Journal of Physiotherapy 61 (2015) 21–27

Journal of PHYSIOTHERAPY

journal homepage: www.elsevier.com/locate/jphys

Research

A massive open online course (MOOC) can be used to teach physiotherapy students about spinal cord injuries: a randomised trial

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KEYWORDS

Rehabilitation
Spinal cord injury
Clinical trials
Methodology

ABSTRACT

Question: Does a massive open online course (MOOC) based around an online learning module about spinal cord injuries improve knowledge or confidence among physiotherapy students more than if physiotherapy students are left to work through the online learning module at their own pace. Which method of presenting the content leads to greater satisfaction among the students? **Study design:** Randomised controlled trial with concealed allocation and intention-to-treat analysis. **Participants:** Forty-eight physiotherapy students in Bangladesh. **Intervention:** Participants randomised to the control group were instructed to work at their own pace over a 5-week period through a physiotherapy-specific online learning module available at www.elearnSCI.org. Experimental participants were enrolled in a 5-week MOOC. The MOOC involved completing the same online learning module but experimental participants' progress through the module was guided each week and they were provided with the opportunity to engage in online discussion through Facebook. **Outcome measures:** The primary outcome was knowledge, and the secondary outcomes were perceived confidence to treat people with spinal cord injuries and satisfaction with the learning experience. **Results:** The mean between-group difference for knowledge was 0.7 points (95% CI −1.3 to 2.6) on a 0 to 20-point scale. The equivalent results for perceived confidence and satisfaction with the learning experience were 0.4 points (95% CI −1.0 to 1.8) and 0.0 points (95% CI −1.1 to 1.2) on a 0 to 10-point scale. **Conclusion:** The MOOC was no better for students than working at their own pace through an online learning module for increasing knowledge, confidence or satisfaction. However, students in the MOOC group highlighted positive aspects of the course that were unique to their group, such as interacting with students from other countries through the MOOC Facebook group. **Trial registration:** ACTRN12614000422628. **[Hossain MS, Islam MS, Glinsky JV, Lowe R, Lowe T, Harvey LA (2015) A massive open online course (MOOC) can be used to teach physiotherapy students about spinal cord injuries: a randomised trial. *Journal of Physiotherapy* 61: 21–27]**

Introduction

Most countries around the world provide undergraduate or graduate training programs for physiotherapists. A challenge for all is to develop efficient ways of providing consistent high-quality education as part of these programs. This is particularly challenging for some of the specialty topics such as physiotherapy management of spinal cord injuries, where smaller universities and colleges often struggle to attract academic staff with appropriate expertise. These problems are greater in countries where physiotherapy is a young profession.

The International Spinal Cord Society sought to overcome this problem by developing an online educational resource for the multidisciplinary team, which contains a module that is specific for physiotherapy students (and junior clinicians).[1] Senior physiotherapy academics and clinicians from 30 countries, including representatives from low-income and middle-income countries, developed this physiotherapy-specific module. This module contains 14 lessons covering a range of topics including assessment, goal setting, treatments for impairments, and strategies to train motor skills. Each lesson contains a short didactic overview of the topic, interactive activities and a self-assessment quiz. The interactive activities are where most of the learning content is presented; they require students to regularly stop, think and perform a learning task in accordance with adult learning principles.

The online learning module provides an inexpensive way of delivering a consistent learning experience for all physiotherapy students at minimal cost. However, it is not clear whether students can be left to work their own way through the module or whether they need to be provided with a more structured and interactive online learning experience. Massive open online courses (MOOCs) provide a way of structuring students' online learning experience.[2–5] They are 'massive' because they sometimes have

http://dx.doi.org/10.1016/j.jphys.2014.09.008

thousands of students; they are 'open' because they are free; they are 'online' because the course is delivered by the Internet; and they are 'courses' because they have a curriculum and learning objectives.[6] They have various formats, but most involve listening to online lectures, completing tasks, reading articles and completing self-assessments. Importantly, most have online forums that provide students with the opportunity to engage with fellow students and teachers from around the world. They are becoming increasingly popular because they are inexpensive to run and provide access for students from all countries to the same level of education.

