THE UNIVERSITY OF BRITISH COLUMBIA Report

Large TLEF Project – Final Report

Report Completion Date: (2018/08/31)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	Developing the formative assessment program of the new undergraduate entry-to-practice PharmD curriculum
Principal Investigator:	George Pachev
Report Submitted By:	George Pachev and Natalie LeBlanc
Project Initiation Date: April 2016	**Project Completion Date:** August 2018

1.2. Project Summary

August 2018 marks the completion of this two year project concerned with the development, implementation, and evaluation of the formative assessment (FA) program for Years 2 (PY2: 2016/17) and 3 (PY3: 2017/18) of the Faculty of Pharmaceutical Science's new undergraduate entry-to-practice (E2P) Doctor of Pharmacy (PharmD) program.

The new Doctor of Pharmacy curriculum, launched in 2015, employs contemporary learning-centered and competency-based education principles, and team-taught integrated modules based on disease-states and/or body systems in place of traditional discipline-based courses. This approach demanded for a re-conceptualization of the assessment program to enhance student achievement through on-going, flexible learning opportunities, and to provide support for self-directed learning.

Using blended learning models, the formative assessment (FA) program, in the form of Checkpoints (CP's), was conceptualized to provide strategic support and direction for student learning through frequent opportunities to apply knowledge in authentic contexts. Within a typical week, regular CP's support different educational objectives as content knowledge unfolds and as skill development requires. CP's also afford multiple chances for students to practice, self-assess, and receive immediate feedback.

Our goals for this project were to:

- Develop, implement, and evaluate the formative assessment (FA) program for Years 2 (PY2: 2016/17) and 3 (PY3: 2017/18) of the Faculty of Pharmaceutical Science's new undergraduate entry-to-practice (E2P) Doctor of Pharmacy (PharmD) program. This included:
  - Creating a bank of FA questions, tasks, and feedback related to the professional, practice-relevant aspects of topics for PY2 and PY3;
  - Developing a repository of cases for the disease-states/body-systems that provide an authentic, professional context for FA Questions; and

o   Performing a close monitoring of the FA program administration through course and module reports; analysis of FA effectiveness for PY2 and PY3 through data analytics and research studies; and disseminate research findings.

1.3. Team Members – *(Please fill in the following table and include __students__, undergraduate or graduate, who participated in your project).*

Name	Title/Affiliation	Responsibilities/Roles
Dr. George S. Pachev	Lecturer and Director, Office of Educational Assessment, Pharmaceutical Sciences	Primary Investigator; Provided guidance and consultation on all aspects of the project; Guided the design and execution of evaluation of FA program; Assisted in the data collection and analyses.
Dr. Simon Albon	Professor of Teaching, Pharmaceutical Sciences	Project Team Member; Provided consultation for all aspects of the project.
Dr. Marion Pearson	Professor of Teaching, Entry-to-Practice Programs Director, Pharmaceutical Sciences	Project Team Member: Provided consultation for the project.
Dr. Arun Verma	Senior Instructor, PharmD Program Integration Activities Lead, Pharmaceutical Sciences	Project Team Member; Subject Matter Expert; Provided consultation for all aspects of the project; Facilitated contact with clinical instructors..
Dr. Natalie LeBlanc	Postdoctoral Research Fellow, Pharmaceutical Sciences and Faculty of Education	Project Lead: 1) provided project coordination; 2) liaised with module development teams; 3) provided direction and supervision to summer students on FA development, and; 4) provided direction and monitoring of the evaluation activities.
Ian Galna	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY2
Christina Lee	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY2
Michelle Durand	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY2
Bill Huang	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY2 and PY3
Nevena Rebic	Student hire/Undergraduate Academic Assistant (UAA), supplemented by the Work Learn (WL) program	Research assistant; Assisted in the collection and analysis of evaluation data
Jonathan Loong	Student hire/Undergraduate Academic Assistant (UAA), supplemented by the Work Learn (WL) program	Developed question bank and tutorial; populated the bank; developed formative assessment questions for PY1, PY2 & PY3; inventoried Care Plans and Drug Information Requests cases
Mattie Bakker	Student hire/Undergraduate Academic Assistant (UAA), supplemented by the Work Learn (WL) program	Developed formative assessment questions for PY3

