Blended Learning Format for Pediatrics Clinical Rotation, Student Perspective

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ABSTRACT

Introduction. Combining online learning with the more traditional face-to-face (F2F) clinical instruction appears to provide opportunity to engage leaners at remote clinical training sites. The purpose of this research study is to describe and evaluate the effectiveness of the blended-learning format for 3rd year medical students who participated in the pediatric blended learning supplement by investigating post-exercise survey responses, end-of-rotation examination (COMAT) scores and final course grades. **Methods.** 264 OMS3 students completed the four-week pediatric clerkship in the 2014/15 academic year (78 blended learning supplement, 186 traditional F2F). Students in the study group were provided opportunity to complete a post-exercise survey regarding their experience with the blended learning format. End-of-rotation exam (COMAT) scores and final course grades were also compared between groups. **Results.** Overall students valued the blended learning experience. 53 completed post-exercise survey (67.9% response rate). 88% agreed or strongly agreed with the statement "This was a practical learning experience," and 85% agreed or strongly agreed with "The integration of eLearning and face-to-face learning helped me learn pediatrics." Overall, 85% reported "I was satisfied with the overall learning experience." A large number of comments requested an increase in the amount of clinical exposure and F2F time with patients. COMAT scores did not differ between groups (p=0.321). Compared to the control group, more students in the blended learning group received a final grade of Honors (p=0.015). **Conclusion**. Results of this study support the use of blended learning in a clinical training environment. Students valued the blended learning approach, While end-of-rotation examination scores were not improved, they may have benefited from the blended learning supplement by receiving higher course grades. Online activities may enhance but should never fully replace F2F learning with real patients.

INTRODUCTION

- Elearning initiatives, such as online and blended learning, are slowly being integrated into a number of health educational programs such as medicine, nursing, physical therapy, nutrition, social work, and pharmacy.[1-23]
- Although many formal definitions exist, blended learning is essentially the integration of online and face-to-face engagement to facilitate learning between students, teachers and resources[21,24,25] Blended learning is more than a collection of digital technology, games and tools; rather, it is a pedagogical strategy to integrate learning technologies with face-to-face learning.[26] Blended learning provides great opportunity to engage learners at remote locations, whereby the learners participate in online activities anytime and anyplace.[21] Through blended learning, learners may engage in a variety of eLearning activities such as online content review, discussion boards, interactive blogs, wikis, webconferencing, self-reflection and group activities.
- Blended learning is particularly well-suited for clinical education, whereby medical students rotate in geographically distributed training sites; a blended-learning program could improve consistency across training sites, maximize learning opportunities, reduce the burden of clinical preceptors at the onsite training facilities, allow students to link experiences to previous knowledge, and increase the number of educational opportunities for students. Previous studies provide rudimentary support and evidence for blended-learning; however, rigorous pedagogical research is still lacking.[18,19]

PURPOSE

In this study, we describe a 3rd year clinical rotation in pediatrics facilitated partially online as a blended learning supplement. The program combines online learning (asynchronous discussion boards and blogs, podcasts, video demonstrations, didactic presentations, scenario-based instruction, menu-driven simulation and virtual patients, online reference material and resources), and face-to-face clinical instruction with a faculty preceptor. We also evaluate the effectiveness of this blended-learning program through course evaluation (post-exercise survey) and performance outcomes (end-of-rotation examination scores and final course grades).

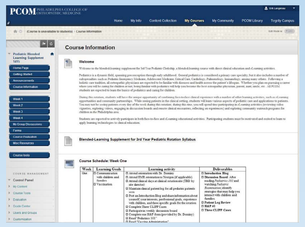
METHODS

Sample

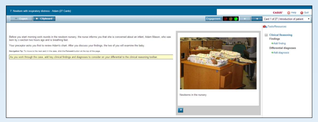
- 264 OMSIII in the 2014/15 academic year
- 3 of 18 clinical training sites
- 78 (29.5%) participated in the blended learning supplement
- 186 (70.5%) participated in the traditional face-to-face course.

Course Description

Face-to-face components	Examples and Notes
Clinical teaching (3-4 days per week)	Clinical precepting with the pediatrician
Case log	Students maintain a log of patients seen during the rotation
History and physical forms (four)	Students submit four H&P forms for patients for specified ages
E-learning components	
Discussion Boards (four)	"After watching the video, *Pediatric Examination*, identify strategies that may help you interact with children and families. "
Blogs (two)	"Post an introduction blog and share information about yourself, interests, professional goals and experience with children; note three specific goals you want to achieve for this rotation."
Podcasts (four)	Weekly summary of learning objectives and orientation
Virtual patient encounters (12-32)	Pediatric Computer-Assisted Learning in Pediatrics Program (CLIPP)[2]
Website Links	Centers for Disease Control and Prevention (CDC). Vaccine Administration, and other important sites such as American Academy of Pediatrics Bright Futures, KidsHealth and GeneTests
Video demonstrations	American Academy of Pediatrics (AAP). View Through the Otoscope
Narrated presentations	Faculty create Power-Point presentations for students to review
Articles and resources	A number of articles, clinical guidelines and references are posted
Community resource summary	Students identify a Philadelphia-based community resource for patients, write a summary and post in on the course site
Case write-up	Students prepare a formal case write-up and share it with students on the course site
Podcasts	Orientation and summary of learning objectives are presented as podcasts for each week of the course
Online training modules	California Vaccines for Children. EZIZ Vaccine Administration Online Training



Online training from EZIZ California vaccines for Children



Virtual Patient (VP) encounters and simulations from Med-U CLIPP program

Outcome Measures

- Post-exercise survey (study group). The survey instrument included items specifically related to the online components of the course: 38 Likert-type items arranged in 10 sections with opportunity to provide open-ended comments for each section, as well as a 15-item adjective checklist.[27]
- End-of-rotation Examination (control and study groups). All students (sample and control groups) completed an end-of-rotation examination: 120-item Comprehensive Osteopathic Medical Achievement Test (COMAT) examination. This high stakes, standardized assessment is offered to PCOM students, as well as osteopathic students across the country. (NBOME)
- Final Course Grade (control and study groups). All students (sample and control groups) were assigned final grades for the course: Honors, High Pass, Pass, and Fail. These grades are assigned based primarily on the end-of-rotation evaluations by the preceptor and COMAT scores.

