Public health and community pharmacy	To exemplify professional services or activities with public health significance	<ul style="list-style-type: none"> • Variety of services provided by community pharmacies • Overview of public health • Natural history of diseases and levels of prevention • Introduction of health care system • Roles of community pharmacies in public health 	U Webinar (https://u.cyberlink.com/products/uwebinar) Line Group Call (https://LINE.me/en/)
14	Nourishing practices of professionalism in pharmacy services	To elucidate the value of integrating professionalism into patient care and daily services	<ul style="list-style-type: none"> • Tenets of pharmacy professionalism • How to nourish professionalism • Deeds of professionalism • Bridging concept to practice 	Line Group Call (https://LINE.me/en/)
15~17	Capstone project – course wrap-up	To conclude the special learning and teaching experiences by candid introspection and interactive discussion	<ul style="list-style-type: none"> • Collating and summarizing learning and teaching experiences • Persistent search, reading, and analyzing relevant literatures • Consolidating findings (<i>e.g.</i> Table 2) • Writing individual reflections • Synthesizing the report 	U Meeting (https://u.cyberlink.com/products/umeeting)

Abbreviations: PHEIC, Public Health Emergency of International Concern; COVID-19, *coronavirus disease 2019* (coined on 11 February 2020; formerly, 2019-nCoV – *2019 novel coronavirus*); OTC, over-the-counter medicines.

* The term '*Pandemic*' was not coined until 11 March 2020.

Pharmacies situated at communities to provide necessity self-care products and pharmaceutical care services are recognized as one of the most accessible healthcare settings.

It is obvious that regional professional practice norms should be set not only according to international standards but also by considering local culture, life style, health beliefs, and

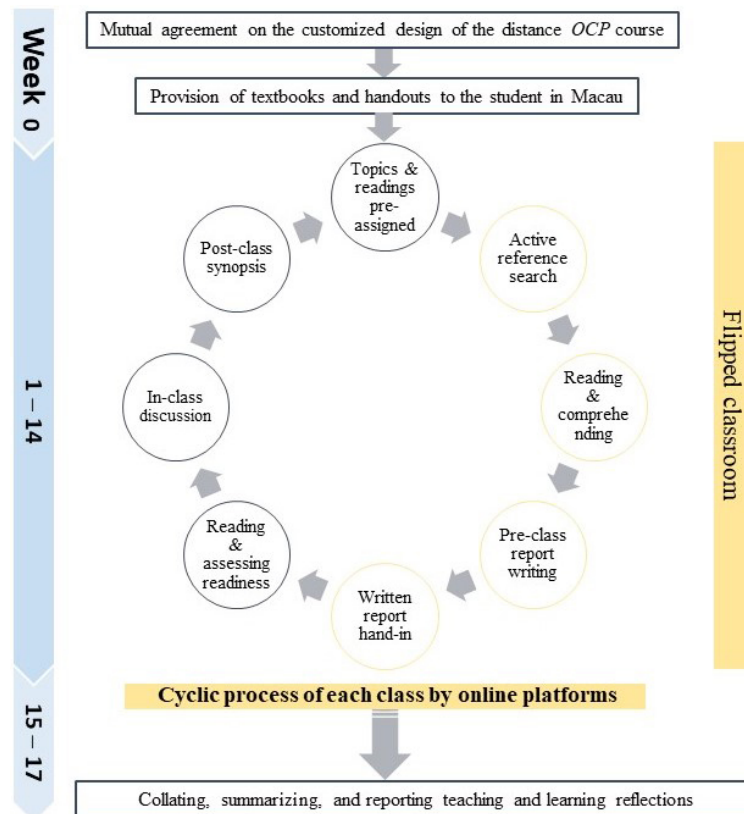


Figure 1. The design and implementation of the *Orientation to Community Pharmacy (OCP)* course.

legislation. To enable the applicability of knowledge and skills taught in *OCP*, an additional goal of exploring and understanding Macau's community pharmacy practices had been added to the distance *OCP* course by taking advantage of the student's homeland-staying for the whole semester. A comparison between Taiwan and Macau regarding status of community pharmacy practices should be deemed as achieving the extended aim of the distance course.

To facilitate learning within the context of distance education, flipped classroom approach was adopted by assigning topics and readings one week ahead of each class (Persky and McLaughlin, 2017). Textbooks and handouts were also provided. The student would then turn in written pre-class reports, oftentimes enriched with self-searched references, for teachers to assess the student's level of understanding. In-class discussions usually focused on fortifying the breadth and depth of comprehension, clarifying issues misunderstood or unrecognized, and encouraging question-answer interactions. Comments or consensus from in-class discussions were logged by the student right after each class and checked by teachers. The evaluation of student performance would be assessed by weekly pre-class written reports, in-class engagement, post-class summary reports, outcomes of the capstone project during the wrap-up stage of the course (weeks 15th–17th), and punctuality toward all online classes and reports.