Tina Wong	Student hire/Undergraduate Academic Assistant (UAA) supplemented by the Work Learn (WL) program	Developed formative assessment questions for PY3
Claire Dixon	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY3 and inventoried Care Plans and Drug Information Requests cases
Elizabeth Ratcliffe	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY3 and inventoried Care Plans and Drug Information Requests cases
Lorenzo Ledesma	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY3
Amanda Driver	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY3
John Groumoutis	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY3
Garrett Tang	Student hire/Undergraduate Academic Assistant (UAA)	Developed formative assessment questions for PY1, and inventoried Care Plans and Drug Information Requests cases

1.4. Student Impact – *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 impacted by your project, including any courses not included in your original proposal (you may adapt this section to the context of your project as necessary).*

Course	Section	Academic Year	Term (Summer/Fall/Winter)
PHRM 100	2 sections	2018/19 (and ongoing)	Fall
PHRM 111	1 section	2017/18 (and ongoing)	Winter
PHRM 211	2 sections	2016/17, 2017/18 (and ongoing)	Fall
PHRM 212	2 sections	2016/17, 2017/18 (and ongoing)	Winter
PHRM 251	2 sections	2016/17, 2017/18 (and ongoing)	Winter
PHRM 311	1 section	2017/18 (and ongoing)	Fall
PHRM 312	1 section	2017/18 (and ongoing)	Winter

2. PRODUCTS & ACHIEVEMENTS

2.1. Products and Achievements – *Please __update__ project products and achievements as necessary. Indicate the current location of such products and provide an URL if applicable.*

Product(s)/Achievement(s):	Location:
Created a bank of FA questions, tasks, and feedback related to the professional, practice-relevant aspects of topics for PY1, PY2 and PY3. The Databank identifies corresponding AFPC competencies (See Appendix A.1 for competency model).	Custom Question Databank > Office of Educational Assessment
Developed a repository of cases for the disease-states/body-systems that provide an authentic, professional context for FA Questions.	Shared Sync Folder > Office of Educational Assessment
Performed a close monitoring of the FA program administration through course and module reports and analysis of FA effectiveness for PY2 and PY3 through data analytics and research studies.	See project evaluation (Section 3)
Conference (Peer Reviewed) Presentations	LeBlanc, N., Pachev, G., Verma, A., & Albon, S. (2018, October). "A Comparison of the Function and Impact of Formative Assessments in UBC's E2P PharmD Program". Centre for Health Education Scholarship (CHES), The University of British Columbia, Vancouver, BC., October 3, 2018. [forthcoming] LeBlanc, N., Pachev, G., Verma, A., & Albon, S. (2018, June). "A Comparison of the Function and Impact of Formative Assessments in UBC's E2P PharmD Program." The Canadian Pharmacy Education and Research Conference (CPERC), Ottawa, ON., June 12-14, 2018. LeBlanc, N., Pachev, G., Verma, A., & Albon, S. (2017, October). "Evaluating the Function and Impact of Formative Assessments in UBC's E2P PharmD Program." Centre for Health Education Scholarship (CHES) Celebration of Scholarship, Robert H. Lee Alumni Centre, The University of British Columbia, Vancouver, BC., October 4, 2017. LeBlanc, N., Pachev, G., & Albon, S. (2017, June). "Examining the impact of formative assessment question-generation on student learning." The joint Association of Faculties of Pharmacy of Canada (AFPC) Canadian Pharmacy Education and Research

