

Blended Learning in Physiotherapy Education: Magic Mix That Improves Quality of Student Learning

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Abstract

Background.

Teaching face to face and partly online is called blended teaching. In practical oriented subjects like physiotherapy more hands on training is required. Hence online teaching may not help to meet the learning outcomes. But a combination of face to face and online may be very effective in delivering the course contents. In this paper the effect of blended teaching on students learning is discussed.

Aim.

The aim of this paper is to discuss the efficacy of blended learning to improve the quality of student learning in physiotherapy education.

Materials and methods.

At INTI International University, we delivered physiotherapy selected courses in blended mode using various tools in the Blackboard platform. We also used zoom and skype to deliver in-classroom lectures with international expert from overseas. The efficacy of this method was evaluated through student's feedback and performance in the formative and summative assessments

Results.

The students participated in these courses perceived blended teaching strategies very effective and convenient. Blended learning encouraged more collaboration between students which was evident based on their summative exam scores.

Conclusion.

Blended teaching strategies may be effective in physiotherapy education to improve the quality of students learning. A higher quality studies will provide more evidence.

Key words:

blended learning, physiotherapy education, physiotherapy education,

Introduction

In the current digital era higher education is transmuting to new models to meet the learning demands of the new generation. (Hanna, 1998). These changes are being adapted in the by the health science curriculum across the globe.(Ruiz, Mintzer, & Leipzig, 2006). Catering the learning needs of the today's learners are known as digital natives and prefer to learn through of digital devices (Prensky, 2001). Traditional teaching methods of lecturing and face to face training is still considered to be the primary method of teaching health sciences program including physiotherapy. This passive method of learning may not improve the essential skills required by the modern health care professionals such as critical thinking and analyzing skills. (Brown, Collins, & Duguid, 1989).

It is strongly believed by the modern educators active involvement of the learners in the learning process improves the clinical reasoning skills.

In the traditional form of physiotherapy education, it is strongly believed that face to face training is an essential part for skills and competency training. Availability of internet and web 2.0 tools have transformed the delivery of teaching into new horizons. Various courses are offered through online modules and which were found to be effective (Means, Toyama, Murphy, Bakia, & Jones, 2009). Physiotherapy education is also moving towards computer assisted learning (Veneri, 2011). Health sciences programs requires to focus on psychomotor and affective domain along with knowledge imparting. One probable method which could be used by the health pro-

professional educators is “Blended learning”. The blended learning integrates the two distinct methods of learning face to face and online interactions in systematic way using computer based technologies. (Graham, 2006) Considering various advantages of this innovative method where teaching face to face and partly online may be of interesting to the modern time educators to be explored further. This flexible method requires active participation of the learners which is the corner stone in developing reasoning skills (Rowe, 2012a).

Physiotherapy program at INTI International University, Malaysia, adopted blended learning as an innovative strategy since January 2015. The objective of this paper is to discuss the process of implementing blended learning and its impact on the students learning experience. The outcome of various strategies of blended teaching on students of selected subjects are discussed.

Strategies

Physiotherapy courses (kinesiology, cardiorespiratory physiotherapy and geriatric physiotherapy) of undergraduate BSc (Hons) in Physiotherapy program traditional face to face training was blended with online teaching using web based tools using Blackboard learning management system. The instructors of these courses were completed their course on effective blended learning conducted the expert team and the entire activity was supported by technically qualified e learn team.

The online component was delivered through Blackboard platform. All the students accessed the Blackboard with their own digital devices like smartphone, laptop and ipads. Computer access facilities were also provided in the INTI International University Library at Nilai campus for students who wanted to use the facility. In this paper selected strategies used to blend the courses of kinesiology, cardiorespiratory physiotherapy and geriatric physiotherapy were discussed.