2.3. Online course implementation by social networking platforms

Starting from week 0, a Line group of three participants had been set up. The team connected regularly and engaged interactively via Group Call (Line, 2020; Table 1). In few occasions, *i.e.* pharmacy-law issues/cases and public-health lecture with in-class activities, synchronized but unidirectionally-delivered live classes were offered by U Webinar (U Webinar, 2020). The U Meeting (U Meeting, 2020) platform was utilized during the wrap-up stage (weeks 15th–17th) of this novel distance course which served as a capstone in collating, summarizing, and reporting teaching and learning reflections. Teaching and learning reflections were discussed during this final stage. Figure 1 depicted the implementation processes employed in the course. Of note, the communication quality of social networking platforms was subject to network traffic and stability, especially the interactions were mostly on Saturday nights and the connections inevitably intermixed by commercial and academic networks.

3. Results

The distance *OCP* course in 2020 Spring semester lasted for nearly five months. The agreed aims of the course were: (1) chiefly, to impart the basics of Taiwanese community pharmacy services, and (2) extendedly, to encourage understanding of the local status within the student's

residency. A total of seven participants partook the course in varying frequencies (regularly or just on one occasion) and ways (interactively engaged or unidirectionally delivered). These participants included the student (1), faculty members (2), pharmacist practitioners (2), and guest specialists (2).

The topics, respective goal and objectives, and online platforms utilized are presented in Table 1. Topics ranged from community pharmacy and COVID-19, essentials of community pharmacy practices, pharmaceutical care, pharmacy professionalism, to public health and pharmacy. These online classes were mostly interactive engagements (flipped classroom) and few unidirectional delivery (lecture). The social networking platforms used included Line Group Call, U Webinar, and U Meeting. Two faculty members met with the student online regularly and played facilitator roles throughout the semester by supporting the student to be an active learner.

The online course also served as an opportunity for core members to contemplate and to contrast personal and professional experiences toward community pharmacies and associated services among geographically different Chinese societies, namely Taipei, Macau, and Hong Kong. A comparison table (Table 2) had thus been made at the completion of the course after numerous discussions, indicating the fulfillment of the extended aim of the special distance course. It was envisioned that the information gathered for this extended aim to be shared with the on-campus class when back to school. Regrettably, it had not been possible because the border control remained effective throughout the whole semester.

Flipped classroom approach was the major mode of delivery for these weekly classes. Course flow and operation processes are shown in Figure 1. The teachers' and the learner's reflections are summarized in Table 3, categorized

Table 2. A comparison of pharmacy-related affairs among Taiwan, Macau, and Hong Kong.

Item	Taiwan (Ho, 2017; NTU, 2020)	Macau (Cheong, 2018)	Hong Kong (CUHK, 2020; HKU, 2020)
Area (km ²)	36,197.07	32.9	1106.81
Population	23,586,562 (May 2020)	696,100 (Q1, 2020)	7,500,700 (Dec. 2019)
Number of registered pharmacists	32,059 (Jan. 2020)	605 (2018)	2930 (2020)
<i>Pharmacy education system</i>			
Number of university-affiliated pharmacy schools	7 (plus 2 technical institutes)	1 (plus 1 technical institute, only to foster pharmacy technicians)	2
Pharmacy education scheme (degree awarded)	<ul style="list-style-type: none"> • 4-year (BS) • 5-year (BS) • 6-year (PharmD) 	<ul style="list-style-type: none"> • 5-year (BPharm) 	<ul style="list-style-type: none"> • 4-year* (BPharm)
<i>Community pharmacy practices</i>			
Number of pharmacies	8189 (Jan. 2020)	272 (2018)	636 (2020)
Drug Category	<ul style="list-style-type: none"> • Prescription • Per instruction (by physicians or pharmacists) • Over-the-counter medicine 	<ul style="list-style-type: none"> • Uso Hospitalar (UH) • Prescrição Médica Obrigatória (PMO) • Over-the-counter medicine 	<ul style="list-style-type: none"> • Prescription-only medicine • Pharmacy-only medicine • Over-the-counter medicine
Pharmacy personnel (with license/certificate)	<ul style="list-style-type: none"> • Pharmacist • Assistant Pharmacist (trained by a bygone system) 	<ul style="list-style-type: none"> • Pharmacist • Pharmacy technician 	<ul style="list-style-type: none"> • Pharmacist
Major tasks of community pharmacist practitioners	<ul style="list-style-type: none"> • Prescription dispensing • Provision of non-prescription drugs • Provision of medical devices, dietary supplements, and other products • Drug consultation service • Responding to health authority's medication recalls • Participation of the following activities (with certification): <ul style="list-style-type: none"> - long-term care service - diabetes care - smoking cessation service - experiential programs for pharmacy students (preceptor) 	<ul style="list-style-type: none"> • Prescription dispensing • Provision of non-prescription drugs • Drug consultation service • Responding to health authority's medication recalls • Participation of the following activities: <ul style="list-style-type: none"> - public health - pharmaceutical care 	<ul style="list-style-type: none"> • Prescription dispensing • Provision of pharmacy-only medicines and over-the-counter medicines • Provision of medical devices and health supplements • Drug consultation service • Responding to health authority's medication recalls • Participation of the following activities: <ul style="list-style-type: none"> - blood pressure monitoring - smoking cessation service - diabetes care

