

## TLEF Project – Final Report

Report Completion Date: 2019/05/01

### 1. PROJECT OVERVIEW

#### 1.1. General Information

<b>Project Title:</b>	Virtual Patients – Bridging the Gap Between the Classroom and Clinical Pharmacy Practice		
<b>Principal Investigator:</b>	Dr. Karen Dahri		
<b>Report Submitted By:</b>	Dr. Karen Dahri		
<b>Project Initiation Date:</b>	April 2017	<b>Project Completion Date:</b>	April 2019
<b>Project Type:</b>	<input type="checkbox"/> Large Transformation <input checked="" type="checkbox"/> Small Innovation <input type="checkbox"/> Flexible Learning <input type="checkbox"/> Other: [please specify]		

#### 1.2. Project Focus Areas – Please select all the areas that describe your project.

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Resource development (e.g. learning materials, media)                      | <input type="checkbox"/> Student experience outside the classroom (e.g. wellbeing, social inclusion)                   |
| <input type="checkbox"/> Infrastructure development (e.g. management tools, repositories, learning spaces)     | <input checked="" type="checkbox"/> Experiential and work-integrated learning (e.g. co-op, community service learning) |
| <input checked="" type="checkbox"/> Pedagogies for student learning and/or engagement (e.g. active learning)   | <input type="checkbox"/> Indigenous-focused curricula and ways of knowing  |
| <input type="checkbox"/> Innovative assessments (e.g. two-stage exams, student peer-assessment)                | <input type="checkbox"/> Diversity and inclusion in teaching and learning contexts                                     |
| <input type="checkbox"/> Teaching roles and training (e.g. teaching practice development, TA roles)            | <input type="checkbox"/> Open educational resources  |
| <input checked="" type="checkbox"/> Curriculum (e.g. program development/implementation, learning communities) | <input type="checkbox"/> Other: [please specify]   |



### 1.3. Project Summary

In 2017-2018 four Virtual Patient (VP) cases were piloted with Entry-to-Practice Doctor of Pharmacy students in an effort to help students develop their clinical reasoning skills and better prepare them for experiential rotations. In 2018-2019 an additional four VP cases were developed. VPs were introduced as an alternative to paper-based case learning opportunities and offer students the opportunity to engage in a virtual patient assessment which includes assessing the ‘patient’, gathering information, identifying drug therapy problems, and then making recommendations to optimize medication management. VPs offer students the opportunity to apply their knowledge in a safe environment and receive in-the-moment feedback.

### 1.4. Team Members – Please fill in the following table and include students, undergraduate and/or graduate, who participated in your project.

Name	Title/Affiliation	Responsibilities/Roles
Fong Chan	Lecturer, Faculty of Pharmaceutical Sciences	Project development and evaluation
Kathy Seto	Senior Instructor, Faculty of Pharmaceutical Sciences	Project development and evaluation
Janice Yeung	Director & Lecturer, Office of Experiential Education, Faculty of Pharmaceutical Sciences	Project development and evaluation
Min Ji Seo	Student, Faculty of Pharmaceutical Sciences	Provided student perspective on grant application and project development
Jill Proudfoot	Student, Faculty of Pharmaceutical Sciences	Undergraduate teaching assistant hired to work on case uploading and implementation
Renee Dagenais	Post-graduate Doctor of Pharmacy Student, Faculty of Pharmaceutical Sciences	Undergraduate teaching assistant hired to work on case development
Mattie Bakker	Student, Faculty of Pharmaceutical Sciences	Directed studies student that worked on developing the study protocol for the first year evaluation of the project
Emilie Lamoureux	Student, Faculty of Pharmaceutical Sciences	Directed studies student that worked on the evaluation of the first year of the project; was responsible for administering the surveys that evaluated the project and analyzing the data Provided student perspective on grant application and project development
Kevin Hong	Student, Faculty of Pharmaceutical Sciences	Provided student perspective on grant application and project development
Jon-Paul Marchand	Director, Educational Technology and Learning Designs, Faculty of Pharmaceutical Sciences	Second year project development and evaluation



Jason Min	Lecturer & Interprofessional Education Co-lead, Faculty of Pharmaceutical Sciences	Second year project development and evaluation
Suki Gill	Student, Faculty of Pharmaceutical Sciences	Directed studies student that worked on developing the study protocol that was used for the second year evaluation of the project
Diana Varga	Student, Faculty of Pharmaceutical Sciences	Directed studies student that was responsible for administering the surveys and analyzing the data used to evaluate the second year of the project
Kimberly MacNeil	PhD Student, Faculty of Education, UBC	Graduate research assistant in the second year of the project
Morgan Garvin	Educational Technology and Learning Designs	Technology support

**1.5. Courses Reached** – Please fill in the following table with **past**, **current**, and **future** courses and sections (e.g. HIST 101, 002, 2017/2018, Sep) that have been/will be reached by your project, including courses not included in your original proposal (you may adapt this section to the context of your project as necessary).

