Perceptions by physiotherapy students and faculty staff of a multimedia learning resource for musculoskeletal practical skills teaching

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ABSTRACT

The aims of this study were to develop a multimedia DVD for musculoskeletal skills within a School of Physiotherapy, and explore faculty staff and students' perceptions of its usefulness and effectiveness. Faculty staff were consulted regarding the resource's content, audio-video clips of manual skills were filmed, and agglomerated in DVD-format. All Year 2 physiotherapy students received a copy of the media. Perceptions of usefulness and effectiveness of the resource were determined with a questionnaire (for students) and focus groups (for faculty staff and students). Quantitative data were analysed with descriptive statistics and the General Inductive Approach was used for qualitative data. Students responded favourably to the DVD with medians from the questionnaire ranging from 1.1 to 1.6 on a Likert Scale (1 most positive, 5 least positive). Qualitative analysis identified four categories: DVD usefulness, learning styles, effects on teaching, and DVD application. While faculty staff did not observe improvements in practical skills during clinical placements, students reported using the DVD primarily for revision purposes and that their confidence for the application of the skills had increased. In general, the DVD was perceived to be useful as an adjunct to traditional laboratory teaching.

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INTRODUCTION

The acquisition and mastery of practical manual skills is important for physiotherapy students to ensure effective assessment and treatment of patients with musculoskeletal disorders (Bowley and Holey 2009, Sizer et al 2007). Besides mechanical application of techniques, manual therapy competency also includes the development of discriminant touch and fine manual sensorimotor feedback (Sizer et al 2007). Development of these skills requires initial practice on healthy individuals to gauge a sense of normal, followed by clinical practice on individuals with musculoskeletal pathologies to develop the ability to discriminate abnormal findings (Bowley and Holey 2009). From a motor learning perspective, repeated rehearsal of manual therapy skills, feedback and experience are needed for competent and safe performance of these techniques (Triano et al 2012).

The four-year baccalaureate degree in physiotherapy at the University of Otago, New Zealand, has an intake of up to 120 students per year. Manual techniques are conventionally taught in class laboratories, mainly in Years 2 and 3 of the physiotherapy programme, in groups of approximately 30 students with instruction often given by different tutors. Despite weekly preparatory meetings between tutors and the paper coordinator, anecdotal reports from students suggest consistency of teaching between tutors and laboratory groups could be improved. Similarly, there are perceived inconsistencies in teaching and implementation of manual skills between the laboratory and clinical environments, as educators supervising students in clinical practice are not always involved in the academic laboratories, and vice versa. To promote student learning, it is important for each person involved in teaching (i.e., laboratory tutors and clinical educators) to be aware of others' methods and to support students to transfer the skills and knowledge between the two teaching settings. Having a standard reference for all education personnel could potentially increase the consistency and clinical application of skills.

Many resources can be utilised as adjuncts to teaching physiotherapy skills. Besides the use of textbooks, multimedia such as DVDs and videos have been used successfully as resources to complement traditional teaching in medical,

nursing and physiotherapy curricula (Brydges et al 2010, Erickson 2004, Kelly et al 2009, Khogali et al 2011, Maloney et al 2013b, Rowe et al 2012). Maloney et al (2013b) showed that physiotherapy students who had access to video tutorials rated the learning experience higher than those in the group receiving traditional teaching only, while no significant between-group differences were found in formal examinations. This perceived increase in educational value may occur for various reasons, i.e., access to these resources allows increased autonomy, self-responsibility for learning, and a greater ability to self-pace or self-regulate learning (Brydges et al 2009, Kelly et al 2009). Based on this trend towards greater self-responsibility of learning and the inclusion of multimedia in health sciences, the aim of this project was two-fold. The first aim was to develop a DVD resource to complement undergraduate Year 2 manual skill acquisition in musculoskeletal laboratories of the University of Otago physiotherapy programme. The second objective was to determine the perceptions of usefulness and effectiveness of the DVD from faculty staff and students that used this resource.

METHODS

Development of the multimedia resource

The resource developed for use in this study was in DVD format and comprised audio-video clips of standardised manual physiotherapy techniques. Prior to the development of the resource, two focus group interviews and informal discussions were held to prioritise and structure the DVD content with faculty staff at our School. This group comprised clinical educators, lecturers and laboratory tutors. After a majority consensus was achieved for the content, filming and formatting of the audio-video clips were undertaken using volunteers consisting of three physiotherapists acting as demonstrators and several physiotherapy students (four males, four females) acting as models. Written informed consent was gained from all volunteers before filming of the clips, as was approval from the University of Otago Human Ethics Committee for the entire research project.

