Article

Blended Learning: Reflections on Teaching Experiences across the Pharmacy Education Continuum

Theresa J. Schindel *, Christine A. Hughes and Cheryl A. Sadowski

Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta, 3-171 Edmonton Clinic Health Academy, 11405 87 Avenue, Edmonton, AB T6G 1C9, Canada;
E-Mails: Christine.Hughes@ualberta.ca (C.A.H.); Cheryl.Sadowski@ualberta.ca (C.A.S.)

* Author to whom correspondence should be addressed; E-Mail: Terri.Schindel@ualberta.ca;
Tel.: +1-780-492-6134; Fax: +1-780-492-1217.

Abstract: Experiences with online learning in higher education have grown due to advancements in technology, technological savviness of students, changes in student expectations, and evolution of teaching approaches in higher education. Blended learning, the thoughtful fusion of face-to-face instruction with online learning, can enhance student learning and provide rewarding teaching experiences for faculty members. Pharmacy educators are beginning to employ blended learning across the continuum of professional education from entry-to-practice programs to continuing professional education programs. The objectives of this paper are to describe our early experiences with blended learning and how it has enhanced our teaching experiences. Possibilities for blended learning are considered as new curricula for pharmacy programs are developed at our institution.

Keywords: blended learning; higher education; continuing professional education; pharmacy

1. Introduction

The pharmacy profession and the professional work of pharmacists have undergone dramatic changes in the past century [1]. These changes have paralleled the evolution in the primary focus of pharmacy from providing drug products to providing patient care services [2,3]. Changes in the practice environment have resulted in significant role transformation for pharmacists. However, some pharmacy educators observe that commensurate changes in pharmacy education have been slower in

coming [4]. Alternative approaches toward professional education challenge educators to rethink the underlying philosophy of pharmacy education and contemplate ways to support professionals in their roles [5–8]. Research indicates that more emphasis on knowledge construction, problem-solving, critical thinking, communication skills, leadership, professionalism, and lifelong learning are needed [8,9]. Blended learning has the potential to address these areas. Changes in focus in higher education settings to include web-based technologies rather than traditional classroom lectures alone have great potential to contribute to professional education throughout a pharmacist's career, helping him or her to address the needs of society in relevant ways [10,11].

The use of online learning in higher education has increased due to factors such as advancements in technology, technological savviness of students, changes in student expectations, and developments in higher education. Online learning has been described as "creating waves, if not a tsunami" in higher education ([12], p. 2). The applications of online learning in higher education vary considerably and include access to course content [13], preparation for learning in the classroom [14], and social interaction and peer learning [15]. Recent developments in courses offered solely online, such as massive open online courses or MOOCs are attracting attention for their potential to enroll students from all over the world [12]. Another powerful wave in higher education is blended learning, a category of online learning that has been recognized as one of the top ten trends to emerge in the field of education [16] and perhaps the greatest (as yet unrecognized) trend in higher education [17]. Blended learning approaches are being applied in pharmacy education programs across the learning continuum [13,18–21]. Over a decade ago, blended learning courses were offered in an estimated 80% of higher education institutions [22].

Blended learning provides opportunities for faculty to develop pedagogically rich courses [23] and improve teaching and learning [24]. How blended learning is defined affects how it is implemented [25]. Despite the increase in use of blended learning approaches in higher education in recent years, there is no standard definition or rule about its implementation. Numerous definitions have led to ambiguity and a lack of consensus on what constitutes blended learning [16,25]. Blended learning has been defined generally as the addition of technology to traditional learning or a combination of instructional modalities or learning environments. More specifically, blended learning has been described as a combination of face-to-face instruction with computer-mediated instruction [25]. Other definitions conceptualize blended learning as a system [16], a continuum from strong to weak [26], or dimensions of possibilities [27]. Blended learning has been defined as "both simple and complex" ([28], p. 96). The simple aspects of blended learning relate to the "thoughtful integration of classroom face-to-face learning experiences with online learning experiences", and the complexity in development and implementation of blended learning relates to its "limitless design possibilities and applicability to so many contexts" ([28], p. 96).

Blended learning is a growing field of inquiry. Considerable research has been conducted on the practical aspects of course development and implementation of blended learning [29,30]. Some of the benefits of blended learning to students include flexibility in time and space [16,24], high levels of engagement with other students and professors [31], exposure to a variety of learning experiences [32], recognition of different learning styles [33], and responsiveness to the needs of a new generation of students [24]. Faculty experiences with blended learning have been less often studied [25,34].

The objectives of this paper are to describe our early experiences with blended learning courses developed for different types of students along the continuum of learning in pharmacy: a continuing education course for practicing pharmacists, an elective course for pharmacy students in their last year of study, and a required course for pharmacy students in the third year of the program. We begin with a description of the learning context and details of the courses with a focus on our experiences as educators developing and delivering instruction using a blended learning approach. We then discuss our evaluation of faculty experiences with teaching in blended learning environments. Finally, we reflect on blended learning as an approach to pharmacy education as we embark on curriculum renewal and development of new pharmacy programs at our institution.