	Conference (CPERC) and the CPhA Canadian Pharmacists Conference (CPC), Quebec City, QC., June 2-6, 2017. LeBlanc, N., Pachev, G., Verma, A., & Albon, S. (2017, June). "Evaluating the function and impact of formative assessments in UBC's E2P PharmD program." The joint Association of Faculties of Pharmacy of Canada (AFPC) Canadian Pharmacy Education and Research Conference (CPERC) and the CPhA Canadian Pharmacists Conference (CPC), Quebec City, QC., June 2-6, 2017.
Meeting Presentations	LeBlanc, N., Pachev, G., Verma, A., & Albon, S. (2018, May). "Developing the Formative Assessment Program for the new Entry-to-Practice (E2P) PharmD Curriculum, Year 2." Teaching and Learning Enhancement Fund (TLEF) Showcase, Celebrate Learning Week, Earth Sciences, University of British Columbia, Vancouver, BC., May 3, 2018. LeBlanc, N., Pachev, G., Albon, S., Pearson, M., & Verma, A. (2017, May). "Developing the formative assessment program for the new entry-to-practice (E2P) PharmD curriculum." Teaching and Learning Enhancement Fund (TLEF), Celebrate Learning Week, The University of British Columbia, Vancouver, BC., May 4th, 2017.
Papers (peer reviewed) in progress	LeBlanc, N., Pachev, G., Verma, A., & Albon, S. "Examining the Impact of Question-Generation on Student Learning." A research paper to be submitted to *The Canadian Journal for the Scholarship of Teaching and Learning* (draft 60% completed) Pachev, G., Verma, A., LeBlanc, N., & Albon, S. (2018, June). "A Comparison of the Function and Impact of Formative Assessments in UBC's E2P PharmD Program." A research paper to be submitted to *The American Journal of Pharmaceutical Education* (draft 40% completed)

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

Item(s) Not Met:	Reason:
The development of the FA blueprint for PY2 and PY3, identifying specific FA types and formats; developing a schedule of administration; and determining required feedback.	The FA map was developed by PY2 & PY3 Assessment Managers, wherein a master assessment schedule for each Medication Management course dictated when Formative Assessments (Checkpoints) could be launched – in-between and in preparation for –Summative Assessments and directly linking with course/module topics. Based on this information, and in discussion with the appropriate Module Lead, types and formats of FA questions and necessary feedback was determined in dialogue with the PL/TLEF team. This discussion was crucial in determining the discipline breakdown of questions (i.e. pathophysiology, pharmacology, therapeutics, and medicinal chemistry), and the quantity of questions needed for each.

FA question review and sign-off by course coordinators and module leaders/content experts for *all modules* in PY2 and PY3.	Not all Module Leads (3/11) bought into the idea of having students generate FA questions. Therefore, the TLEF team spent time and focus on the topics in which Module Leads supported student-generated items (see breakdown of Modules not included below).
	In addition to 8 (total) modules in PY2 and PY3, student-generated items were developed and utilized in PHRM 251 (PY2 course outside of Medication Management), and PHRM 100 and PHRM 111 (PY1 courses).
	1/5 Modules in PY2 did not utilize student-generated questions, which included:
	• *Cardiovascular (included in student-generated question bank, included in program evaluation)*
	2/6 Modules in PY3 did not use student-generated questions, which included:
	• *Oncology (excluded from student-generated bank, included in program evaluation)*
	• *Toxicology (included in student-generated bank, not included in program evaluation)*

3. PROJECT EVALUATION

3.1. Project Outcomes – *Please list the intended outcomes or <u>benefits of the project</u> for students, TAs and/or instructors.*

The project has benefited PharmD students, instructors in the program, and the Undergraduate Academic Assistants (UAA's) – both in the BSc in Pharmacy program and the PharmD program – hired to develop the FA questions. Therefore, the benefits of the project were threefold:

1. Materials developed in the project were used in PY1, PY2 and PY3 of the PharmD assessment program, therefore impacting student learning in direct and purposeful ways. Benefits for students included: access to an expanded scope of learning opportunities and activities, tailored to enhance and support learning in the curriculum; access to educationally effective FAs; immediate feedback on performance and knowledge gaps; and opportunities to engage in context-specific learning opportunities that are relevant to the education of pharmacists. From our examinations implemented in PY2 and PY3, FA's have enhanced students' learning and through our research studies, it appears that the FA program has fulfilled its function for most of the modules.

2. Having advanced students create the FA items helped save time for faculty. Feedback by faculty has been encouraging. Many module leads found the questions to be of good quality and helped when developing assessment materials for the content they were organizing. Additional benefits to faculty instructors included: enhanced understanding of contemporary learning-centered approaches to curriculum and pedagogical practice, particularly the role of FA in student learning; the creation of coherent course/module curriculum designs that link FA with student learning; and opportunities to improve teaching practice based on the impact of FAs on student performance.