A recent systematic review of MOOCs identified 17 quantitative studies on this style of learning.[5] Most of the 17 studies were case studies and the review did not include the only randomised controlled trial (unpublished) we have identified.[7] There are, however, a lot of publications written about the underlying learning theories of MOOCs and online education.[8–11] Educational academics have expanded the older behaviourism, cognitivist and constructivism theories of learning to include theories of connectivism. 'Connectivism provides insight into learning skills and tasks needed for learners to flourish in a digital era.'[9] Connectivism captures an important aspect of MOOCs – the sense of community that they create and the opportunity that they provide for participants to engage online in order to learn from each other.

While MOOCs are increasingly popular, it is not known whether they are any better than leaving students to work at their own pace through online educational material. Therefore, the purpose of the present trial was to compare two ways of providing online education about spinal cord injuries to physiotherapy undergraduate students in Bangladesh. Both ways were based on the physiotherapy-specific module of www.elearnSCI.org. However, one way required students to work at their own pace over a 5-week period through the online module and the other way required students to enroll in a MOOC titled *Physiotherapy Management of Spinal Cord Injuries* (details can be found at: http://www.physio-pedia.com/Physiotherapy_Management_of_Spinal_Cord_Injuries). It was hypothesised that MOOCs provide physiotherapy students with greater knowledge about physiotherapy management of spinal cord injuries, greater confidence in managing people with spinal cord injuries and a more satisfying learning experience than access to an online learning module alone.

Therefore, the specific research questions for the present study were:

Does a MOOC that is based around an online learning module about spinal cord injuries improve knowledge or confidence among physiotherapy students more than working through the online learning module at their own pace?

Which method of presenting the content leads to greater satisfaction among the students?

Method

Design

A 5-week randomised parallel controlled trial with a 1:1 allocation was undertaken through the Bangladesh Health Professions Institute, Bangladesh. Undergraduate physiotherapy students from Bangladesh were randomised to a control or experimental condition. The control participants were instructed to move at their own pace through the physiotherapy-specific module that forms part of www.elearnSCI.org. The experimental participants were enrolled into a MOOC. Participants started the 5 weeks of study on 28 April 2014 and finished 5 weeks later. Everything related to the trial, including its content, was conducted in English.

Participants and centre

Second-year and third-year undergraduate physiotherapy students from the Bangladesh Health Professions Institute were screened by their teachers for inclusion and invited to participate. This Institute has been providing undergraduate physiotherapy training for 15 years. The Bangladesh Health Professions Institute has approximately 40 students in each year, and is located at the Centre for Rehabilitation of the Paralysed: a 120-bed spinal cord injury centre.

Physiotherapy students were included if they were over 16 years of age, willing to participate and had regular Internet access. Potential students were excluded if they had insufficient English to provide consent, and complete the online modules and assessments. One teacher who was well acquainted with the students and was fluent in English rated the English skills of all students. He was asked to rate each student's English on a 0 to 10-point scale, where 0 represented 'very poor' and 10 represented 'very good'. The students were also asked to rate their own English skills on the same scale.

Once the final number of students willing to participate was known, a randomised allocation schedule was computer generated by an independent person in Australia. The schedule was blocked and stratified by year of study (second-year student versus third-year student). The Bangladeshi site emailed the participants' details and year of study to Australia, where an independent person provided each participant's allocation according to the random schedule. Each participant was individually emailed to reveal group allocation and to provide instructions about what they were expected to do. The participants were deemed to have entered the study at this point.