2. Blended Learning Experiences

2.1. Context

The University of Alberta first offered professional pharmacy programs in 1914 and remains the only school of pharmacy in the western Canadian province of Alberta. Approximately 4,400 pharmacists are practicing in Alberta [35], which has a population of approximately 3.7 million [36]. The Faculty of Pharmacy and Pharmaceutical Sciences offers two professional programs: a fully-accredited 4-year program culminating in a Bachelor of Science in Pharmacy, in which currently approximately 130 students are enrolled in its first year, and a Post-professional Doctor of Pharmacy program. The University of Alberta is a research-intensive university and the Faculty offers graduate programs in both pharmaceutical sciences and pharmacy practice at the master's and doctoral levels for approximately 60 students. The Faculty has delivered professional development courses to pharmacists for over 40 years and is an accredited provider of continuing education in Canada [7]. The Faculty is currently comprised of 20 tenure-track and 17 non-tenure-track faculty members. In addition, the Faculty has 16 support staff. The clinical faculty and students practice and train in one of the most progressive pharmacy practice environments in the world. Pharmacists have authorization to prescribe medications, access electronic health records, administer drugs by injection, and order laboratory tests [37,38].

The professional pharmacy programs offered at the University of Alberta aim to develop a strong foundation for practice by building on core skills and knowledge throughout the curriculum from classroom learning to experiential training. The curriculum includes courses in which basic and clinical sciences are integrated with experiential learning in clinical practice settings throughout the four-year program. Courses are typically delivered in a face-to-face setting coordinated by one faculty member and taught by an instructional team consisting of other faculty members, external content experts, practicing pharmacists, and other health professionals (dieticians, physicians, and nurses). In addition, many of the clinical practice faculty members contribute to the development and teaching of continuing professional education courses, which are delivered in a variety of formats (*i.e.*, face-to-face, online, and blended learning courses) [7].

Each faculty member is encouraged to develop an individual approach to teaching. Consequently, there is no standard approach to teaching at our school. Faculty members are free to use a variety of instructional strategies, including lectures, problem-based learning, case-based learning, and simulation. Faculty members use online learning in various ways. Online learning is primarily facilitated by the

Moodle learning management system. Most instructors use Moodle to post course materials and provide grades. Other uses include online tests, surveys, blogs, discussions, and links to resources. Some faculty members have also developed proprietary online teaching applications that are incorporated into classroom teaching.

We have experience teaching higher education courses for 20 years at the undergraduate, graduate, and continuing education levels. We have collectively developed more than 15 blended learning and online courses and typically contribute to teaching one online or blended learning course per year. Our first experience with on-line course delivery was in 1994 with a computer-mediated communications course using FirstClass client software. This course required a dial-up connection and was limited to 4 telephone lines. This was followed by the development of custom-designed web-based courses for pharmacists [39,40], blended courses for pharmacy students [41], interprofessional teams [42], and pharmacists[19,43].

2.2. Blended Learning Courses

Blended learning courses may be implemented in several ways [16,44]. Three categories described by Graham [16] cover a range of possibilities: enabling blends, enhancing blends, and transforming blends. Enabling blends facilitate access to learning opportunities or the delivery of course content via different modalities. Enhancing blends are reflected by incremental changes in pedagogy, such as the addition of online resources to a traditional classroom learning environment. Transforming blends represent a radical change in pedagogical approach from passive learning to active construction of knowledge.

Our early experiences with blended learning courses are described below. These courses can be categorized as enabling, enhancing, and transforming blends [16]. Descriptions of the courses are offered in the following sections and summarized in Table 1. In addition, evaluation data associated with each course are presented to aid in describing our experiences with developing and teaching in the blended learning courses.

Table 1. Summary of blended learning experiences at the University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences.

	Enabling Blend	**Enhancing Blend**	**Transforming Blend**
Course	Practice Skills: Monitoring Drug Therapy using Laboratory Values	Therapeutics	The Pain Module
Description	12 weeks; 24 continuing education units; Continuing professional development course for pharmacists	26 weeks (2 semesters); 6 credits; Required course in a 4-year BScPharm Program	13 weeks (1 semester); 3 credits; Elective course in a 4-year BScPharm Program
Years Active	2006–present	2000–2005	1998–2000
Audience	Practicing pharmacists; 25–30 pharmacists	3rd year pharmacy; 100–120 students	4th year pharmacy; 20–25 students

Table 1. *Cont.*

	Enabling Blend	Enhancing Blend	Transforming Blend
Focus	Knowledge and skill development for patient assessment, ordering and interpreting laboratory tests, and monitoring drug therapy in anemia, hypothyroidism, dyslipidemia, hypertension, renal and hepatic function	Therapeutic approach to the treatment and prevention of disease according to systems; Web-based modules on either the management of hyperlipidemia or anticoagulation therapy	Pathophysiology, pharmacology, therapeutic management, patient assessment of pain associated with acute, chronic and palliative conditions
Blended Elements	Lectures and workshop activities over 2 days; Asynchronous discussion (Web CT); Synchronous discussion every 2 weeks (Elluminate); Experiential learning with application in practice	Lectures (1 h) 3 times weekly; Web-based modules with study guide; Approximately 6 h of contact time	Seminar (3 h) once weekly comprised of 1 h lecture, student presentations, and group discussion; Student-led weekly asynchronous discussion (WebBoard); Experiential learning in patient care sites