3. The project greatly contributed to UAA's learning who frequently articulated how the project helped them review content while learning new material and/or material that was covered in less detail in their own curriculum. The benefits for UAA's included: opportunities to engage in and experience educational-development practices; develop teamwork skills as a development team member and to take an active role in curriculum development; to learn about assessment practices and the critical role assessment plays in student learning; to develop and practice mentorship, peer learning and team communication skills as development team members; and contribute to the Faculty and the profession. A study on the impact of UAA learning is currently underway (See Sections 3.2 & 3.3 for more detail).

3.2. Findings – *Please describe <u>the findings of your project evaluation effort: to what extent were intended project outcomes achieved or not achieved?</u> You are encouraged to include both graphical representations of data as well as scenarios or quotes to represent key themes.*

1. Student Response

Evaluation of the FA Program was conducted through end-of-module reports in which we studied the degree to which CPs fulfilled their intended functions (i.e. practice, self-assessment, study guidance), and the extent to which students' use of CPs was conducive to learning (see Figure 1).
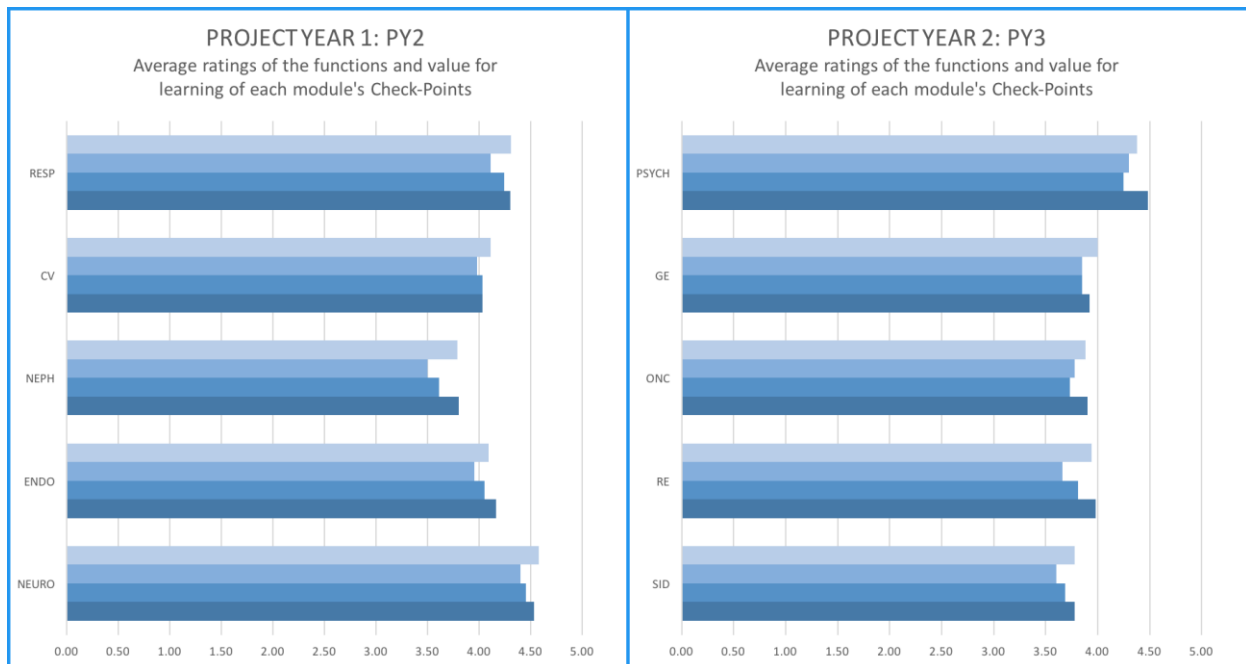

Figure 1. Students' evaluation of the CPs in PY2 (left) and PY3 (right)

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Students overall agreed that the CPs enhanced their learning and that the CPs fulfilled their functions for most of the modules. The majority of respondents to the end-of-term course survey agreed that the CPs provided a good opportunity to practice material, helped identify areas of strength and areas needing improvement, and helped direct and support learning.