Following a 3-week filming period, the series of manual skill-based audio video-clips were edited and formatted to DVD. A copy of the developed DVD was provided to all Year 2 laboratory tutors and students in our physiotherapy programme. The DVD was incorporated into the second half of a 13-week semester within the 2010 academic year.

Evaluation of the multimedia resource

Procedures

Data were collected through two mediums: (1) administration of an evaluation questionnaire, and (2) facilitation of focus group interviews.

Evaluation questionnaire

An evaluation questionnaire pertaining to the DVD was designed with the assistance the Higher Education Development Centre (HEDC) at the University. The questionnaire, in the form of a survey, was administered to all enrolled physiotherapy students in Year 2 (n = 109) during a laboratory at the end of the second 13-week teaching semester in October, prior to the formal 2010 academic year examination processes. The questionnaire consisted of nine closed-questions measured on a 5-point Likert scale (ranging from 1 to 5, where 1 designated the most favourable response and 5 the least favourable, Table 1). It also included the following open-ended question: "Do you have any additional comments relating to any aspect of the DVD?". Students were informed of the purpose of the questionnaire, which was then completed voluntarily, indicative of consent to participate.

Focus group interviews

Two distinct focus group interviews were held. The student focus group was performed after the academic examinations in November 2010, and the staff focus group in December 2010. The student interviews were semi-structured, following the outline provided in Table 2, and targeted between 8 to 16 participants. No specific order of questioning was followed during the interview process; however, more time was allocated to some questions than others depending on the information provided by interviewees. All participants involved in the focus groups were volunteers and provided verbal and written informed consent prior to participation. The same experienced researcher conducted both focus group sessions (MP), and had not previously been involved in teaching the Year 2 physiotherapy students. The two interviews were recorded with a digital voice recorder for later analysis.

Participants

A total of 81 (74%) Year 2 physiotherapy students from the 2010 cohort completed the questionnaire, with 15 of them attending the focus group in November (6 males, 9 females; mean (SD) age, 20 (1) years). A total of 9 faculty staff (7 males, 2 females; professional experience range, 2 to 31 years) participated in the December focus group. Eight of the faculty staff were employed as professional practice fellows, with responsibilities for laboratory tutoring and/or clinical education, and one was a lecturer, with responsibilities for coordination of papers and presentation of lectures and laboratories.

Data management, processing and analyses

Counts and medians for the Likert scales for the students' nine closed questions were computed by HEDC using customised software. Responses to the open-ended question from the evaluation questionnaire were transposed verbatim in anonymous format into a word processor for qualitative assessment, as were the two digital voice recordings from the focus group interviews. Quotes from specific individuals were labelled as "student" or "staff" together with an identification number. To distinguish questionnaire data from focus group data, the former were labelled with "HEDCq". Furthermore; dashes (—) were used to indicate pauses, ellipses (…) to indicate removal of text that did not interfere with data interpretation, and brackets [ ] to denote information added from investigators to clarify data.

The General Inductive Approach (Thomas 2006) was used to analyse the transcribed data. Two investigators independently read the transcribed data multiple times to identify recurrent themes. Through an independent iterative process, the

Table 1: Outcome of the student evaluation questionnaire for the DVD

	Question	Responses as percentage of all responders*					Median
		1	2	3	4	5	
1	How well structured have you found the material on this DVD?	78	19	2	0	0	1.1
2	How well are the techniques demonstrated on this DVD?	59	40	1	0	0	1.3
3	How clearly are the techniques described verbally on this DVD?	56	38	6	0	0	1.4
4	How effective have you found this DVD in helping you to prepare for your lab sessions?	64	30	5	1	0	1.3
5	How effective have you found this DVD in helping you to revise techniques following lab sessions?	84	16	0	0	0	1.1
6	How would you rate the quality of the video?	44	48	7	0	0	1.6
7	How would you rate the quality of the audio?	46	42	10	2	0	1.6
8	How would you rate the quality of the graphics?	47	42	11	0	0	1.6
9	Overall how well produced is the DVD?	49	47	2	0	0	1.5

* Most favourable response: 1; least favourable response: 5

Table 2: Schedule of semi-structured interview questions

Generic questions
• What did you think about the finished DVD?
• In what ways have you used the DVD?
• Has the DVD changed your method of learning/teaching of this course?
• How has the DVD helped/supported your learning/ teaching (in relation to lab and lecture teaching)?
• Any further recommendations/thoughts about this DVD or future DVDs?
Student specific questions
• Has the DVD changed the way that you work/practise and/or collaborate with classmates (peer support etc)?
• In what ways have you been able to apply these techniques to other learning situations this year?
• How would you envisage using the DVD in the future?
• What would make the resource more useful?
• What else would you like included on the DVD?
• Would other resources such as this DVD be of use in other papers?
Faculty staff specific questions
• Has the presence/provision of the DVD required extra work from you? How?
• How has the DVD changed the way the students approach (learning/interaction with classmates/clinical placements)
• What would make this specific DVD a more useful resource for you as a teaching tool?