2.2.1. Enabling Blend

A 12-week continuing professional education course was developed to support practicing pharmacists in Alberta who had been granted access to electronic health records and authorized to order laboratory tests and monitor medication therapy [37]. Blended learning was purposely built into this course. It involved a combination of face-to-face workshops consisting of lectures and small group activities, synchronous (using Elluminate) and asynchronous computer-mediated communications (using WebCT), and practice-based learning activities. The course was developed and delivered by a team of faculty members and expert clinicians using a constructivist paradigm, in which the teaching and learning activities encouraged construction of knowledge through interactions and reflection with others [10]. Online learning activities evolving over 2–3 weeks were developed for specific therapeutic areas (for example, thyroid disorders) and included self-study readings, patient cases, role-play simulation of patient assessment scenarios, short synchronous lectures, and group discussions of case studies, followed by asynchronous discussions, written assignments outlining pharmacists' experiences in practice and application of learning in the workplace, and provision of written individualized feedback to pharmacists [19]. An example of blended course components and a schedule are outlined in Table 2. At the close of each segment, a synchronous session to review assignments and facilitate group discussions was held. All synchronous sessions were recorded (using Elluminate) for review at a later time. The course concluded with a case study assignment to focus on synthesis of knowledge and skills and reflection on practice. The assignment integrated several core content areas. The course website (using Web CT) provided access to learning resources and practice tools.

Table 2. Blended course components and schedule for a Practice Skills course.

Course Component	Schedule
Pre-course assignment; Pharmacist assessment of the current use of laboratory tests in practice, completion of a case study, identification of learning goals	Week 0
Workshop; Introduction; Lectures and case-based small group activities: anemia, electrolytes and liver function tests, thyroid, renal, lipids	Week 1
Online synchronous lectures, asynchronous discussions; Session 1—Diabetes, renal, anemia	Weeks 1–3
Session 2—Thyroid	Weeks 4–6
Session 3—Dyslipidemia, hepatic	Weeks 7–9
Assignment and Online Discussion; Patient case study, changes planned for practice, review of learning goals	Weeks 10–12

Following the first offering of the course in 2006, a course evaluation questionnaire was mailed to the 41 pharmacists who participated. Thirty-five questionnaires were returned. Evaluation of the course demonstrated support for blended learning by pharmacists. Most pharmacists (84%) agreed that blending face-to-face learning experiences with online learning was appropriate for the audience. However, fewer pharmacists (61%) agreed that discussion with other pharmacists contributed to learning. When asked about the components of the course they liked best, pharmacists indicated that assignments (34%) and synchronous lectures (31%) were most valuable to them, followed by the face-to-face workshop (29%) and readings (14%). The course evaluation results were used to modify and improve the course. Changes included expansion of the workshop to 2 days, more time allocated to online synchronous lectures and group discussion of cases, and alignment of the asynchronous online discussions with assignments. Faculty members identified the need for formal evaluation of the course. When that formal evaluation was conducted, the results revealed improved knowledge, increased confidence, and changes in practice for pharmacists completing the course. More details about the formal evaluation of this blended learning course have been previously reported [19].

Faculty members and instructors involved in the development and teaching of the course met to review course evaluations and informally evaluate their own experiences as a group over the 12-week time frame of the course. Faculty members noted that the level of interaction and engagement afforded by the blended learning design was one of the most enjoyable and rewarding aspects of teaching the course. Social aspects of membership on a teaching team were also beneficial. The team approach to development, teaching, and evaluation of this course had a positive influence on the success of the course as well as participant and faculty satisfaction. Challenging aspects of the course included requirements of time and resources to learn about online learning, master the technology, attend team meetings, facilitate synchronous and asynchronous communications, and prepare individualized written feedback in an online learning environment. Ongoing faculty development and support was felt to be essential at the start and throughout the duration of the course. This 12-week continuing professional education course is framed as an enabling blend since it primarily involved issues of

access to and convenience of learning and practice materials. The blending of face-to-face learning with synchronous and asynchronous online learning elements provided flexibility to learners, enabling them to participate in the course from various geographical locations in the province. Blending also permitted the interaction between learners and faculty members to take place over several weeks, which is a departure from more traditional continuing professional education offerings [7]. Finally, blending provided a forum for learning that could not occur without the use of technology to support asynchronous and synchronous communication [16]. While this course may be categorized as an enabling blend, we acknowledge elements of other blends, particularly transforming elements arising from the formation of community [10,34].

2.2.2. Enhancing Blend

A web-based module was integrated into a mandatory therapeutics course for third-year pharmacy students in the Bachelor of Science in Pharmacy program at the University of Alberta. The course covered a broad range of topics such as cardiology, endocrinology, infectious diseases, and pulmonary medicine. The therapeutics course was delivered primarily through lectures taught by faculty members and expert clinicians. Many faculty members contribute to the development and teaching of continuing professional education courses; therefore, several faculty members involved in teaching about dyslipidemias worked together to integrate a new web-based course initially developed for practicing pharmacists [39]. The web-based module provided support for practicing pharmacists, aiding them in determining cardiovascular risk, patient assessment, medication management, patient education, monitoring ongoing therapy, and establishing hyperlipidemia clinics in practice. The custom-designed module was developed for independent learning. It included web-based hypertext content, practice tools, animations, and links to external learning resources. Students were able to interact with the content of the web-based module, but not with each other or with faculty members in the online environment. The module was progressive and unique at the time of its introduction. It provided variety for students, taking them out of the routine, familiar environment of the classroom. This teaching approach facilitated an increase in students' responsibility for learning compared to that associated with lecture-based classroom learning. In addition, it introduced them to various professional learning and practice issues. In subsequent years, the web-based module on dyslipidemias was replaced by a similar module on anticoagulation management [43].