Online discussion

Online discussion is one of the important web 2.0 tool which promotes collaborative learning among students. The aim of blended learning is repurposing part of face to face class to online to achieve the desired learning outcome. The repurposed part can be an online discussion which will help for active learning in a collaborative way. Online discussion is one of the effective method of interactive approach to learning replacing traditional method of transforming knowledge (Vrasidas & McIsaac, 1999; Warschauer, 1997). Online discussion encourages to think independently and share their thoughts and supports learner’s cognitive thinking (Chen & Looi, 2007). Effective use of online discussion can provide positive learning experience to students in the form of peer feedback and questions, and sharing new ideas. It is one of the important component of blended learning (Alebaikan & Troudi, 2010). Therefore, effective use of online discussions would provide a sign of efficient blended learning. Considering the advantages of asynchronous online discussion, it was used in the blended teaching at INTI in the following manner. In the kinesiology subject the “neurophysiological mechanisms of normal motor control and learning” was delivered in

the following way. First component of teaching was online in the form of videos in the Blackboard. Video about Fitts and Posner stages of motor learning, classical conditioning, operant conditioning were posted online during the online class hour. A vodcast on stage of motor learning was also recorded using camtasia studio in dell laptop and posted online for the students to review during the online hour. Followed by that there were face to face classroom demonstration and discussion on the same topic. After the face to face class online discussion forum was created in the Blackboard in the topic of motor control and learning with a case scenario which was graded with rubrics. The students need to discuss about the given case scenario in an asynchronous manner. By participating in this asynchronous discussion the students learned about the topic very deeply in a collaborative manner.

To teach the basic concept about movement analysis, in face to face class the students were taught about observational movement analysis. Then the students were advised to download smartphone application (protractor app) from Google Play store. Followed by that an online discussion forum was created in the Blackboard in the title of Movement analysis-an introduction. The students were given a task of analyzing 3 steps of squat lift with mobile app and post their discussion about analysis in the discussion forum. So the students took the picture of their friends in squat lift postures in their mobile phone. Then they measured the joint angles of the photos using the protractor app and analyzed the movement. The student posted their analysis in the discussion forum and commented at least two of their classmate’s post which was graded with rubrics. This way innovative use of smartphone aided the learning and understanding of movement analysis.

In Cardiorespiratory physiotherapy course to teach the students about the gaseous exchange and V/Q matching, initially face to face lecture about the revision of basic anatomy and physiology were given. Then videos of gaseous exchange and V/Q matching was posted online. The students after watching the video need to discuss about the factors affecting V/Q matching in the discussion forum which was graded with a rubric. In that discussion the students have to critically think to discuss the V/Q mismatch based on the video information.

In order to train the students in the skill of reading chest X-rays the students were given face to face lecture about the basic interpretation of chest X-ray. Then a real patient chest X-ray were posted in the discussion thread. Based on the face to face class and learning materials the students have to diagnose the chest X-ray and discuss about it. The discussion forum was graded using the discussion rubric.

In this way discussion forum was used as a mode of blended learning for students. The students reported positive feedback about the activities.

Wiki activity

Wiki is one of the powerful collaborative tool available which has the potential to enhance teaching and learning practice (Rowe, 2012b). Wiki combined with other face to face activities enhance collaborative student’s learning of critical thinking skill and clinical reasoning (Snodgrass, 2011). Wiki

can be used for group projects, assignments, online education and in various innovative ways (Parker & Chao, 2007).

In Cardiorespiratory physiotherapy to teach the students about various diseases, active learning using wiki tool of Blackboard was used. Following face to face lecture about respiratory disease condition, the students were divided into 4 groups and each group was given a different disease condition to deal with. They have to collectively find out the causes, clinical features, diagnosis and treatment. So students worked collaboratively to find a solution which strengthens their team approach ability. The wiki activity was graded using the wiki activity rubric. The learning through wiki was very effective and it encouraged active learning.

Flipped classroom

“The flipped classroom is a pedagogical model in which the typical lecture and homework elements of a course are reversed” (“EDUCAUSE Learning Initiative 7 Things You Should Know About Flipped Classrooms - eli7081.pdf,” n.d.). Bergmann & Sams defined “the flipped classroom as an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom.” (Bergmann & Sams, 2012). Student’s perception about flipped classroom were reported positive that it encourages active learning and improves their performance. (Pierce & Fox, 2012; Veeramani, Madhugiri, & Chand, 2015). As the flipped classroom promotes active learning, this strategy was used in the blended learning approach at INTI.