In order to explore potential relations with exam performance, a comparison of students' use of the CP's were recorded (see Fig. 2). Students were grouped for each module based on the frequency of use: once only, twice, and frequently (see Fig. 3).

Module	# of CPs	Mean # of Attempt	Mean time per attempt (hh:mm:ss)	Total time on-line	Module	# of CPs	Mean # of Attempt	Mean time per attempt (hh:mm:ss)	Total time on-line
RESP	5	2.10	00:24:15	01:58:16	PSYCH	5	1.55	0:14:59	1:00:21
CV	8	1.61	00:13:50	01:47:30	GE	5	1.41	0:12:22	0:56:01
NEPH	3	1.58	00:24:00	01:05:40	ONC	3	1.37	0:14:12	0:39:59
ENDO	4	1.52	00:17:07	01:03:27	RE	4	1.39	0:09:54	0:35:22
NEURO	5	1.58	00:22:50	01:46:17	SID	3	1.31	0:22:16	0:57:09

Figure 2. Students' use of the CPs in PY2 (left) and PY3 (right)
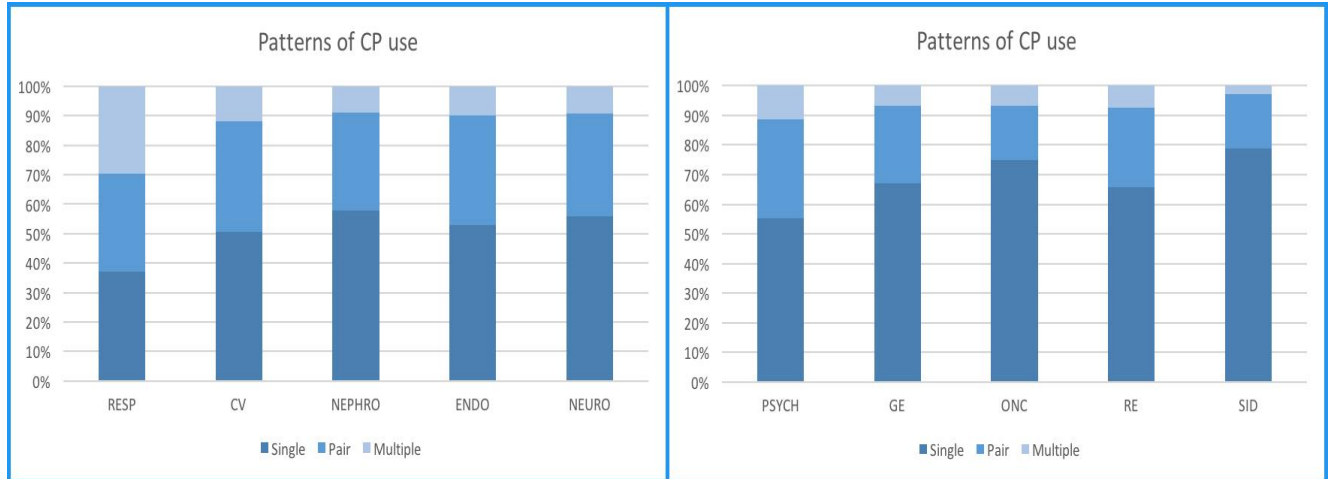

Figure 3. Percentage of class accessing each module's CPs, Once only, twice, frequently
PY2 (left) and PY3 (right)

In five modules evaluated in each PY2 and PY3, student respondents agreed that the CPs enhanced their learning and fulfilled their functions. Majority of respondents agreed that the formative assessments covered the relevant material, provided effective practice, helped them keep-up, and identify learning gaps. For some modules, doing the FAs more often contributed to higher scores on the summative measures (see Fig. 4).