The teaching strategy in this enhancing blend was planned by a team consisting of the course coordinator, faculty members, clinical experts, and a web-based designer. Initially, access to the web-based module was given to half of the students, while the remaining students were assigned to attend the usual lecture, after which they were provided with access to the module. An optional seminar was offered to all students assigned to the module; however, no students attended. Student experiences with blended learning in the course were evaluated using questionnaires and comparison of grades on exam questions. The students expressed strong dissatisfaction with the arrangement of being assigned to either the web or lecture format, generally undervaluing the online module and indicating a strong preference for direct interaction with instructors and traditional teaching of the content by the faculty. There was also a sense that education developed for pharmacy professionals was inauthentic and irrelevant to third-year pharmacy students. A comparison between student groups revealed no significant

difference in terms of grades associated with related content on the final exam. In subsequent offerings of the course, the blended learning approach was modified to include completion of the web-based module by all students, a hard-copy learning guide developed for the student context, a case-based assignment associated with grades and individualized feedback, and a classroom debriefing seminar following completion of all activities. Lecture time previously allocated for the therapeutic topic was cancelled. A sample schedule of the online module portion of the course is outlined in Table 3.

Table 3. Blended course components and schedule for a Therapeutics course.

Course Component	Schedule
Introduction to the web-based module; Web-based learning module and assignment introduced; Learning guide is distributed and reviewed	Week 1
Web-based module; Students access and complete the web-based module	Weeks 1–13
Assignment; Students submit case-based assignment	Week 7
Review assignment; Classroom discussion of assignment and debrief of the web-based learning experience	Week 8

As part of the course evaluation, questionnaires were administered before and after completion of the web-based modules. Course evaluation data collected from students (n = 113) enrolled in the Therapeutics course in 2003 indicated students' overall satisfaction with blended learning. Overall, the students' views of web-based learning improved following completion of the dyslipidemias module, increasing from 47% (n = 113 pre-module) to 90% (n = 110 post-module) of students indicating a positive or very positive impression. Students' expectations were met or exceeded by 85% of the students responding to the questionnaire. In addition, most students found the module interesting (89%). Prior to starting the module, 59% of the students anticipated a heavy workload associated with its completion, whereas fewer students (33%) responding to the post-module survey indicated that the workload had been heavy. Only 15% of students favoured comprehensive use of web-based components in all courses. Most favoured inclusion of web-based modules in parts of some courses (73%).

Informal evaluation of teaching experiences by the faculty members involved in the course was achieved through review of student evaluations at meetings following completion of the course each year. Faculty members expressed satisfaction with the enhanced blended learning experience while noting many challenges related to blending existing web-based components into a traditional course. The most significant challenge related to the time and resources required to plan and integrate this type of blended learning. The faculty members initially underestimated the amount of time that would be required. They perceived that a web-based module of excellent quality was readily accessible and that the content would align with or exceed course objectives. This perception influenced their initial planning. Despite having a fully developed web-based module, the instructors found integration of the online components to be complex and resource-intensive. Through the process of integrating all components, they gained new perspectives and embraced the challenge to think strategically about developing ways to deliver content effectively and approach student assessment in a blended learning

environment. Creating a teaching presence knowing that the professor would not "be there" was another welcome challenge during this process. Faculty members learned the importance of student-focused strategies in implementation of the web-based module. Thus, a learning guide was developed, lecture time was reassigned, and the online learning component was given greater value by its association with assignments and grades. It was felt that student engagement increased as faculty members became more obviously committed to the blending of different types of learning. In the absence of an online mechanism for interaction in the web-based module, classroom debriefing sessions were held to solicit student evaluations and feedback on use of the module. These also fulfilled the students' need for interaction with faculty members.

This example of blended learning is categorized as an enhancing blend because it permitted faculty to introduce incremental changes to the teaching and learning experience without radically changing their approach to the course as a whole [16]. Facilitating student–faculty interactions was important to the teaching and learning experience and the success of this enhancing blend.