Intervention

Participants allocated to the experimental group were enrolled in a 5-week MOOC titled *Physiotherapy Management of Spinal Cord Injuries* (http://www.physio-pedia.com/Physiotherapy_Management_of_Spinal_Cord_Injuries). The MOOC was run through Physio-pedia in collaboration with the International Spinal Cord Society and was not solely for the participants of the trial; it was open to physiotherapy students or physiotherapists from any country. It was widely advertised and ultimately attracted 3523 registrants from 108 countries. The MOOC required the experimental participants to devote 3 hours per week to study. It provided these participants with a course curriculum, objectives and a weekly study plan. In addition, these participants were invited to complete a pre-course and post-course quiz; this was different to the knowledge assessment used as part of the trial. At the beginning of each week, these participants were emailed three to six tasks to complete. The tasks included completing lessons from the physiotherapy-specific module of www.elearnSCI.org. By the end of the course, the experimental participants moved through the 14 physiotherapy-specific lessons. The experimental participants were also required to do some additional reading and engage in an online Facebook discussion for all MOOC registrants. Checks were made to ensure that all of the experimental participants joined the Facebook group. There were two designated teachers of the MOOC; both had extensive clinical and academic experience in the physiotherapy management of spinal cord injuries. The MOOC did not involve listening to either of the teachers (or anyone else) talk with electronic slide presentations, although it did involve viewing short videos from the two teachers at the beginning of the course and then from one teacher each week. The videos outlined the content of the course and learning material for each week. The learning objectives and weekly plan of the MOOC were freely available through the Physio-pedia website, although the details of each week were only released at the beginning of each week of the course. The experimental participants were emailed prior to the course, upon completion of the course and each week throughout the course to provide them with instructions. These emails were generic emails sent to all registrants of the MOOC. The Bangladeshi students who were part of this study were not provided with any special attention during the MOOC, but they were provided with assistance to register, and in some cases, assistance to set up email accounts. One

local Bangladeshi teacher who was aware of each participant's allocation provided the assistance.

The control participants were asked to move at their own pace through the physiotherapy-specific module of www.elearnSCI.org over a 5-week period. They, like the experimental participants, were instructed to devote 3 hours per week to their studies. Checks were made to ensure that none of the control participants registered for the MOOC or joined the MOOC discussion forum run through Facebook. Again, one local Bangladeshi teacher who was aware of each participant's allocation provided some participants with assistance to set up email accounts.

The physiotherapy-specific module of www.elearnSCI.org, which both control and experimental participants were required to move through, contains 1367 screens.[1] The module is divided into 14 lessons, each with a short didactic 'overview' and between two and seven activities, and a self-assessment. Interactive screens that require students to regularly stop, think and perform a learning task are dispersed throughout. The interactive screens require students to enter text in response to questions, view videos and analyse movement through multiple-choice questions, select appropriate exercises for particular problems, and constantly reflect on content learnt through drop-and-drag activities, matching exercises and various other interactive tasks. In addition, there are over 150 videos of people with spinal cord injuries, and interviews with both physiotherapists and patients from a diverse range of countries. While both control and experimental participants moved through these online modules, only those in the experimental group were provided with a weekly study plan, course curriculum, objectives, and importantly, the opportunity to engage in an online Facebook discussion.

Experimental and control participants continued with their usual undergraduate training throughout the 5-week period. The participants' teachers were aware of the trial and encouraged these students to actively participate, but they were not aware of each participant's allocation (except the one lead teacher). The students were told that the trial was not a formal part of their training and individual scores collected as part of the trial would not be shared with their teachers and would not contribute to any formal exam results. They were, however, told that participation in the trial might assist them with their formal studies.

All participants were told that the purpose of the trial was to compare two styles of online learning. They were not told the hypothesis or encouraged to believe that the MOOC was superior. Nor were the words 'experimental' or 'control' used in any correspondence or information provided to them. Participants were also asked not to discuss amongst themselves to which group they were allocated or what they were required to do. This was done in an attempt to blind the participants to the purpose of the trial; participants did, no doubt, discuss what they were doing amongst themselves and guess the purpose of the trial. In addition, the control participants may have found information about the MOOC on the Internet and all participants may have found information about the trial from its online registration. Therefore, in an attempt to gauge the success of blinding, the participants were asked at the end of the trial the following question: 'The hypothesis of this trial was that the experimental group would do better than the control group. Which group do you think you belonged to?'