Module	Summative Measure	Module	Summative Measure
CP USE RESP	.185**	CP USE PSYC	.169*
CP USE CV	.170*	CP USE GE	.114*
CP USE NEPH	.024	CP USE ONC	.062
CP USE ENDO	.039	CP USE RE	.129*
CP USE NEURO	.180*	CP USE SID	.118*

Figure 4. Correlations of CP-use patterns with summative measures of performance, PY2 (left) and PY3 (right)

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Analysis of students' narrative comments further supported ways in which CPs fulfilled their intended functions (i.e. practice, self-assessment, study guidance). For example, some comments were:

1. *"Checkpoints were well done, they focused on key concepts and reinforced learning objectives. They provided valuable practice of lecture material."*
2. *"I found the checkpoints to be very helpful and indicative of exam material covered. It was also especially helpful that the answers for the most part also had feedback as well, which was more helpful to guide studying.*
3. *"The checkpoints are the best way for me to check to see if I am understanding key instructional matters and where I can improve."*
4. *"I really enjoyed having the checkpoints open for the length of the module so that I could use them to first guide my studying, and then to test my knowledge."*

Students' in PY2 and PY3 suggested ideas for program improvement (*n=155*), such as: adding more questions; adding more content-specific questions; increasing their difficulty; broadening questions formats from multiple choice to short answer and case-based scenarios; changing release dates; improving technological functions (i.e. images of molecular structures); better alignment with course material and summative assessments; and providing more consistent feedback. Further analysis of student comments demonstrated FA program improvement between project years in some of these areas. For example, students commented:

1. *"I liked how the checkpoints were longer than last year's, giving us more opportunity to practice."*
2. *"I enjoyed that there were more case-based questions in the checkpoints!"*
3. *"The checkpoints this year are a lot more reflective of the level of difficulty for the quizzes and End-of-Blocks compared to last year."*

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2. Faculty Feedback

Overall, Module Leads were appreciative of the help and support that the TLEF project facilitated in the development of student-generated questions. For example, Dr. Judith Soon (Module Lead for RH/SH/GU) commented that the student generated questions were highly "informative," "thoughtful," "meaningful" and "pertinent." Working one-on-one with several UAA's for the development of questions for PY3, Dr. Soon was very impressed with the way students structured the questions, finding the content "insightful," and the choice of answer options "very appropriate." Dr. Janice Moshenko (Module Lead for GI), found the CP questions "well-written," whereas Dr. Tessa Nicol (Module Lead for Neurology and Psychiatry) found many items "excellent," opting to use surplus FA items in summative assessments.

Concerning questions generated for PY2, Dr. Fong Chan (PHRM 251) commented that "the students were a tremendous help in developing assessment questions" whereas Prof. Judith Marin, an instructor for the Nephrology Module, noted that the students did "a great job" on the questions for several of her topics, giving her many ideas for summative items that she later developed.

Some instructors in PY3 offered ideas for moving forward with utilizing student-generated assessment items in the future. One suggestion was to recruit graduate students to help develop questions for highly specialized topics requiring more clinical expertise (i.e. PHRM 311 & 312). For example, Prof. Janice Leung commented that, "it is very difficult for [undergraduate students] to create these assessments given their limited clinical experience in working with these types of patients or clinical scenarios." In this case (special infectious diseases module), the instructor created these assessment items but appreciated the student starting the framework for her. As this demonstrates, some instructors/lecturers/clinicians created the FA items for their topic(s) and the UAA's helped when and where necessary by beginning the structure, adding references, creating distractors, writing feedback, and/or organizing the question bank for faculty.

Several MLs (in both PY2 & PY3) reviewed student-generated items and selected questions for inclusion in the FA program when they aligned with lesson-specific-objectives. For some modules, the lesson-specific objectives were developed *after* the question-development phase took place and in some instances, this could not be avoided. During project year 1, we modified our workflow to better accommodate the course/module development teams by hiring several UAA's during the school year. In this way, students could continue generating FA questions as the course and/or module topics/objectives were being developed (see Appendices A.2 and A.3). Appendix A.2 represents the linear chronological methodology that we envisioned prior to project year 1, which functioned on the premise that all questions would be completed before the start of each course (i.e. 211/Fall, 212/Winter, 311/Fall, 312/Winter). Appendix A.3 represents the cyclical process that we developed during project year 1 and prior to project year 2, which ensured that questions were completed by the start of each *module* (i.e. psychiatry, gastroenterology, reproductive health, special infectious diseases). Building from knowledge gained in project year 1, this modified work

flow allowed us to better tailor questions for FA program inclusion. Coupled with early faculty engagement, this enabled us to break the process of development into subsequent cycles, creating more opportunities for review and revision. Student-generated questions not included in the FA program have been banked for future use.