2.2.3. Transforming Blend

A course on pain entitled The Pain Module was developed and taught by a team of scientists, practice faculty members, clinical experts, and instructional design and technical support workers as an elective for senior level students. The course was developed at a time when our Faculty was planning a new curriculum and contemplating ways to use technology in learning. The integration of technology was purposely planned to enhance the learning and teaching experience. Content areas of the course included pathophysiology and theories of pain, medicinal chemistry, pharmacology, therapeutics, emerging therapies and research, and application to patient care. The course was taught over 13 weeks in a blended learning format consisting of a weekly 3-hour seminar, weekly online discussions (using WebBoard), and site visits for experiential learning in patient care environments [41]. Learning activities included group work and group discussion (in the classroom and online) to encourage the construction of knowledge, meaning-making, and reflection. These concepts are often associated with a constructivist approach [10]. Similar to other courses, the learning activities included short lectures, facilitated discussions, and individual and group assignments. Faculty members were available during classroom time; 2–5 faculty members usually participated in discussions and provided feedback on student presentations. For the online discussions, a different student was assigned to initiate a discussion topic each week based on ideas or content introduced in the classroom. All students contributed to the discussion, and a second student was assigned to summarize the topic, highlighting new learning, insights, or evidence brought to light though interactions with students and faculty. Guests with particular expertise related to topics chosen by students were invited to participate in online discussions. The online component of the course was recognized by the assignment of grades. A sample course outline is provided in Table 4.

Twenty-one students enrolled in the course in 1998. The students' views of blending online asynchronous discussion with other course activities were determined using two survey methods: questionnaires and focus group interviews [41]. Findings of the post-course survey (n = 21) indicated that while students favoured classroom learning (80%), there was support for asynchronous online discussion (75%). Students indicated that the components of the course they valued most were the

weekly online discussions (67%), access to faculty members (48%), interaction with other students (38%), and access to guest speakers (33%). Most students (85%) thought that online asynchronous discussions should be used in parts of some courses. In the focus group interviews, students expressed overall satisfaction with the blended learning approach and specifically appreciated the opportunity for interaction with faculty members. However, some students expressed dissatisfaction with online discussions, preferring traditional lecture-style teaching by faculty members or other experts. Students commented on the time commitment required for this course (up to 8 h in addition to classroom hours) to maintain an online presence. Only one student indicated that the time spent online was a waste. Students identified the following benefits of the blended learning approach: interaction with other students and faculty, greater depth of understanding, awareness of additional information and resources, exposure to new ideas, and a positive effect of the online asynchronous discussions. Thus, online learning enhanced the discourse in face-to-face classroom discussions.

Table 4. Blended course components and schedule for the Pain Module.

Course Component	Schedule
Introduction; Asynchronous online discussion and technology training	Week 1
Individual student presentations on current issues	Week 2
Classroom lectures and online discussions; Pharmacological issues associated with the treatment of pain	Week 3
Common pain etiologies	Week 4
Special topics in medicinal chemistry	Week 5
Clinical site visit and online discussions; Exposure to health care providers working with patients with pain	Weeks 6–7
Descriptions of the clinical site visits posted on the course website	
Classroom student group presentations and online discussions; Sports injury	Week 8
Post-operative pain	Week 9
Headaches	Week 10
Pediatric pain	Week 11
Post-herpetic neuralgia	Week 12
Palliative care	Week 13

Following completion of the course, faculty members expressed positive views toward interaction with students through face-to-face and online discussions and also with other faculty members involved in development and teaching of the course. They found it particularly rewarding to experience a higher level of engagement with the students and to observe them applying knowledge to practice. Faculty members remarked that the blended learning approach met the different learning needs of the students in the course. Despite the significant time commitment required to develop, teach, and evaluate the course, they found the effort to be worthwhile.

This course can be described as a transforming blend, since the approach to teaching and learning deviated from the model of information transfer from faculty to student to a model of active engagement of students in knowledge construction [16]. While the interaction among students and with faculty fostered

knowledge creation, the quality of learning was increased by the online discussions. This improvement would not have been possible without the technology in this blended course. Similar to the example of the enabling blend, this blended learning course offered flexibility to students with respect to the timing of participation. The social aspects of learning were important to the students and faculty involved in this course.

3. Discussion

The implementation of blended learning in a single course or across multiple programs is a complex and significant undertaking for educators [10,25,28]. Our experiences with the implementation of blended learning in courses for various types of students, including practicing pharmacists and entry-to-practice pharmacy students, illustrate the level of complexity associated with planning and delivery of blended learning. We found that the addition of a web-based component to an existing course presented as many challenges as designing an entirely new course. Adding an online component to a traditional course does not necessarily result in a quality blended learning or teaching experience. Garrison and Vaughan [10] emphasize that fundamental redesign of a course for blended delivery involves purposeful integration of face-to-face and online learning, rethinking of course designs for optimal student engagement, and reducing and restructuring classroom hours. In our efforts to create blended learning environments, we experienced successful course redesign, student engagement, and restructuring of classroom time, especially in the development of the Pain Module. However, we struggled with the idea of reducing classroom hours. In the Pain Module, we maintained the traditional 3 h of classroom time per week, and in the Therapeutics course, lecture time was only reduced by 1 h. Reducing classroom hours has been recognized in previous studies as one of the greatest challenges for faculty members [32].

Integral to our learning about planning, developing, and teaching the blended learning courses in the Faculty of Pharmacy was the use of evaluation. We employed formative and summative evaluation strategies, along with reflexive approaches to evaluate our own teaching, to elucidate student and faculty experiences with the blended learning courses. Understanding student views through in-depth evaluation of blended learning courses helped us develop a deeper understanding of blended learning and teaching experiences. These practices allowed us to make incremental adjustments during course delivery and more significant changes in subsequent course offerings. Other educators and researchers involved in blended learning describe evaluation as a process vital to learning and student growth [25,33,45,46]. Our reflections on these experiences reinforce the need for formal evaluation of both student and faculty experiences and practices with blended learning.