Outcome measures

One primary outcome and two secondary outcomes were measured in the present study. Participants were assessed 13 or 15 days prior to the start of the 5-week study period and then 1 or 2 days after completion. All assessments were completed online. Participants sat at computers in an exam-style setting to complete the assessments. They were given unlimited time and were directly supervised by a teacher who was blinded to participants' allocation.

The primary outcome measure was knowledge about the physiotherapy management of spinal cord injuries. Two 20-item multiple-choice tests were devised specifically for this trial. They were different to questions set as part of the MOOC and online learning module. Initially, 20 pairs of questions, which were similar in content and complexity and based on the content of the physiotherapy-specific modules of www.elearnSCI.org, were composed. Then one question of each pair was randomly allocated to the pre-trial assessment and the other to the post-trial assessment. This was done in order to ensure there were no systematic differences between the pre-trial and post-trial assessments. Each question had four possible answers, although only one answer was correct. An example of six questions is provided in Table 1. The total possible score was 20 points. The smallest worthwhile treatment effect was arbitrarily set a priori as 4 points. That is, the experimental group needed to do better than the control group by 4 points to enable a conclusion that the MOOC was superior to self-paced learning.

There were two secondary outcomes: perceived confidence to treat people with spinal cord injuries and satisfaction with the learning experience. Both outcome measures were designed specifically for the purpose of the trial and comprised a series of questions or statements that required students to respond on a scale from 0 to 10 (see Tables 2 and 3). The scale to assess confidence was anchored at one end with the words 'not confident' and at the other end with the words 'highly confident'. The scale used to assess satisfaction was anchored at one end with the words 'strongly disagree' and at the other end with the words 'strongly agree'. There were ten statements for perceived confidence, which were averaged for each participant for a total possible score of 10 points. There were four statements for satisfaction with the learning experience, which were similarly averaged for each participant for a total possible score of 10 points. Participants were also asked to estimate the average number of hours they spent over the duration of the trial learning about spinal cord injuries and the positive and negative aspects of the online teaching strategies used as part of the trial.

Data analysis

A sample of 48 was selected for pragmatic reasons because there were no prior data upon which to base a power calculation. This was, however, estimated a priori as sufficient to determine a 4-point difference in knowledge, assuming: an alpha of 5%, a SD of 5 points, power of 80%, a dropout rate of 10% and a correlation with baseline knowledge of 0.6. An intention-to-treat analysis was performed. A mean between-group difference (95% CI) was calculated for each of the three outcomes based on the change scores (ie, post minus pre scores).

Results

Flow of participants through the study

Eighty students were screened for inclusion. Thirty-two either declined to be involved or did not meet the inclusion criteria (see Figure 1). In total, 48 students (20 second-year students and 28 third-year students) were randomised (19 males and 29 females). One participant was incorrectly classified as a second-year student when she was, in fact, a third-year student. This was not detected until the trial was completed so, for the purpose of all analyses, this mistake was ignored. The mean age of the participants was 21 years (SD 1). The participants in the two groups were similar on all key prognostic factors except confidence treating people with spinal cord injuries (see Tables 4 and 5). The participants in the experimental group had less confidence than those in the control group. Experimental group participants also reported lower proficiency with English, although this was not reflected in their teacher's assessment of English proficiency. The teacher scored both groups similarly (see Table 4).

Table 1
Example of six pairs of questions used as part of the knowledge quiz. The questions were designed in pairs and then one question from each pair was randomly allocated to the baseline test and the other to the test after the 5-week interventions.