Course	Section	Academic Year of First Exposure	Term (Summer/Fall/Winter)
PHRM 111	All	2017	Jan
PHRM 161	All	2019	Jan
PHRM 171	All	2018	May
PHRM 211	All	2017	Sep
PHRM 212	All	2019	Jan
PHRM 251	All	2018	Jan
PHRM 271	All	2018	May
PHRM 272	All	2018	May
PHRM 311	All	2017	Sep
PHRM 371	All	2018	May
PHRM 405	All	2017	May
PHRM 420	All	2018	May
PHRM 471	All	2019	Sept
PHRM 472	All	2019	Sept
PHRM 473	All	2019	Sept



2. OUTPUTS AND/OR PRODUCTS

2.1. Please list project outputs and/or products (e.g. resources, infrastructure, new courses/programs). Indicate the current location of such products and provide a URL if applicable.

Product(s)/Achievement(s):	Location:
Virtual Patient Case – Clostridium difficile	
Virtual Patient Case – Chronic Obstructive Pulmonary Disease	
Virtual Patient Case – Deep vein thrombosis	
Virtual Patient Case – Heart Failure	
Virtual Patient Case – Type II Diabetes	
Virtual Patient Case – Gastrointestinal Bleeding	
Virtual Patient Case – Schizophrenia	
Virtual Patient Case - HIV	

2.2. Item(s) Not Met – Please list intended project outputs and/or products that were not attained and the reason(s) for this.

Item(s) Not Met:	Reason:
Separate website to host cases	Our Education Technology and Learning Designs members were able to allow students direct access to the cases within their required courses utilizing Canvas. They had issues when they had attempted this with Connect which was why we had planned for the website to host the cases.

3. PROJECT IMPACT

3.1. Project Impact Areas – Please select all the areas where your project made an impact.

- Student learning and knowledge
- Student engagement and attitudes
- Instructional team teaching practice and satisfaction
- Student wellbeing, social inclusion
- Awareness and capacity around strategic areas (indigenous, equity and diversity)
- Unit operations and processes
- Other: [please specify]



**3.2. What were you hoping to change or where were you hoping to see an impact with this project? – Please describe the intended benefits of the project for students, TAs, instructors and/or community members.**

- Creation of eight interactive cases focused on different medical conditions
- An instructional presentation for students on how to best utilize the VPs and the VIC player
- Four student research directed studies projects evaluating the use of the virtual patients in the curriculum
- Support students to develop their clinical reasoning skills
- Support students to develop their confidence for assessing real patient in their experiential rotations
- Support students to apply clinical reasoning skills in their experiential rotations

**3.3. Were these changes/impacts achieved? How do you know they occurred? – What evaluation strategies were used? How was data collected and analyzed? You are encouraged to include copies of data collection tools (e.g. surveys and interview protocols) as well as graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.**

To assess the impact of both the 2017-2018 (Year 1) and 2018-2019 (Year 2) VP cases we conducted surveys. In Year 1 we also conducted 1 focus group. To analyze the data in both years we engaged in both quantitative analysis of Likert-style survey questions and qualitative thematic analysis of students' open-ended responses.

In Year 1 (2017-2018), we wanted to get a sense of students' perceptions related to: 1) the benefit of using VP cases; 2) the conditions of implementation (e.g., timing); 3) and their overall experience of using VP cases. See Tables 1, 2, & 3 for a summary of our findings from Year 1 of our project.

Briefly, what we found was that over 90% of 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> year students felt VP sessions were a valuable learning experience. In terms of conditions of implementation, first we learned that students preferred that they engage with VP cases in smaller-group, interactive, and facilitated settings rather than in a large, lecture-based settings. Second, students preferred VP cases that were timed to coincide with relevant content learning rather than after a two-month lag between the two. In terms of the experience of using VP cases, we learned that students found specific aspects of VP cases particularly helpful such as the realism of the documentation within VP cases as well as the interactivity of the platform. Further, students described feeling engaged during VP cases which allowed them to take on an active role in their learning. For example, in a focus group one 2<sup>nd</sup> year student said:

It feels that you are more in charge of solving a real problem and you feel rewarded if you solve the problem and you become motivated to be more involved in the patient's therapeutics, in a team or even individually, and it is rewarding. It makes you want to...learn more and go in-depth more and it is you who decides if you want to look at the chest x-ray for example or a lab result...it helps the learning process.