Analysis

- Survey Monkey
- MS Office Excel
- IBM SPSS Statistics program, version 22.
- Institutional Review Board (IRB) approval was granted by the Philadelphia College of Osteopathic Medicine for conducting this study.

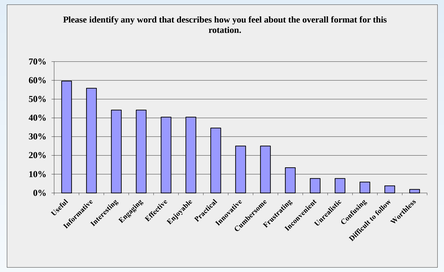
RESULTS

78 students Blended Learning Supplement (186 traditional), 2014/15 academic year

Course Format	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
The integration of eLearning and face-to-face learning was convenient for me.	2	6	24	20	0
This was a practical learning experience.	3	3	31	15	0
The integration of eLearning and face-to-face learning helped me learn pediatrics.	2	6	25	19	0
Overall Technology	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
I have taken online or hybrid courses in the past.	11	16	17	8	0
I have used BlackBoard in the past.	0	0	20	32	0
I found BlackBoard easy to use in this course.	2	2	25	23	0
I found Dr. [online preceptor] was helpful when addressing technology-related issues or problems.	0	0	14	37	0
I did not experience any technical difficulties during the course.	0	2	27	22	0
Discussion Boards	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
Discussion boards improved my understanding of pediatric topics.	4	12	29	7	0
Discussion boards were valuable.	5	9	30	8	0
Discussions were relevant.	3	2	32	15	0
Discussions were facilitated well by Dr. [online preceptor] .	2	3	26	21	0
Blogs	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
The introduction Blog was valuable.	7	13	25	7	0
The reflection Blog helped me review what I learned during the course.	5	10	27	10	0
CLIPP Cases	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
CLIPP cases were valuable.	1	3	21	27	0
CLIPP cases covered topics and clinical presentations which were not seen during my face-to-face clinical experience with patients at my training site.	1	2	17	32	0
Case Write Up	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
The case write-up was a valuable exercise.	3	6	33	8	2
Completing the case write-up helped me to learn a pediatric topic in detail.	2	4	31	13	2
Preparing the case write-up increased my comfort with medical writing.	2	9	30	9	2
Community Resource Summary	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
Preparing the Community Resource Summary was a valuable learning experience.	1	10	24	15	2
Preparing the Community Resource Summary helped me learn about a community resource available to families in Philadelphia.	1	5	26	18	2
Overall Experience	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**N/A**
I prefer this hybrid learning format (eLearning combined with face-to-face clinical education) to traditional face-to-face clinical rotations.	8	18	15	11	0
The amount of work required for this course was appropriate.	2	12	30	8	0
As a result of this course, I feel more confident in communicating with children.	1	3	30	18	0
I would recommend this course to my fellow students.	5	7	30	10	0
I would sign up for another hybrid course (eLearning combined with face-to-face clinical education) like this in the future.	4	11	27	10	0
I was satisfied with the overall learning experience.	3	5	31	13	0

Selected Student Responses

- *There was supplemental online coursework but I do not feel that it was a good substitute for actual patients. The workload also felt very back loaded in that most of the large assignments were due in the last week of the course while in the first few weeks there was very little to do.*
- *The blended learning is a nice idea, but it is not a replacement for patient encounters.*
- *The online blackboard Blended Learning Supplement with Dr. [Online Preceptor] was enriching and engaging throughout, and made us think critically about topics encountered in the field of pediatrics on a regular basis.*



End-of-Rotation Examination (Comprehensive Osteopathic Medical Achievement Tests, COMAT) Scores*

	Sample	Mean	SD	Min	Max	National Average
All Students	264	66.2	6.49	47	85	67.6 (SD= 6.9)
Traditional Learning (Control)	186	66.4	6.53	47	85	
Blended Learning (Sample)	78	65.6	6.40	52	79	

p=0.321 (two-tailed t-test)

***Scores are represented as score percent (percent correct)**

Final Course Grades

	Sample	Pass	High Pass	Honors
All Students	264 (100%)	77 (29.2%)	85 (32.2%)	102 (38.6%)
Traditional Learning (Control)	186 (100%)	54 (29.0%)	69 (37.1%)	63 (33.9%)
Blended Learning (Sample)	78 (100%)	23 (29.5%)	16 (20.5%)	39 (50.0%)

p=0.015 (test for independence" using a chi squared distribution)

CONCLUSION

- Results of this study support the use of blended learning in a clinical training environment.
- Students valued the blended learning approach.
- End-of-rotation examination (COMAT) scores were not improved.
- Students may have benefited from the blended learning supplement by receiving higher overall course grades.
- As more medical educators utilize blended learning, it is important to investigate the best balance between learning with technology and learning in a face-to-face setting. Online activities may enhance but should never fully replace face-to-face learning with real patients.

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