Baseline test	6-week test
If a person has signs of autonomic dysreflexia, you should: • sit or stand the person up • clamp the catheter • put on an abdominal binder • give the person some glucose.	The main sign of autonomic dysreflexia is: • raised blood pressure • decreased blood pressure • raised temperature • increased heart rate.
The triceps muscle is primarily innervated at: • C4 • C5 • C6 • C7.	The key muscle group innervated at C5 is: • elbow flexors • finger and thumb flexors • knee flexors • wrist extensors.
A person with motor complete-thoracic paraplegia rolls by: • inducing spasticity in the hip abductor muscles • swinging the arms rapidly across the body to generate momentum • inducing spasticity in the hip flexor muscles • externally rotating and flexing the shoulders.	It is difficult for a person with motor complete C5 tetraplegia to roll over independently because of weakness in the: • pectoralis • wrist extensors • back extensors • trapezius.
What is the most common type of contracture for a person with spinal cord injury who sits for prolonged periods of time in a wheelchair? • ankle dorsiflexion contracture • ankle plantarflexion contracture • ankle inversion contracture • ankle eversion contracture.	What is the most common type of contracture for a person with C6 tetraplegia who lies for prolonged times in bed? • elbow flexion and forearm supination • elbow flexion and forearm pronation • elbow extension and forearm supination • elbow extension and forearm pronation.
The main implication of the latissimus dorsi muscle is that it enables people with C6 tetraplegia to: • vertically lift the body during transfers • roll independently • stand on a tilt table • take a deep breath.	The main implication of the biceps muscle is that it enables people with C5 tetraplegia to: • vertically lift the body during transfers • roll independently • stand on a tilt table • perform hand to mouth activities.
Neuropathic pain: • can be felt at, above, or below the level of the lesion • is only felt at the level of the lesion • is due to soft tissue trauma in the shoulders • is uncommon following spinal cord injury.	A physiotherapist can help reduce susceptibility to later-life shoulder pain in people who are wheelchair-dependent by: • teaching patients good wheelchair propulsion techniques • avoiding shoulder strengthening exercises • assisting with all activities • all of the above.

Table 2
The statements used to assess participants' confidence in managing people with spinal cord injuries. The instructions were: 'Rate how confident you feel today if we asked you to do each activity.' A 0 to 10-point scale was provided for each activity, anchored at each end by 'not confident' and 'highly confident'.

Activity
1. Conduct a physiotherapy assessment of a person with spinal cord injury.
2. Recognise medical complications in a person with spinal cord injury.
3. Manage contracture in a person with spinal cord injury.
4. Manage pain in a person with spinal cord injury.
5. Treat respiratory complications in a person with spinal cord injury.
6. Train strength in a person with spinal cord injury.
7. Train bed mobility and transfers in a person with spinal cord injury.
8. Train wheelchair skills in a person with spinal cord injury.
9. Train gait in a person with spinal cord injury.
10. Train fitness in a person with spinal cord injury.

Table 3
The statements used to assess participants' satisfaction with the learning experience. The instructions were: 'Think about everything you have been asked to do over the course of this trial to improve your understanding of spinal cord injuries. Rate the following four statements.' A 0 to 10-point scale was provided for each statement anchored at each end by 'strongly disagree' and 'strongly agree'.

Statement
1. The online education improved my knowledge about physiotherapy management of spinal cord injuries.
2. The online education improved my practical skills for treating people with spinal cord injuries.
3. The online education will help me with my studies of physiotherapy.
4. I am satisfied with the knowledge I gained from the online education.

Compliance with the protocol

Compliance with the trial protocol was good and all participants were assessed at the allocated times. There were no dropouts and all participants remained within their allocated group, except one participant from the control group who joined the Facebook group of the MOOC for 1 week before detection. All participants were instructed to devote 15 hours in total (or 3 hours per week) to their studies. The experimental participants reported devoting a median of 11 hours (IQR 9 to 15) in total and the control participants reported devoting a median of 10 hours (IQR 7 to 15) in total. Thirteen of the control students and 17 of the experimental students believed that they belonged to the experimental group. This indicates reasonable success with blinding of the students to the purpose of the trial.

Effect of intervention

The mean between-group difference in knowledge was 0.7 points (95% CI −1.3 to 2.6) on a scale from 0 to 20, with a positive score favouring the experimental group. The equivalent results for perceived confidence to treat people with spinal cord injuries and satisfaction with the learning experience were 0.4 points (95% CI −1.0 to 1.8) and 0.0 points (95% CI −1.1 to 1.2), respectively on a scale from 0 to 10, with a positive score favouring the experimental group (see Table 5). For individual participant data, see Table 6 on the eAddenda.