In Cardiorespiratory physiotherapy, videos about the Airway clearance treatment techniques (postural drainage, ACBT) were recorded and edited using camtasia software. Then the videos were posted as a flipped class with reading materials before the actual practical class in the Blackboard. In the face to face component the students were given group activities to demonstrate the technique which they saw online and further explanations were given by the lecturer. This strategy was useful in maximizing face to face practical hour in teaching physiotherapy techniques and the student’s response was very positive.

Online assignment

Traditionally assignment topics were given to students and the students will type and print the assignment. They submit the hardcopy of the assignment based on given case scenario. But with the use of online learning management systems like Blackboard, the assignment can be submitted online as a soft copy or video format. So the online assignment provides flexibility in the form of assignment submission (From paper to video). When the online assignments are linked to plagiarism detection Turnitin platform, it can detect the plagiarism of students work. It was reported that online assignment saves time and money and feedback was quicker than paper-based assignment. (Bridge & Appleyard, 2008; “Three generations of online assignment management,” n.d.).

In Cardiorespiratory physiotherapy subject blended teaching at INTI, the students were taught cardiorespiratory assessment techniques in face to face practical class. Followed by

that an online video assignment based on a case scenario was given. The assignment was having 3 components. For the first part of the assignment, the students need to select the assessment techniques based on the given case scenario. Then they need to find the evidence for assessment technique in reviewing the literature and post in the turnitin page of the assignment. The turnitin helps to find out the plagiarism in students assignments. For the second part they need to take video of the assessment technique with role play. That means the concerned student need to act as therapist and another students in the same class need to act as patient. So they do the role play and record the whole assessment. They need to post it in the video page of the Blackboard assignment and it will be evaluated with a rubric. For the third part they need to do peer assessment- the students acted as a patient need to evaluate the performance of the student who acted as a therapist. So this single assignment covers various aspects of learning like clinical reasoning, evidence based practice and practical skill. It was very effective in assessing their practical skill.

Similarly in kinesiology, Following face to face lecture and demonstration about movement analysis, a topic for the assignment (kinesiological analysis of volleyball and badminton service) was given to the student. The students have to prepare the assignment based on the face to face lecture and research articles (evidence based practice) available on that topic. Then they submitted online in the turnitin assignment platform which was graded with rubrics. Providing this kind of topics and blending evidence based analysis and practice was appreciated by the students which will help them for lifelong learning. So whatever they learned through this activity will also help them to apply in their future clinical practice.

Skype and Zoom classes

Social media like Skype and zoom can be used for education purpose. The use of skype and other web 2.0 tools for tele-reporting the lectures, providing learning support and clinical training was reported with positive student learning experience. (George & Dellasega, 2011; Jones, Dean, & Hui-Chan, 2010; Stephens & Hennefer, 2013; Trisha Parsons & Kathleen Norman, 2010, p. -). In order to provide students an international experience of blending, an online lecture was organized with an international resource person Dr. Senthil Kumar from United States using Skype. The Skype lecture was conducted during class hour in international practice patterns. By looking at the positive feedback from the students, Laureate International Lecture was organized first time in INTIUI with a Walden university professor Dr. Cheryl L. Anderson with the management team. The interactive online lecture was conducted from United States during the class hour in Geriatric Physiotherapy in the topic of Dementia for Jan 2015 students. Followed by online lecture, face to face discussion was conducted in the classroom by the subject lecturer, which was also tested in test 2 of coursework. An online discussion on same topics was given to the students to enhance their learning on dementia. Thus, an internationally renowned clinician sharing her experience and giving case examples really boosted the students’ interest in the subject.