Further to previous comments, some MLs selected student-generated items for use in summative assessments, including quizzes, end-of-block exams (EoB's), and supplemental exams (i.e. nephrology, neurology, psychiatry, and gastroenterology). At the request of some ML's, all UAA's were asked to fill out a confidentially agreement, ensuring summative assessment protection (see Appendix A.4). Identification of student-generated questions used (and how) has been well documented. PharmD Assessment Managers have integrated the student-generated question bank into their current workflow, providing further support for future iterations of modules/courses.

3. Impact of Question-Development on UAA's Learning

Advanced undergraduate pharmacy students hired as undergraduate academic assistants (UAA's) researched topics, compiled resources, created, reviewed and refined FA questions for subject areas including respirology, cardiovascular, nephrology, endocrinology, neurology, psychiatry, gastroenterology, reproductive/sexual health, special infectious diseases, and toxicology.

As an extension of this grant, we are examining the UAAs process of developing FA questions to study the impact that question-generation had on their own learning. Our initial findings are demonstrating that question-generation has had multiple benefits for UAAs including opportunities to: 1) review previously learned material; 2) add to existing knowledge; 3) develop deeper understanding of topics/content; 4) develop higher order thinking skills; 5) generate more diverse and flexible approaches to thinking and problem-solving; and 6) become more involved in (and in control of) their own learning.

One of our most significant findings is that UAAs developed a greater appreciation for the challenges professors face regarding question-creation. Throughout the process, UAA's were anxious about how their lack of understanding in certain areas (e.g., nephrology, special infectious diseases, and toxicology) impacted their ability to create suitable questions and they realized the importance of expert knowledge. Overall, the project has helped UAAs construct personal knowledge through the employment of various cognitive and metacognitive learning strategies and by engaging in reflective and reflexive processes of learning –skills that we feel are necessary for becoming life-long learners.

UAA's provided the following comments on the value of developing formative assessment questions:

1. *"I learned that it's a lot more difficult to create content questions that help foster learning in students. It tested my knowledge and my understanding of the material and it made me realize that there are different ways of thinking. I had to constantly imagine different ways that the question could be perceived, taking into consideration other possible answers." (UAA, 2016/17)*

2. *"[The process] made me think about the topics through a different perspective. For example, if I was just studying for a test, I would focus on the big picture or I would try to memorize certain things. Whereas, in this way, I had to go through things in more depth. I had to get rid of what the teacher would think is important and develop my own thoughts about what's most important" (UAA, 2016/17).*

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3. *"It made me think outside the box. Because looking at a case from a students' perspective is almost always a cause and effect situation, but when I am looking it through a third-party perspective, it made me focus on things that I hadn't before – like certain aspects of the drug, or certain aspects of the disease… it helped me see a more complete picture of the topic, which helped in my overall understanding of the material" (UAA, 2017/18).*

3.3. Data Collection and Evaluation Method*s – Please describe the data collection strategies used, how the data was analyzed, and perceived limitations.* ***Note: Please attach copies of data collection tools (e.g. surveys and interview protocols) and any additional data or other relevant items.***

1. Items regarding the formative assessment program were incorporated into program evaluation surveys administered during and at the end of the term (See Appendix A.5). For each module, students rated on a 5-point Likert scale their agreement that the CPs helped their learning by providing study guidance and opportunities to practice and self-assess. The perceived effect of CPs' coverage of the material, frequency, set-up, and incentives were addressed through items included in an end-of-course survey. Narrative comments were analyzed for themes.

Learning impacts were studied through student CP usage patterns and correlations between usage patterns and performance on summative assessments. Web-analytics for identifying usage patterns included frequency and duration of access to the CPs; correlations were calculated using Excel while narrative comments were analyzed for themes. The two years were compared in these areas.

2. Although a survey was prepared by the TLEF team and sent to Module Leads (see Appendix A. 6), the most pertinent feedback was relayed informally on an on-going basis and at multiple stages during the process of development and implementation of each program year. Faculty response was also measured by the number of student-generated items approved and utilized in the FA program, which almost doubled in project year 2 (PY3).