Discussion

A recent systematic review of MOOCs identified just 17 quantitative studies on this style of learning.[5] Most of the 17 studies were

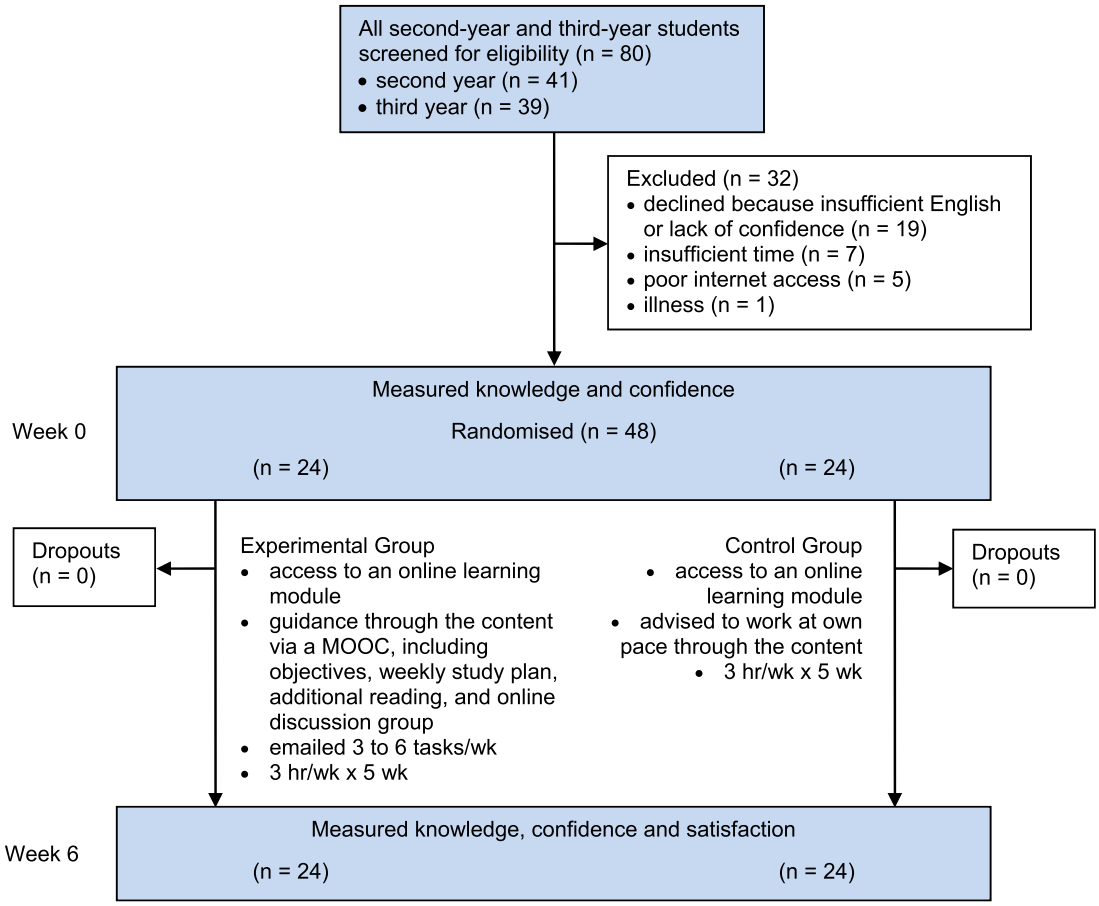

Figure 1. Design and flow of participants through the trial. MOOC = massive open online course.

Table 4
Baseline characteristics of the participants.