Various Web 2.0 tools

To blend the course effectively various web 2.0 tools were used during course delivery. To record the video and edit the videos camtasia software (TechSmith Corporation) were used. To create self-test quiz raptivity software (Harbinger Group) were used. Using raptivity quiz can be made in the form of games like spin the wheel and hangman game. So after going through a video and reading online materials the students can check their knowledge by playing the raptivity game in the Blackboard. To embed the videos in the blackboard, kaltura video platform integration (<http://corp.kaltura.com/>) of Blackboard was used. Social software like Skype and zoom also used to teleport the lecture from international experts live into the classroom. All these tools effectively helped to blend the course.

Outcomes

The quality of education can be assessed from the student's time spent in learning activities and examination grades(Porter, 2012). The analytical report taken from Blackboard plat-

form proves that the students of above mentioned courses spent more time in Blackboard than the department average. When the results of the students were analyzed, in kinesiology course the percentage of students in the A-, B+, B and B- grades were improved in 2015 (both Jan and July 2015 session) compared to 2014 Session (Jan and July 2014 sessions) which was taught in a traditional mode. In the cardiorespiratory physiotherapy course the percentage of students in A, B+ and B grades were improved in 2015 compared to 2014. Similarly the improvement in grade percentage of B+, B and B- were noted in the geriatric physiotherapy subject in 2015. Even though multiple factors play a role in the grade scores, one of the important factor is the mode of delivery and the students learning.

Traditional methods of assessment of student learning involve students' self-perceptions of their learning and perception on course structure which is an indirect evidence of learning.(Lindholm, 2010) The data collected by faculty regarding the student's perception of subject revealed better student experience in 2015 when compared to 2014 as shown in the Fig. 1