Blended learning provided some rewarding teaching experiences. Enhanced interaction with and engagement by students mediated by online and classroom interactions was particularly enriching. We observed many forms of engagement among students, of students with course content, and of students with faculty members; this trend has been reported elsewhere [24]. Important connections between faculty members and students can be formed in blended learning courses [47]. Although online technologies were integral to facilitate student engagement, classroom interactions also thrived in the blended learning environment. Students and pharmacists were actively engaged in knowledge construction with peers, fellow students, and teachers. Other studies on blended learning courses

reported high levels of satisfaction on the part of instructors, particularly with regard to increased interaction and positive relationships with students [21,23,32,33,45,47,48].

Researchers acknowledge that course development or redesign to include blended learning is particularly challenging when undertaken by a single professor [10] or for the first time [48]. Collaboration and teamwork for development and delivery of blended courses was an effective, albeit time-consuming, approach for us. We learned from our individual and collective teaching experiences, generated new ideas, continually improved course design, and shared the workload. Other scholars engaged with blended learning report the benefits of teamwork and community-building [10,11,32,45].

It is well documented that faculty members must obtain support and resources for delivering a blended learning course and develop new teaching and technology-related skills, which can be challenging [11,34,47]. Of particular note is the need for faculty to have protected time to adopt and implement novel teaching strategies. Skill development is essential to the advancement of blended learning in higher education. Faculty development initiatives may include taking a blended learning course [11,45], reviewing literature on blended learning [45], working with experienced peers [33], and becoming involved in communities of practice [10,48].

Some faculty members teaching in a blended learning environment experience a change in role from teacher to coach or guide [25,34]. Role changes may challenge traditional ways of teaching and teaching identities [49] and introduce risk in terms of teaching evaluations [47]. In our experiences, no dramatic role changes occurred; however, blended learning courses required us to learn new teaching strategies. We were primarily facilitators; we frequently had to stifle the urge to employ information transfer techniques. Our perceptions of teaching roles may not have changed significantly because our constructivist philosophies aligned well with a blended learning approach [10,50]. While some aspects of teaching and learning changed in our experiences with blended learning courses, others remained the same; for example, scheduling of classroom time was largely unchanged. Blended learning has been characterized as a "dangerous idea" [24] because of its potential to challenge the status quo; however, in many cases, traditional aspects of teaching and learning may be maintained when implementing blended learning in a higher education setting [49]. Faculty members are encouraged to revisit their beliefs and approaches to teaching and learning as they embark on blended learning projects and design education for the integration of technology [28,34,49].

As we reflect on our experiences, the greatest challenge encountered with the introduction of blended learning in the courses was the demand on faculty members' time. Shortcuts do not seem to be possible in the development of new courses in which face-to-face and online learning are integrated. Adequate lead time must be allocated to development projects, and the fact that this is a time-intensive endeavour must be recognized. Organizational support for faculty members in the implementation of blended learning is vitally important for project success [11]. Resources to support faculty development, protected time to implement blended learning strategies, changes in faculty evaluation methods, and technical support are required [11,51].

Possibilities for blended learning are numerous as curricula for pharmacy programs are continually revised and as new curricula are developed at our institution. Our past experiences with blended learning may serve to inform future growth in online and blended learning strategies. Garrison and colleagues describe the transformative potential of blended learning through a community of inquiry framework [10,28]. In a community of inquiry, the social nature of teaching and learning is evident in

relationships, discussions, and reflection on learning processes and construction of knowledge through active engagement with others [10]. Our experiences with blended learning reinforce the value of community, knowledge construction, and engagement of students and faculty in the teaching and learning processes. Within a community of inquiry framework [10], blended learning may be expanded from a few courses to an entire program. In addition, the idea of a community of inquiry framework may guide and support faculty development, change in teaching practices, approaches to pharmacy education, professional development in the practice environment, and research in professional learning. The transformative potential of blended learning holds promise for significant contributions to teaching approaches and design and delivery of professional education throughout the continuum of professional education [10,11]. Further research on faculty experiences with blended learning environments, faculty development, and teaching roles using the community of inquiry framework is ongoing.

4. Conclusions

As the profession of pharmacy changes in unprecedented ways, pharmacy educators are challenged to prepare graduates and support practicing pharmacists. Blended learning is at the heart of transformational changes in higher education today [10]. The potential for blended learning to facilitate transformation in teaching and learning is enormous. Changes in the pharmacy profession and the professional work of pharmacists present an opportunity for educators to revisit approaches to professional education. Based on our experiences, successful adoption of blended learning entails "thoughtful fusion of face-to-face and online learning" ([10], p. 5). Our early experiences with entry-to-practice and continuing professional education demonstrate that implementation of blended learning is complex and demands careful planning, sufficient time and resources, faculty development, and institutional support. Collaboration and teamwork supported development and delivery of blended learning courses and increased levels of student and faculty engagement in teaching and learning. It is anticipated that blended learning approaches will increase at our institution as we embark on development of new curricula and learning experiences for faculty, students, and practitioners.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Goodrick, E.; Reay, T. Constellations of institutional logics: Changes in the professional work of pharmacists. *Work Occupation.* **2011**, *38*, 372–416.
2. Agomo, C.O. The role of community pharmacists in public health: A scoping review of the literature. *J. Pharm. Health Serv. Res.* **2012**, *3*, 25–33.
3. Anderson, S. The state of the world's pharmacy: A portrait of the pharmacy profession. *J. Interprof. Care* **2002**, *16*, 391–404.
4. Rosenthal, M.; Austin, Z.; Tsuyuki, R.T. Are pharmacists the ultimate barrier to pharmacy practice change? *Can. Pharm. J.* **2010**, *143*, 37–42.