Below, we have attached summary tables of Year 1 findings:

**Table 1.** Year 1 (2017-2018): Student population and response rates

	<b>PY1 Students</b>	<b>PY2 Students</b>	<b>PY3 Students</b>
<b>Survey participants</b>	82 (38%)	78 (35%)	20 (9.9%)
<b>Focus group participants</b>	0	6	0
<b>Total number of students</b>	215	221	203

**Table 2.** Year 1 (2017-2018): Survey of student perceptions regarding VP cases

	<b>Survey Question</b>	<b>Survey Answer</b>	<b>PY1 N = 82</b>	<b>PY2 N = 78</b>	<b>PY3 N = 20</b>
<b>Value</b>	Overall, I felt that the incorporation of VPs was a valuable learning experience.	SA/A	N (%) 74 (90)	N (%) 78 (100)	N (%) 18 (90)
	I would like to have the VP cases incorporated into future courses.	Yes	56 (68)	77 (99)	20 (100)
	I preferred the VP case over paper-based cases.	SA/A	49 (60)	66 (85)	19 (95)
	I found the VIC system easy to use.	Agree	71 (87)	71 (91)	19 (95)
	I felt engaged while working through the case.	SA/A	67 (82)	77 (99)	19 (95)
	The feedback given after the VP case was helpful.	Agree	74 (90)	72 (92)	18 (90)
<b>Implementation</b>	The class setting in which I experienced the VP case was appropriate.	Yes	78 (95)	78 (100)	11 (55)
	The amount of time that was given to complete the VP case was appropriate.	Agree	73 (89)	68 (87)	14 (70)
	The timing of the case seemed logical based on what was being taught at the time in lecture and other courses.	Agree	39 (48)	78 (100)	18 (90)
	I had enough knowledge about the subject to answer the questions regarding the VP case.	SA/A	65 (79)	72 (92)	12 (60)
	The degree of difficulty of the case was appropriate.	Agree	67 (82)	75 (96)	18 (90)
<b>Benefits</b>	The VP case helped me to learn more about the main medical conditions in the case.	SA/A	57 (70)	68 (87)	18 (90)
	The VP case helped me to develop my clinical reasoning skills.	SA/A	64 (78)	76 (97)	19 (95)
	I went back into the VIC system and accessed the case a second time for study purposes.	Yes	35 (43)	35 (45)	6 (30)

SA/A = strongly agree/agree; Five-point Likert scale answer options: strongly agree, agree, neither agree nor disagree, strongly disagree



Table 3. Year 1 (2017-2018): Thematic analysis results.

Theme	Codes
<b>Helpful Elements</b>	<ul style="list-style-type: none"> <li>Realistic</li> <li>Safe</li> <li>Helpful feedback</li> <li>Clear and accessible</li> <li>Comprehensive</li> <li>Engaging</li> </ul>
<b>Benefits to Learning</b>	<ul style="list-style-type: none"> <li>Solidified learning</li> <li>Exposure to real-world documents and experiences</li> <li>Process-based experience</li> </ul>

Given that the goal of VP cases was to help students build clinical reasoning skills and prepare for real-life practice, in Year 2 (2018-2019) we followed-up with students who had been surveyed in 2017-2018 to see how they were making links between what they learned through their first year VP cases and their Summer 2018 experiential rotations (see Table 4). We had a response rate of 20% (n=43) for the online follow-up survey. What we found was that 84% of students agreed/strongly agreed (A/SA) that VP cases helped them to develop their clinical reasoning skills. Most commonly identified themes related to this benefit included learning how to identify necessary information (e.g., patient assessment results) and using a systematic approach by focusing on their process of clinical reasoning as opposed to, for example, focusing on the end outcome of a correct response. However, students were less likely to state that VP cases helped them to: organize their thought process for patient assessments (51% A/SA); improve their confidence when assessing patients during inpatient experiential rotations (49% A/SA); and feel more prepared for their inpatient experiential rotations (67% A/SA). Through analyzing students’ open-ended responses, we learned that students described limitations of the program to capture the complexity and multi-dimensionality of real-world practice. Students suggested that having more practice using VP cases might be helpful in preparing them for their experiential rotations and increased guidance for completing cases. Overall these findings lead us to want to know more about how to help students connect their learning through VP cases to real life practice.