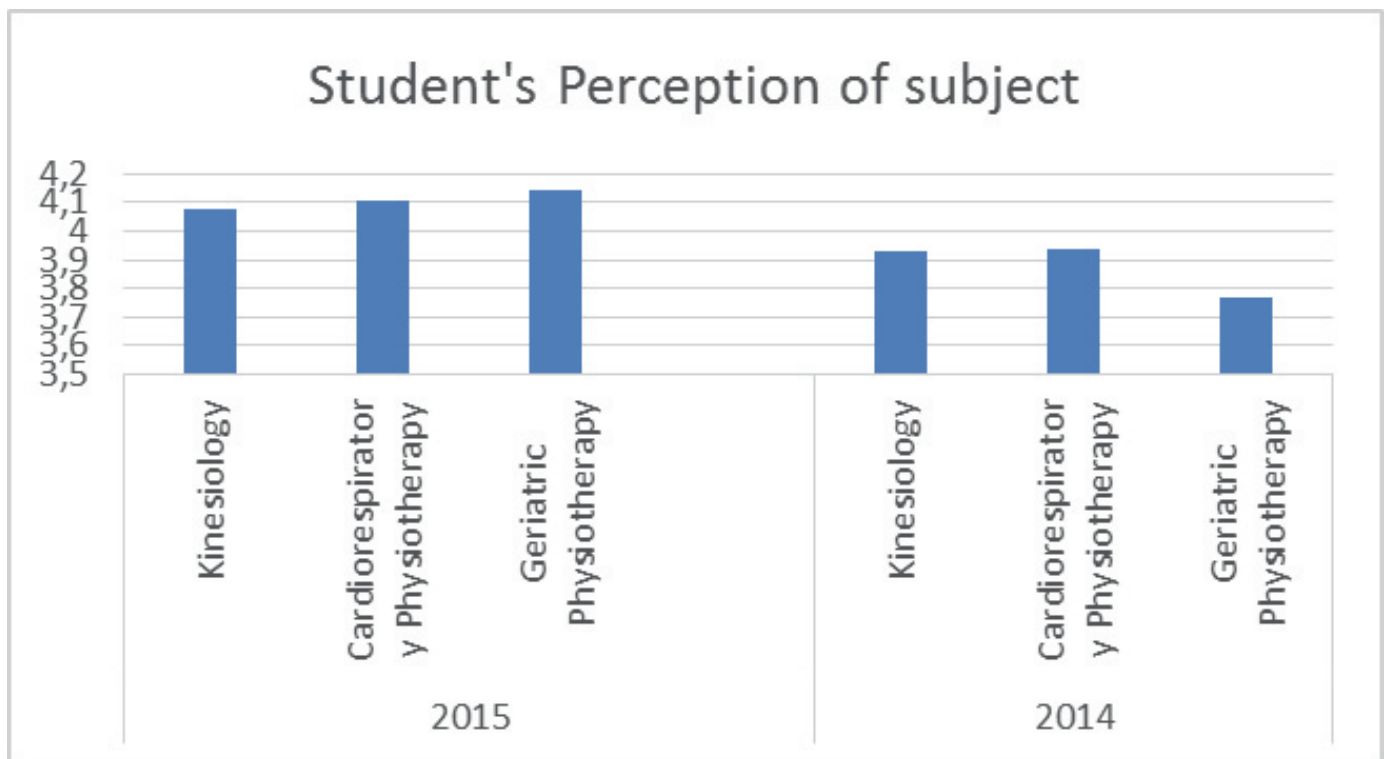


Fig. 1. Student's perception of subject in 2014 and 2015

The students who took the above mentioned courses in blended mode were very much satisfied with their learning process. It was reflected in their feedback about the activities given to them. The students reported that online discussion helped them a lot to learn from their friends. Flipped classroom method was reported as very effective in learning practical skills as they learn the technique online and practice it in face to face class. Similarly, Skype and zoom classes

also added international experience to their learning as informed by the students.

The assessment regarding the quality of students learning with blended learning is ongoing and data collection in current and future semesters will help to understand the student's learning better. Hence we conclude that blended learning approach followed in the year 2015 was contributed to the improvement in grades of students and student perception about the courses.

Conclusion

Blended learning seems to be effective in delivering method in physiotherapy course as it mixes the traditional teaching with modern methods of online active learning. It improves the quality of learning in the form the student grades and student perception about the courses which helped them to achieve the learning outcomes.