	Experimental (n = 24)	Control (n = 24)
Gender, n female (%)	14 (58)	15 (63)
Age *(yr)*, mean (SD)	21 (1)	21 (1)
Year of training, n (%)		
second	10 (42)	10 (42)
third	14 (58)	14 (58)
English proficiency *(0 to 10)*, median (IQR)		
self assessed	7 (5 to 8)	9 (7 to 10)
teacher assessed	3 (3 to 3)	3 (2 to 3)
Previous spinal cord injuries clinical experience, n (%)		
none	7 (29)	9 (38)
minimal	10 (42)	6 (25)
moderate	7 (29)	7 (29)
extensive	0 (0)	2 (8)
Frequency of internet use for studies, n (%)		
never	1 (5)	1 (5)
once a month	1 (5)	1 (5)
once a week	3 (13)	4 (17)
most days	11 (46)	10 (42)
every day	8 (33)	8 (33)

case studies with data taken from participants of MOOCs. The review did not include the only clinical trial (unpublished) that we have been able to identify.[7] That trial focused on student engagement, not effectiveness. Therefore, the present study is the first trial to address the issue of whether MOOCs are an effective way of providing education. The results of the present study indicate that the physiotherapy students did not gain more knowledge or confidence about the physiotherapy management of spinal cord injuries by participating in a MOOC than by progressing at their own pace through the physiotherapy-specific content on www.elearnSCI.org. Nor were they more satisfied with the learning experience. However, responses to the open-ended questions suggest that the MOOC students enjoyed engaging with students from other countries on the Facebook group.

The failure to demonstrate better outcomes with the MOOC is not due to an insufficient sample size. On the contrary, the upper end of the 95% CI associated with the mean between-group difference for knowledge (ie, −1.3 to 2.6 points) was below the pre-specified smallest worthwhile treatment effect of 4 points. In addition, the 95% CI was remarkably tight, which indicates good

Table 5
Knowledge about, and confidence in managing people with, spinal cord injuries, and satisfaction with the learning experience. Mean (SD) of groups, mean (SD) difference within groups, and mean (95% CI) difference between groups.

Outcome	Groups				Difference within groups		Difference between groups
	Week 0		Week 6		Week 6 minus Week 0		Week 6 minus Week 0
	Exp (n = 24)	Con (n = 24)	Exp (n = 24)	Con (n = 24)	Exp	Con	Exp minus Con
Knowledge *(0 to 20)*	9.2 (2.1)	9.1 (1.9)	9.0 (3.1)	8.3 (2.2)	−0.1 (3.7)	−0.8 (3.0)	0.7 (−1.3 to 2.6)
Confidence *(0 to 10)*	4.7 (3.0)	6.0 (2.8)	6.2 (2.4)	7.1 (2.4)	1.5 (2.5)	1.1 (2.2)	0.4 (−1.0 to 1.8)
Satisfaction *(0 to 10)*			8.1 (1.8)	8.1 (2.2)			0.0 (−1.1 to 1.2)

Exp = experimental group, Con = control group.

precision in the estimate. These results indicate that, within the limitations of the trial, there was no added benefit of the MOOC over self-directed completion of the online learning module. However, these results need to be interpreted with caution because the outcome measures may not have captured important differences. For example, the knowledge assessment was probably too difficult and may not have been sensitive to differences between the two groups. Interestingly, there were some types of questions that all students consistently answered correctly, both at the beginning and end of the trial. The confidence and satisfaction questionnaires were also problematic because both had marked ceiling effects. Consequently, both the control and experimental students had high scores at the end of the trial. This may have masked differences between groups.

It is possible that the control participants were very diligent in response to participation in the trial, thereby limiting any possible benefits of the structure provided by the MOOC. Alternatively, perhaps there was limited engagement by students of both groups. Students may not have been motivated to devote time to this topic because it was not part of their formal curriculum and they may have had competing demands on their time from their usual studies. This latter hypothesis is supported by the within-group results, which indicate no change in knowledge of either group. Of course, without a control group that did not engage in any learning, it is difficult to know which interpretation explains the non-significant findings. It might be interesting to repeat the study with the MOOC embedded within the students' curriculum. This may yield quite different results because students may be more motivated to learn if the content is part of their formal assessment.

The Bangladeshi students who participated in this trial may have been limited by language. The course was run in English and while all the Bangladeshi students spoke English, it was not their first language. Interestingly, when asked, the students generally reported good English skills. However, the students' ratings of their own English skills were consistently higher than the ratings provided by their teacher (who was fluent in English). While language barriers would have affected both groups, it may have particularly affected the MOOC students. The success of the MOOC relied on following weekly instructions and reading the Facebook discussion. Limited English skills may have prevented the MOOC students from fully benefitting from the learning experience.