3. Undergraduate Academic Assistants hired to develop FA questions in 2016/2017 and 2017/2018 were individually interviewed and asked a combination of structured and open-ended questions (see Appendix A.7). The interview was followed by a short survey (see Appendix A.8). Analysis of this study is currently underway. We received additional support from CTLT in the form of a small SoTL seed in which we are examining the student cases more closely.

3.4. Dissemination – *Please provide a list of __past__ and __future__ scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have or intend to disseminate the outcomes of this project.*

Media presence

Checkpoints help PharmD students self-assess learning. CTLT case-study by Wendy Chan, June 14, 2018, https://ctlt.ubc.ca/2018/06/14/checkpoints-help-pharmd-students-self-assess-learning/

Past Presentations

LeBlanc, N., Pachev, G., Verma, A., & Albon, S. (2018, June). "A Comparison of the Function and Impact of Formative Assessments in UBC's E2P PharmD Program." The Canadian Pharmacy Education and Research Conference (CPERC), Ottawa, ON., June 12-14, 2018.

LeBlanc, N., Pachev, G., Verma, A., & Albon, S. (2018, May). "Developing the Formative Assessment Program for the new Entry-to-Practice (E2P) PharmD Curriculum, Year 2." Teaching and Learning Enhancement Fund (TLEF) Showcase, Celebrate Learning Week, Earth Sciences, University of British Columbia, Vancouver, BC., May 3, 2018.

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Forthcoming Presentations

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Publications in Progress

LeBlanc, N., Pachev, G., Verma, A., & Albon, S. "Examining the Impact of Question-Generation on Student Learning." A research paper to be submitted to *The Canadian Journal for the Scholarship of Teaching and Learning*.

Pachev, G., Verma, A., LeBlanc, N., & Albon, S. (2018, June). "A Comparison of the Function and Impact of Formative Assessments in UBC's E2P PharmD Program." A research paper to be submitted to *The American Journal of Pharmaceutical Education*.

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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 TLEF project helped faculty instructors have a better understanding of contemporary learning-centered approaches to curriculum and pedagogical practice, particularly the role of FA's in student learning. It offered a way for instructors to witness the importance of linking course/module curriculum design with assessment to support student achievement and learning, demonstrating how working collaboratively can help develop assessment materials for respective curriculum units. Although not all instructors were fully convinced with the idea of having advanced students generate FA questions, all medication management courses in the PharmD program implemented the FA program into their curriculum.

Long-term sustainable benefits of this project include:
- An approach to teaching and learning that aligns with the new competency-based PharmD program, shifting pharmacy education at UBC toward learning-centered approaches to curriculum and pedagogical practice;
- Program use of 'For Learning' (FL) models and learning habits of self-directed, independent learners;
- An FA program that is consistent throughout the curriculum;
- Improved student learning and the development of practice-ready PharmD graduates;
- A culture of assessment within the Faculty.

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?*

We see the PharmD FA program as being sustainable over time with the continued support and leadership of the Office of Educational Assessment (OEA), who will continue to:

- oversee the FA program, ensuring program consistency;
- have access to the student generated question bank and repository of cases as a resource for instructors and assessment purposes;
- advocate for a culture of assessment within in the Faculty, ensuring that assessment is integrated into course/module development.

Furthermore, we are envisioning a Directed Studies Course, led by the OEA director, in which advanced students will continue to write and develop case-based questions, involving library and scholarly inquiry related to pharmacy, with the potential use of these questions in courses and/or modules in the PharmD program. This approach will directly impact the Faculty by helping instructors tailor questions to modified and/or expanded content/learning objectives; while further supporting advanced students in opportunities for on-going learning. Challenges we foresee in achieving expected long-term impacts include:

- New recruitment of faculty and/or course/module leads with limited knowledge of learning-centered approaches to curriculum and pedagogical practices, including the benefits of FL models and learning habits of self-directed, independent learners, who are not willing to offer support or expertise to students wishing to continue the development of FA items;

- Although highly unlikely, without further support and leadership of the OEA, it would be difficult to:
  - successfully implement the Directed Studies Course;
  - ensure FA program consistency throughout the PharmD curriculum; or
  - continue building a culture of assessment within the Faculty.