* Plus 1-year internship before licensure.

Table 3. Teaching and learning reflections of the distance *Orientation to Community Pharmacy* course.

Category	Teaching reflection	Learning reflection
Prerequisites or resources required	<ul style="list-style-type: none"> • Time and efforts devoted was substantial (instructor-to-student ratio = 6:1). • If with similar time constraint and resources, a trade-off in quality between one-on-one teaching and group teaching would be inevitable. • The design and implementation of an effective distance course required well-educated and experienced instructors who kept breadth of local and international trends of the field. 	<ul style="list-style-type: none"> • Industrious and perseverant attitudes were essential because self-study of pre-class readings (assignments and references) was quite laborious. • Distance learning was tougher than on-campus education because pre-class readings were oftentimes hard to be understood by novice learners.
Perceptions toward course outcomes	<ul style="list-style-type: none"> • Effective teaching and learning <ul style="list-style-type: none"> - Course contents and delivery pace could be tailored to student's motivation, learning responses, available resources, and time slots. • Enhanced course applicability to one's homeland <ul style="list-style-type: none"> - With proper guidance, distance learning allows one to experience homeland's community practices and, hopefully in the future, to pertinently apply principles learnt. 	<ul style="list-style-type: none"> • Learning with flexibility <ul style="list-style-type: none"> - Comprehension of each topic by the flipped approach was better than face-to-face classrooms because the learner was encouraged to study actively and, thus, had learned more. • Learning beyond conventional classrooms <ul style="list-style-type: none"> - The course aims had been extended to include understanding of pharmacies and practices in Macau which would not be an option in regular classes. - Additional extracurricular knowledge was obtained from reading and online interactive discussion.
Issues of uncertainty	<ul style="list-style-type: none"> • Uncertainty about the distance course period <ul style="list-style-type: none"> - Back-to-school date of the full-time overseas student was initially thought to be 'deferred' only, yet, the border control turned out to be effective throughout the whole semester. 	<ul style="list-style-type: none"> • Uncertainty about 'exact' weekly topics <ul style="list-style-type: none"> - Although provided with the syllabus of the on-campus course early on, exact weekly topics and readings might not be assigned until one week prior.

as prerequisites or resources required, perceptions toward course outcomes, and issues of uncertainty. It is obvious that certain prerequisites or resources are required for the smooth implementation of a distance course, especially the flipped classroom type. Both parties expressed satisfactory views toward the course implementation, although effort-demanding. The student stated to have benefited greatly from the course. Correspondingly, the teachers felt quite rewarding. The student's positivity and punctuality might have contributed to these pleasant and worthwhile online interactions. These impressions or comments should be of relevance to future distance course designs.

4. Discussion

The course design, implementation process, weekly topics, and teaching and learning reflections of a novel distance course pertinent to community pharmacy practices or services, and a comparison of main matters among the student's residency and adjacent regions of same cultural tradition have been described. The delivery of teaching was via blended modes, with flipped classroom being the most predominant one. Teacher-to-student ratio of 6 to 1 implied that the pedagogical quality was no less than the conventional classroom teaching. Reflections from both sides in learning and teaching experiences were quite satisfactory.

The flipped (or, reverse/inverse/backwards) classroom is a learner-centered instructional strategy that urges a learner to start learning prior to the beginning of a class (Persky and McLaughlin, 2017). The flipped classroom approach was reported to enhance learning as compared to traditional teaching (Hew and Lo, 2018). However, a meta-analysis

performed by Gillette et al. (2018) found that it required more time to develop. Our reflection of the necessity in prerequisites or resources for smooth implementation of the flipped classroom approach was in line with Gillette et al.'s report. Three online platforms were utilized either in interactive discussions or for synchronous lectures. In fact, these digital social media have been widely utilized amid the era of COVID-19, leading to unpredicted globalization of virtual universities (Hunter, 2015; Rose et al., 2020).