5. Duncan-Hewitt, W.; Austin, Z. Pharmacy schools as expert communities of practice? A proposal to radically restructure pharmacy education to optimize learning. *Am. J. Pharm. Educ.* **2005**, *69*, 370–380.

6. Waterfield, J. Two approaches to vocational education and training. A view from pharmacy education. *J. Vocat. Educ. Train.* **2011**, *63*, 235–246.

7. Schindel, T.J.; Kehrer, J.P.; Yuksel, N.; Hughes, C.A. University-based continuing education for pharmacists. *Am. J. Pharm. Educ.* **2012**, *76*, Article 20.

8. Blouin, R.A.; Riffee, W.H.; Robinson, E.T.; Beck, D.E.; Green, C.; Joyner, P.U.; Persky, A.M.; Pollack, G.M. Roles of innovation in education delivery. *Am. J. Pharm. Educ.* **2009**, *73*, Article 154.

9. Eraut, M. *Developing Professional Knowledge and Competence*; Routledge: London, UK, 1994.

10. Garrison, D.R.; Vaughan, N.D. *Blended Learning in Higher Education: Framework, Principles, and Guidelines*; Jossey-Bass: San Francisco, CA, USA, 2008.

11. Dzuiban, C.; Hartman, J.; Juge, F.; Moskal, P.; Sorg, S. Blended learning enters the mainstream. In *The Handbook of Blended Learning: Global Perspectives, Local Designs*; Bonk, C.J., Graham, C.R., Eds.; Pfeiffer: San Francisco, CA, USA, 2006; pp. 195–206.

12. Blue Ridge Academic Health Group. Health Professions Education: Accelerating Innovation through Technology. Available online: http://whsc.emory.edu/blueridge/publications/archive/blue-ridge-2013.pdf (accessed on 7 August 2013).

13. Caron, G.; Visentin, S.; Ermondi, G. Blended-learning for courses in pharmaceutical analysis. *Je—LKS* **2011**, *7*, 93–102.

14. Strayer, J.F. How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learn. Environ. Res.* **2012**, *15*, 171–193.

15. Carbonaro, M.; King, S.; Taylor, E.; Satzinger, F.; Snart, F.; Drummond, J. Integration of e-learning technologies in an interprofessional health science course. *Med. Teach.* **2008**, *30*, 25–33.

16. Graham, C.R. Blended learning systems: Definition, current trends, and future directions. In *Handbook of Blended Learning: Global Perspectives, Local Designs*; Bonk, C.J., Graham, C.R., Eds.; Pfeiffer: San Francisco, CA, USA, 2006; pp. 3–21.

17. Young, J.R. 'Hybrid' teaching seeks to end the divide between traditional and online instruction. *Chron. High. Educ.* **2002**, *48*, A33.

18. Edginton, A.; Holbrook, J. A blended learning approach to teaching basic pharmacokinetics and the significance of face-to-face interaction. *Am. J. Pharm. Educ.* **2010**, *74*, Article 88.

19. Hughes, C.A.; Schindel, T.J. Evaluation of a professional development course for pharmacists on laboratory values: Can practice change? *Int. J. Pharm. Pract.* **2010**, *18*, 174–179.

20. Visentin, S.; Ermondi, G.; Vallaro, M.; Scalet, G.; Caron, G. Blended-learning for courses in pharmaceutical analysis. Part 2. *Je—LKS* **2013**, *9*, 93–102.

21. Motycka, C.A.; St. Onge, E.L.; Williams, J. Asynchronous versus synchronous learning in pharmacy education. *J. Curric. Teach.* **2013**, *2*, 63–67.

22. Arabasz, P.; Baker, B.M. Evolving campus support models for e-learning courses. Available online: http://net.educause.edu/ir/library/pdf/ers0303/ekf0303.pdf (accessed on 7 August 2013).

23. Graham, C.R. Emerging practice and research in blended learning. In *Handbook of Distance Education*, 3rd ed.; Moore, M.G., Ed.; Routledge: New York, NY, USA, 2013; pp. 333–350.

24. Moskal, P.; Dziuban, C.; Hartman, J. Blended learning: A dangerous idea? *Internet High. Educ.* **2013**, in press.

25. Ocak, M.A. Why are faculty members not teaching blended courses? Insights from faculty members. *Comput. Educ.* **2011**, *56*, 689–699.