**Table 4.** 3<sup>rd</sup> Year Student Responses: Impact of VP Cases on Experiential Rotations

Survey Question	Strongly Agree	Disagree	Neutral	Agree	Strongly Agree
Completing the virtual patient cases prior to my hospital experiential rotation helped me to organize my thought process (ex. NESA) for patient assessments.	0	5 (11.6%)	16 (37.2%)	19 (44.2%)	3 (7.0%)
The virtual patient cases helped me to develop my clinical reasoning skills*. <i>*Clinical reasoning skills relate to recognizing and analyzing relevant patient information, identifying drug therapy problems including making recommendations for resolution, and plans to ensure continuity of care.</i>	0	0	7 (16.3%)	32 (74.4%)	4 (9.3%)
The virtual patient case helped to improve my confidence when assessing patients during my hospital experiential rotation.	0	9 (20.9%)	13 (30.2%)	16 (37.2%)	5 (11.6%) <sup>1</sup>
The virtual patient case helped me feel more prepared for my hospital experiential rotation.	1 (2.3%)	4 (9.3%)	9 (20.9%)	26 (58.1%)	4 (9.3%)

We continue to study VP cases from a scholarly perspective and are thankful for the strong start we have obtained through TLEF funding.

**3.4. Dissemination** – Please provide a list of **past** and **upcoming** scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have shared information regarding this project.

**Publications:**

Dahri, K., MacNeil, K., Chan, F., Lamoureux, E., Baker, M., Seto, K., Yeung, J. (2019). Virtual Patients – Bridging the Gap Between the Classroom and Clinical Pharmacy Practice. *Manuscript submitted for publication to Currents in Pharmacy Teaching and Learning.*

**Presentations:**

Invitation received to present project as showcasing innovation at our Faculty at the Canadian Pharmacy Education and Research Conference scheduled for June 11-14<sup>th</sup> 2019.

**Posters:**

Dahri K, MacNeil K, Chan F, Lamoureux E, Bakker M, Seto K, Yeung J. Virtual Patients – Bridging the Gap Between the Classroom and Clinical Practice. Evaluation of Year 1. Canadian Society of Hospital Pharmacists Professional Practice Conference, Toronto, Canada, 2018-02-03.

Dahri K, Chan F, Seo MJ, Seto K, Yeung J. Virtual Patients – Bridging the Gap Between the Classroom and Clinical Pharmacy Practice. Teaching and Learning Enhancement Fund Showcase, Vancouver, Canada, 2018-05-03, Poster.



**Submitted:**

Connecting a Simulated Virtual Patient Program with Real-Life Clinical Placements: Perspectives from Year 3 Students at the University of British Columbia for poster presentation at the Canadian Pharmacy Education and Research Conference scheduled for June 11 – 14<sup>th</sup> 2019.

**4. TEACHING PRACTICES** – *Please indicate if **your** teaching practices or those of **others** have changed as a result of your project. If so, in what ways? Do you see these changes as sustainable over time? Why or why not?*

The incorporation of the virtual patients into the curriculum have provided myself and others with an additional modality to use in the classroom. Instead of relying on linear paper-based cases we can make use of the virtual patient cases that offer the students a more dynamic experience. These cases are facilitated differently than a linear paper-based case in that the students are given time to independently work through the case with the instructor interjecting at the end to discuss their findings. It also has offered an additional method that students can use to review the material that was taught in class and to assess their learning of the material. I do see these changes as sustainable over time as the use of virtual patients does not represent a significant burden to the instructors that use them.

**5. PROJECT SUSTAINMENT** – *Please describe the sustainment strategy for the project components. How will this be sustained and potentially expanded (e.g. over the next five years). What challenges do you foresee for achieving the expected long-term impacts listed above?*

The Educational Technology and Learning Designs within our Faculty have taken over the technology aspects of maintaining the cases. In addition, we have actively integrated the virtual patient cases within the curriculum. The different cases are now contained within the modules with both the Module Leads and Integration Activities Leads aware of how best to facilitate their use. The main challenge we foresee will be to maintain the integrity of the cases content. The virtual patients reflect the best evidence base practice that is currently available. If any changes to this occur, then there will be a need to update the cases to reflect the changes in practice to ensure that the cases remain relevant to the students.