The profession of pharmacy has an important role in public health. Pharmacists are often engaged in health promotion activities in the communities they serve, ranging from counseling services to vaccination roles (Chandra et al., 2003; Mohamed et al., 2013; Petrelli et al., 2019; Shah et al., 2018; Wheeler et al., 2018). Both of our conventional and distance 2020 *OCP* courses had addressed Taiwanese pharmacists' involvement in public health (Ho, 2017; NTU, 2020). Furthermore, we had taken the unforeseen 'centennial' global public health emergency as a special topic to brainstorm pharmacists' roles in the distance course. Interestingly, the COVID-19 pandemic has also spurred intense discussions not only on pharmacy service preparedness but also on experiential education adaptations in the pharmacy society worldwide (Abdel Jalil et al., 2020; Aruru et al., 2020; Basheti et al., 2020; Louiselle et al., 2020).

The distance *OCP* was offered to a single undergraduate student in one semester only. The success of the course would heavily depend on the student's learning attitudes and, hence, outcomes. On the other hand, course participants' views could also be biased by subjective feelings of the few. If either virtual university or flipped classroom is envisioned to

be the norm in the future, the needs of more data gathering and further evaluation of the long-term impacts are absolutely needed. Nonetheless, the teaching experiences gained from this distance *OCP* is valuable to future course preparations, whether conventional or online, in terms of customizing to students' knowledge and cultural background, adding more information about regional community pharmacy practices, and applying flipped classroom adeptly.

5. Conclusion

Community pharmacy practices is a life science of practicality for promoting the public's health and well-being. The *OCP* is one of the core courses relevant to pharmaceutical care in the communities. Online course by flipped classroom approach offered the possibility of learning without interruption even amid the COVID-19 pandemic. As long as the learners are motivated, engaged, and guided by well-prepared instructors, gratifying outcomes could be attained. These new pedagogical strategies may complement traditional teaching methodology in fostering professionals in the ever-changing complex healthcare environment.

Acknowledgments

We thank Szu-Lan Chen and Hui-Chen Hsu for providing secretarial assistance for the distance course. This work was supported by the Ministry of Science and Technology, Executive Yuan, Taipei, Taiwan, R.O.C. (MOST 108-2511-H-002-002).