26. Littlejohn, A.; Falconer, I.; McGill, L. Characterising effective elearning resources. *Comput. Educ.* **2008**, *50*, 757–771.

27. Sharpe, R.; Benfield, G.; Roberts, G.; Francis, R. The undergraduate experience of blended e-learning: A review of UK literature and practice undertaken for the higher education academy. Available online: http://www.heacademy.ac.uk/assets/documents/teachingandresearch/Sharpe_Benfield_Roberts_Francis.pdf (accessed on 7 August 2013).

28. Garrison, D.R.; Kanuka, H. Blended learning: Uncovering its transformative potential in higher education. *Internet High. Educ.* **2004**, *7*, 95–105.

29. Drysdale, J.S.; Graham, C.R.; Spring, K.J.; Halverson, L.R. An analysis of research trends in dissertations and theses studying blended learning. *Internet High. Educ.* **2013**, *17*, 90–100.

30. Halverson, L.R.; Graham, C.R.; Spring, K.J.; Drysdale, J.S. An analysis of high impact scholarship and publication trends in blended learning. *Distance Educ.* **2012**, *33*, 381–413.

31. Dziuban, C., Hartman, J., Moskal, P., Eds. *Blended Learning: Research Perspectives*; Sloan Center for Online Education: Needham, MA, USA, 2007; pp. 265–286.

32. Jokinen, P.; Mikkonen, I. Teachers' experiences of teaching in a blended learning environment. *Nurse Educ. Pract.* **2013**, in press.

33. King, S.E.; Arnold, K.C. Blended learning environments in higher education: A case study of how professors make it happen. *Mid-Western Educ. Res.* **2012**, *25*, 44–59.

34. Gerbic, P. Teaching using a blended approach—what does the literature tell us? *Educ. Media Int.* **2011**, *48*, 221–234.

35. Alberta College of Pharmacists. Healthy Albertans through Excellent in Pharmacy Practice 2012–2013 Annual Report. Available online: https://pharmacists.ab.ca/Content_Files/Files/AR2012-13_May13.pdf (accessed on 7 August 2013).

36. Statistics Canada. Population of Alberta, 2011 Census. Available online: http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo62j-eng.htm (accessed on 7 August 2013).

37. Hughes, C.A.; Guirguis, L.M.; Wong, T.; Ng, K.; Ing, L.; Fisher, K. Influence of pharmacy practice on community pharmacists' integration of medication and lab value information from electronic health records. *J. Am. Pharm. Assoc.* **2011**, *51*, 591–598.

38. Yuksel, N.; Eberhart, G.; Bungard, T.J. Prescribing by pharmacists in Alberta. *Am. J. Health Syst. Pharm.* **2008**, *65*, 2126–2132.

39. Olson, K.L.; Schindel, T.; Geissler, C.; Tsuyuki, R.T. The development of an internet-based course on dyslipidemias: A new form of continuing education for pharmacists. *Am. J. Pharm. Educ.* **2001**, *65*, 13–19.

40. Lam, A.; Molnar, R.; Vu, T.; Sadowski, C.A.; Jones, C.A. Online continuing education module for community pharmacists: Assisting clients with ambulatory devices. *Curr. Pharm. Teach. Learn.* **2009**, *1*, 87–92.

41. Schindel, T.J. Evaluation of Computer Mediated Conferencing in a Pharmacy Pain Module. Master's Thesis, University of Calgary, Calgary Alberta, Canada, June 1999; Unpublished work.

42. Pereira, J.; Murzyn, T. Integrating the "new" with the "traditional": An innovative education model. *J. Palliat. Med.* **2001**, *4*, 31–37.
43. Bungard, T.J.; Schindel, T.J.; Brocklebank, C. A description of a multistaged professional development course for practising pharmacists in anticoagulation management. *Can. Pharm. J.* **2012**, *145*, 14–16.
44. Yuen, A.H.K. Exploring teaching approaches in blended learning. *Res. Pract. Technol. Enhanc. Learn.* **2011**, *6*, 3–23.
45. King, V.J.; King, J.L. Personal experiences and lessons learned from building a blended nursing pharmacology course. *Teach. Learn. Nurs.* **2010**, *5*, 104–110.
46. Edginton, A.N.; Power, M.; Stark, A.; Holbrook, J. Using student feedback to design a more effective clinical biochemistry course component. *Curr. Pharm. Teach. Learn.* **2013**, *5*, 23–32.
47. Vaughan, N. Perspectives on blended learning in higher education. *Int. J. e Learn.* **2007**, *6*, 81–94.
48. Napier, N.P.; Dekhane, S.; Smith, S. Transitioning to blended learning: Understanding student and faculty perceptions. *JALN* **2011**, *15*, 20–32.
49. Eynon, R. The use of the world wide web in learning and teaching in higher education: Reality and rhetoric. *IETI* **2008**, *45*, 15–23.
50. Kang, L.O.; Brian, S.; Ricca, B. Constructivism in pharmacy school. *Curr. Pharm. Teach. Learn.* **2010**, *2*, 126–130.
51. Bohle Carbonell, K.; Dailey-Hebert, A.; Gijselaers, W. Unleashing the creative potential of faculty to create blended learning. *Internet High. Educ.* **2013**, *18*, 29–37.