One of the important aspects of the MOOC was the opportunity it provided for students to engage with other students and senior physiotherapists from around the world through the Facebook group. The course coordinators posted between two and five discussion points each week, which students of the MOOC were expected to comment on. Some of the Bangladeshi students stated that they enjoyed this aspect of the course and the opportunity to communicate with students and physiotherapists from different countries. However, this may not have provided the intended educational experience for the Bangladeshi students because they predominantly relied on their mobile phones to access the Facebook group and some of the discussion threads attracted close to 1000 posts, which would have been slow to load on mobile phones in Bangladesh. In addition, some students may have felt reluctant to fully engage in the Facebook discussion because of concerns about their English.

MOOCs are a relatively new educational phenomenon and, in part, arose from a global push about a decade ago to provide education for all although the MOOC term was only coined in 2008.[2,4–7,12–14] Academics and teachers are divided about the merits or otherwise of MOOCs; students also report mixed experiences.[14] However, most agree that MOOCs will probably never replace an experienced, knowledgeable and engaging teacher in front of a small class – nor will they effectively teach students practical skills; these need to be learnt elsewhere. However, MOOCs might provide students with a different type of learning experience and one that has other benefits. They may also provide students with access to information and knowledge that they may otherwise not have. MOOCs may be particularly useful for some of the specialty areas such as spinal cord injuries. However, before jumping to conclusions about the effectiveness of MOOCs, their possible merits need to be better understood. While the present study does not provide answers about the effectiveness or otherwise of MOOCs, it does provide an example of how rigorous trial methodology can be used to answer questions about the effectiveness of MOOCs and other online educational strategies. The randomised trial design is important for minimising bias, and bias is a problem for educational research, as it is for any research topic. However, if any trial, regardless of its scientific rigor, is going to provide answers about the effectiveness of different approaches, more work needs to be performed in developing good outcome measures in education.

What is already known on this topic: Massive open online courses (MOOCs) offer efficient ways of providing training to large numbers of people. MOOCs could be utilised to enhance the training of undergraduate and/or graduate physiotherapists. An important aspect of MOOCs is the sense of community that they create, and the opportunity they provide for people to engage online and learn from each other.
What this study adds: MOOCs for physiotherapy students are feasible. However, they may not increase students' knowledge about spinal cord injuries and confidence in treating people with spinal cord injuries more than self-paced independent learning of the same material via an online educational module.

eAddenda: Table 6 can be found online at doi:10.1016/j.jphys.2014.09.008.

Ethics: The study was approved by the Ethics Committee of the Centre for Rehabilitation of the Paralysed, Bangladesh. Participants were provided with a participant information sheet and then signed a consent form prior to participation in the study.

Competing interests: Physio-pedia receives sponsorship from Elsevier, which in turn received publicity through the MOOC. Elsevier and LA Harvey may also have indirectly benefited through any sales generated of the course textbook (which was published by Elsevier).

Sources of support: The University of Sydney provided salary support to LA Harvey and JV Glinsky to run the MOOC and trial. Elsevier sponsors Physio-pedia, but Physio-pedia did not receive any direct sponsorship or funding to run the MOOC. Bangladesh Health Professions Institute provided in-kind support to run the trial.

Acknowledgements: The MOOC was based on the physiotherapy-specific module of www.elearnSCI.org. This website was the initiative of the International Spinal Cord Society. Over 40 physiotherapists in different countries compiled the physiotherapy-specific module. The contributions of all that made the website possible and specifically contributed to the physiotherapy-specific module is acknowledged. The contributions of Dr HS Chhabra and Mr S Muldoon to the co-ordination of the entire website are also acknowledged. The MOOC was also based on www.physiotherapyexercises.com. This was an initiative of Sydney-based physiotherapists, Peter Messenger and Paul Pattie. The contributions of all those who contributed to this website are also gratefully acknowledged.

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Further reading

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