References

- Abdel Jalil M, Alsous MM, Abu Hammour K, Saleh MM, Mousa R and Hammad EA. Role of pharmacists in COVID-19 disease: A Jordanian perspective. *Disaster Med Public Health Prep.* 2020. [doi: 10.1017/dmp.2020.186]
- Aruru M, Truong HA and Clark S. Pharmacy Emergency Preparedness and Response (PEPR): A proposed framework for expanding pharmacy professionals' roles and contributions to emergency preparedness and response during the COVID-19 pandemic and beyond. *Res Social Adm Pharm.* 2020. [doi: 10.1016/j.sapharm.2020.04.002.]
- Basheti IA, Nassar R, Barakat M, Alqudah R, Abufarha R, Mukattash TL, et al. Pharmacists' readiness to deal with the coronavirus pandemic: Assessing awareness and perception of roles. *Res Social Adm Pharm.* 2020. [doi: 10.1016/j.sapharm.2020.04.020]
- Chandra A, Malcolm N 2nd and Fetters M. Practicing health promotion through pharmacy counseling activities. *Health Promot Pract.* 2003; 4(1): 64–71.
- Cheong CP. Pharmacy education and pharmacy profession in Macau. Department of Pharmaceutical Affairs, Health Bureau, Macau. 15 August 2018 [cited 2020 August]. Available from <https://www.dses.gov.mo/counseling/images/activityinfo/2018/act2018-5/act2018-8-5-2-info.pdf>
- Chinese University of Hong Kong (CUHK). Bachelor of Pharmacy (BPharm), School of Pharmacy, Faculty of Medicine. [cited 2020 September]. Available from <http://www.pharmacy.cuhk.edu.hk/1/education/ug/bpharm/>
- Fauci AS, Lane HC and Redfield RR. Covid-19 – Navigating the uncharted. *N Engl J Med.* 2020; 382(13): 1268–1269.
- Gillette C, Rudolph M, Kimble C, Rockich-Winston N, Smith L and Broedel-Zaugg K. A meta-analysis of outcomes comparing flipped classroom and lecture. *Am J Pharm Educ.* 2018; 82(5): 6898.
- Hew KF and Lo CK. Flipped classroom improves student learning in health professions education: A meta-analysis. *BMC Med Educ.* 2018; 18(1): 38.
- Ho YF, editor. *Guide to Community Pharmacy Practice Experiences* (in Chinese). 4th ed. Taipei; School of Pharmacy, National Taiwan University, 2017.
- Ho Y-F, Huang Y-M, Hsieh L-L, Tsou Y-T and Liu K C-S C. The progress of introductory community pharmacy experiential course at the National Taiwan University (in Chinese). *J Taiwan Pharm.* 2013; 29(2): 2–9.
- University of Hong Kong (HKU). Curriculum and course characteristics, Department of Pharmacology and Pharmacy. [cited 2020 September]. Available from <https://www.pharma.hku.hk/en/Study-With-Us/Bachelor-of-Pharmacy/The-Course/Curriculum-and-Course-characteristics>
- Hunter P. The virtual university: Digital tools for e-learning and remote learning are becoming an increasingly important tool for teaching at universities. *EMBO Rep.* 2015; 16(2): 146–148.
- Line. Free calls & messages. 2020 [cited 2020 February]. Available from <https://line.me/en/>
- Louiselle K, Elson EC, Oschman A and Duehlmeier S. Impact of COVID-19 pandemic on pharmacy learners and preceptors. *Am J Health-Syst Pharm.* 2020; 77(14): 1097–1099.
- Ministry of Education. Suspension of the entry of Hong Kong and Macau students due to the COVID-19 outbreak, announced on February 10 and effective immediately from midnight February 11 [in Chinese]. Taipei, Taiwan, ROC. [cited 2020 August]. Available from https://www.edu.tw/News_Content.aspx?n=9E7AC85F1954DDA8&sms=169B8E91BB75571F&s=49320DFD17E90579#
- Mohamed SS, Mahmoud AA and Ali AA. Involvement of Sudanese community pharmacists in public health activities. *Int J Clin Pharm.* 2013; 35(3): 393–400.
- National Taiwan University (NTU). Course Information, School of Pharmacy, NTU Online. 2020 [cited 2020 August]. Available from <https://no12.aca.ntu.edu.tw/nol/guest/index.php> [https://no12.aca.ntu.edu.tw/nol/coursesearch/print_table.php?course_id=403%2036400&class=&dpt_code=4030&ser_no=52830&semester=108-2&lang=CH]
- Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *Int J Surg.* 2020; 78: 185–193.
- Persky AM and McLaughlin JE. The flipped classroom - From theory to practice in health professional education. *Am J Pharm Educ.* 2017; 81(6): 118.
- Petrelli F, Tiffi F, Scuri S, Nguyen CTT and Grappasonni I. The pharmacist's role in health information, vaccination and health promotion. *Ann Ig.* 2019; 31: 309–315.
- Rose C, Mott S, Alvarez A and Lin M. Physically distant, educationally connected: Interactive conferencing in the era of COVID-19. *Med Educ.* 2020; 54(8): 758–759.
- Sahu P. Closure of universities due to coronavirus disease 2019 (COVID-19): Impact on education and mental health of students and academic staff. *Cureus.* 2020; 12(4): e7541.
- Shah PD, Trogdon JG, Golden SD, Golin CE, Marciniak MW and Brewer NT. Impact of pharmacists on access to vaccine providers: A geospatial analysis. *Milbank Q.* 2018; 96(3): 568–592.
- Tang Y-W, Huang Y-M, Lo Y-H, Chen Liu K C-S, Chen L-J and Ho Y-F. Learning by doing at community pharmacies: Objectives and outcomes. *J Med Education.* 2016; 20(3): 144–153.
- U Meeting. Video meeting and conference. 2020 [cited 2020 July]. Available from <https://u.cyberlink.com/products/umeeeting>
- U Webinar. Online presentation & distance learning. 2020 [cited 2020 May]. Available from <https://u.cyberlink.com/products/uwebinar>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). COVID-19 response. Education: From disruption to recovery – Distance learning solutions. 2020 [cited 2020 August]. Available from <https://en.unesco.org/covid19/educationresponse/solutions>
- Wheeler AJ, Mey A, Fowler JL, Mihala G and Kelly F. A web-based mental health promotion intervention for pharmacy staff to reduce stigmatising and discriminating attitudes. *Health Promot J Austr.* 2018; 29(3): 328–333.
- World Health Organization. WHO coronavirus disease (COVID-19) dashboard. 2020 [cited 2020 August]. Available from <https://covid19.who.int>