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Piśmiennictwo/ References

1. Alebaikan, R., & Troudi, S. (2010). Online discussion in blended courses at Saudi Universities. *Procedia - Social and Behavioral Sciences*, 2(2), 507–514. <http://doi.org/10.1016/j.sbspro.2010.03.054>
2. Bergmann, J., & Sams, A. (2012). *Flip your classroom: reach every student in every class every day*. Eugene, Or: International Society for Technology in Education.
3. Bridge, P., & Appleyard, R. (2008). A comparison of electronic and paper-based assignment submission and feedback. *British Journal of Educational Technology*, 39(4), 644–650. <http://doi.org/10.1111/j.1467-8535.2007.00753.x>
4. Brown, J. S., Collins, A., & Duguid, P. (1989). Situated Cognition and the Culture of Learning. *Educational Researcher*, 18(1), 32–42. <http://doi.org/10.3102/0013189X018001032>
5. Chen, W., & Looi, C.-K. (2007). Incorporating online discussion in face to face classroom learning: A new blended learning approach. *Australasian Journal of Educational Technology*, 23(3), 307–326.
6. EDUCAUSE Learning Initiative 7 Things You Should Know About Flipped Classrooms - eli7081.pdf. (n.d.). Retrieved March 13, 2016, from <https://net.educause.edu/ir/library/pdf/eli7081.pdf>
7. George, D. R., & Dellasega, C. (2011). Use of social media in graduate-level medical humanities education: Two pilot studies from Penn State College of Medicine. *Medical Teacher*, 33(8), e429–e434. <http://doi.org/10.3109/0142159X.2011.586749>
8. Graham, C. R. (2006). Blended learning systems. C.J Bonk & CR Graham, *The Handbook of Blended Learning: Global Perspectives, Local Designs*. Pfeiffer. Retrieved from <http://www.click4it.org/images/a/a8/Graham.pdf>
9. Hanna, D. E. (1998). Higher education in an era of digital competition: Emerging organizational models. *Journal of Asynchronous Learning Networks*, 2(1), 66–95.
10. Jones, A. Y. M., Dean, E., & Hui-Chan, C. (2010). Comparison of teaching and learning outcomes between video-linked, web-based, and classroom tutorials: An innovative international study of profession education in physical therapy. *Computers & Education*, 54(4), 1193–1201. <http://doi.org/10.1016/j.compedu.2009.11.005>
11. Lindholm, J. A. (2010). UCLA. Retrieved from http://www.nyack.edu/files/OIA_12_Learning_Outcomes_Guidelines_UCLA_F10.pdf
12. Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies. US Department of Education. Retrieved from <http://eric.ed.gov/?id=eD505824>
13. Parker, K. R., & Chao, J. T. (2007). Wiki as a teaching tool. *Interdisciplinary Journal of Knowledge and Learning Objects*, 3(1), 57–72.
14. Pierce, R., & Fox, J. (2012). Vodcasts and Active-Learning Exercises in a "Flipped Classroom" Model of a Renal Pharmacotherapy Module. *American Journal of Pharmaceutical Education*, 76(10). <http://doi.org/10.5688/ajpe7610196>
15. Porter, S. R. (2012). Using student learning as a measure of quality in higher education. HCM Strategists. Retrieved from http://www.hcmstrategists.com/contextforsuccess/papers/PORTER_PAPER.pdf
16. Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon*, 9(5), 1–6.
17. Rowe, M. (2012a). Blended learning in physiotherapy education: Designing and evaluating a technology-integrated approach. Department of Physiotherapy, University of the Western Cape. Retrieved from [https://www.researchgate.net/profile/Michael_Rowe2/publication/259675865_Rowe_M._\(2013\).Blended_learning_in_physiotherapy_education_Designing_and_evaluating_a_technology-integrated_approach/links/00b7d52d4eb8520014000000.pdf](https://www.researchgate.net/profile/Michael_Rowe2/publication/259675865_Rowe_M._(2013).Blended_learning_in_physiotherapy_education_Designing_and_evaluating_a_technology-integrated_approach/links/00b7d52d4eb8520014000000.pdf)
18. Rowe, M. (2012b). The use of a wiki to facilitate collaborative learning in a South African physiotherapy department. Retrieved from <http://repository.uwc.ac.za/xmlui/handle/10566/495>
19. Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of e-learning in medical education. *Academic Medicine*, 81(3), 207–212.
20. Snodgrass, S. (2011). Wiki activities in blended learning for health professional students: Enhancing critical thinking and clinical reasoning skills. *Australasian Journal of Educational Technology*, 27(4), 563–580.
21. Stephens, M., & Hennefer, D. (2013). Internationalising the nursing curriculum using a Community of Inquiry Framework and blended learning. *Nurse Education in Practice*, 13(3), 170–175. <http://doi.org/10.1016/j.nepr.2012.08.010>
22. Three generations of online assignment management. (n.d.). Retrieved March 13, 2016, from <http://www.ascilite.org/conferences/perth97/papers/Jonesd.html>
23. Trisha Parsons, & Kathleen Norman. (2010). Tele-rehabilitation Assisted Clinical Education. *Academic Exchange Quarterly*, 14(3). Retrieved from <http://www.rapidintellect.com/AEQweb/cho4607.htm>
24. Veeramani, R., Madhugiri, V. S., & Chand, P. (2015). Perception of MBBS students to "flipped class room" approach in neuroanatomy module. *Anatomy & Cell Biology*, 48(2), 138. <http://doi.org/10.5115/acb.2015.48.2.138>
25. Veneri, D. (2011). The role and effectiveness of computer-assisted learning in physical therapy education: A systematic review. *Physiotherapy Theory and Practice*, 27(4), 287–298. <http://doi.org/10.3109/09593985.2010.493192>
26. Vrasidas, C., & Mclsaac, M. S. (1999). Factors influencing interaction in an online course. *American Journal of Distance Education*, 13(3), 22–36. <http://doi.org/10.1080/08923649909527033>
27. Warschauer, M. (1997). Computer-mediated collaborative learning: Theory and practice. *The Modern Language Journal*, 81(4), 470–481.