investigators classified important or common concepts into categories. The categories that emerged from this parallel coding were then compared, discussed, and refined (Thomas 2006). Once consensus had been reached, the defined categories were cross-referenced to the original data to verify that these were indeed representative of the data. The computer programme NVivo 8 (QSR 2009) was used to assist in the thematic organisation of data. Excerpts from the transcribed data are presented to depict concepts inherent in each main category and are reported alongside the study findings.

RESULTS

Results for the questionnaire indicate median scores ranging from 1.1 to 1.6 on the 5-point Likert Scale (Table 1). Over 94% of respondents rated the content of the DVD favourably in terms of demonstration of techniques (Question 2) and revision following laboratory sessions (Question 5). The audio, video, graphics and overall production quality of the resource also were favourably rated, with medians of 1.5 or 1.6 (Questions 6 to 9).

Four main categories were identified from the qualitative analysis, with each category encompassing perceptions from students and faculty staff on given aspects. The categories were: DVD usefulness, learning styles, effects on teaching, and DVD applications. 'DVD usefulness' describes perceptions of outcomes resulting from use of the DVD for teaching, education, or learning. 'Learning styles' were perceptions of how the DVD could or did cater for particular learning styles, such as facilitating retention of information in visual learners. 'Effects on teaching' relates to perceived effects on teaching within the laboratory setting, and 'DVD applications' were the perceptions and/or contexts surrounding the use of the DVD.

DVD usefulness

The majority of the students perceived the DVD positively:

> *"DVD's of techniques are fantastic…more!"* (HEDCq)

Similarly, staff also perceived that the students appreciated the DVD:

> *"I had feedback from the students…I think that's probably the most important.…The students were very positive"* (Staff 1)

Students thought that their confidence for performing the techniques had increased, particularly when applying them on their peers:

> *"It was really good to know that I was doing it right and was not going to harm them. It gave me quite a bit of confidence."* (Student 4)

However, staff members were yet to see a difference in student confidence and performance during clinical practice:

> *"To be able to definitely say "Yes, there is a difference in their techniques or they are much more confident coming to the clinic now...", I think it's…too early…to make that statement."* (Staff 4)
>
> *"For some of the students, it did help to motivate their learning."* (Staff 1)

Clinical staff perceived that the DVD was useful for improving their own understanding of what students had been taught and for extending their technical skills in the clinical environment:

> *"I think as a clinician…it's actually quite nice for me to have seen …how they've been taught so that when they come along to the clinic I know…how it's been done."* (Staff 5)

In addition staff could envision using the DVD in other useful ways:

> *"I think* [the DVD] *would be useful for clinicians, and for your down time with your students. You could use it as a discussion tool to go through and practise things and perhaps develop that to the next stage."* (Staff 7)

Learning styles

Both students and staff recognised that the DVD provided a different medium to prepare and learn from and may be particularly appealing to visual learners:

> *"You…go to the lab and you see what's happening...and then if you go home and read a textbook, they're not the same…Whereas actually seeing it, you actually visualise what you are supposed to be doing and what you are testing and how it's all working…I don't know, rehab just seems to be a physical and visual subject, and therefore it needs a physical and visual medium to teach it."* (Student 15)
>
> *"It's…much easier for people to watch a resource rather than…read a resource."* (Staff 3)

However, one student commented that just watching the DVD would not be enough and that hands-on practise with another student was still important for learning the manual techniques:

> *"It's still a practical course. You still have to practice it at some point. You can't just watch only the DVD and never practise and still be able to do the techniques."* (Student 8)

Effects on teaching

Students and staff recognised that the DVD provided consistency between staff teaching the techniques in various laboratories:

> *"It's good to sort of unite what we are learning, cause we are in different groups and we do have different instructors…we are not starting off in a variation…we are all starting off at the same point."* (Student 3)
>
> *"It's almost like a calibration tool to make sure that everybody is on the same page."* (Staff 2)

However, while staff attempted to use the laboratory time for showing variations in techniques and to provide underlying context to use of techniques, it was perceived that the DVD may have potentially hindered the incorporation of modified techniques into teaching and student practice sessions:

> *"The detriment…is that often, they* [students] *would completely ignore all the modifications and everything else that was going on in the lab* [laboratory]*…they would go back to learning and reproducing the DVD version of the technique."* (Staff 1)

This staff member's comment was verified by some students, who found discrepancies between demonstrations of techniques between the DVD and lab tutors confusing. In addition, other students had been disappointed when staff appeared unsure of the DVD content and questioned a particular technique:

> *"Sometimes confusing when a technique is done differently in the lab compared to the DVD."* (HEDCq)
>
> *"Our lab demonstrator would say sometimes, "I'm not sure how this is shown on the DVD" and then would continue on to do however he did it. It would have been nice if maybe he did know how it was shown on the DVD."* (Student 9)

Conversely, other students enjoyed seeing the different methods of performing the same techniques as they perceived it increased their ability to individualise the technique to different patients or individuals:

> *"DVD was good to use to see different methods of doing technique rather than just lab tutors."* (HEDCq)

DVD applications

Some students found the resource helpful for pre-laboratory preparation:

> *"I did watch it before the lab and I thought it was really useful for practice."* (Student 3)

However, many students did not practise prior to the laboratory sessions for a variety of reasons, but mostly due to perceived time constraints:

> *"I didn't have time really. Too lazy, really. To be honest."* (Student 4)
>
> *"We do a lot of contact time in class and organise other things, and we also got sports and other commitments as well. It's pretty hard without them asking us to do prep before labs as well… if we do that, we give up all the other spare time we've got."* (Student 15)

Staff also noted that many students did not use the DVD for laboratory preparation:

"The DVDs are meant to be watched by the students before they come to the labs, so they are used as preparation. So myself, as a lab tutor then brings in… context, modification…and why you would modify it, what the technique means, a positive and negative test et cetera." (Staff 1)

Assigning specific tasks was one method for encouraging preparation:

"The first time I said "Watch the DVD, next week we are doing the hip or the knee". So they came, and I said "okay, so you all watched the DVD, can any of you show me [a specific technique]*", and then they all looked at me blankly. But when I said "I want…your group to prepare and have a look at this technique",…that worked."* (Staff 1)

Students mainly used the DVD as a reference tool for revision after laboratories, catching up after missing these classes, and preparing for formal examinations:

"It was good to be able to go over the stuff in labs and then watch it back, after the labs." (Student 6)

"If you've previously missed a lab, it's really good." (Student 15)

"Perfect for exam study." (HEDCq)

However, one staff member perceived that students used the DVD to cram and another felt that, while students might do well in examinations with the DVD, so far, students had not shown improved ability to transfer the techniques into clinical practice:

"Well, what they did tell me at the end of the semester [was that] *they would cram with the DVD."* (Staff 1)

"Whether it [the DVD] *makes any difference to their ability to treat patients or to manage a patient situation, I'm a little sceptical. Whether it gives them the ability to pass their practical exam at the end of 254* [PHTY254, the University code for the paper Physiotherapy Rehabilitation Science], *working with a normal model, it probably will."* (Staff 2)

Some students thought that the DVD would be useful for revision prior to laboratories and clinical placement in the following academic year (Year 3):

"Preparing someone for going into say, Year 3 so we've got it 'down pat'…say before we move on to harder things. Definitely. Definitely." (Student 5)

"I would use it to prepare before physiotherapy [clinical] practice." (HEDCq)

DISCUSSION

The results indicate that the DVD was perceived to be useful by students and academic staff as an adjunct to traditional laboratory teaching. Based on student responses to the evaluation questionnaire, the resource was of high to very high video, audio, and graphical quality, and perceived to be well structured, demonstrated, and produced. End-users' evaluations of the resource suggest that the DVD was useful in increasing consistency amongst personnel involved in laboratory teaching, providing an additional or alternative learning tool, revising material covered in laboratory, and preparing for end-of-year assessment procedures. Despite these positive perceptions, the resource was not consistently employed by students for laboratory preparation or self-directed learning, or across faculty staff.

Based on the favourable scores from the DVD evaluation questionnaire and the perceptions sourced from qualitative interviews, students regarded the DVD as a valuable and beneficial addition to their education experience and suggested that similar resources be developed for the subsequent year of their physiotherapy programme. These findings concur with previous studies indicating that the addition of multimedia learning resources were highly appreciated by students in health sciences (Khogali et al 2011, Maloney et al 2013b, Veneri 2011). Although faculty staff suggested that the use of the multimedia resource was unlikely to significantly influence formal examination scores, as shown by Maloney et al (2013b), the comments from the students suggest that their learning experience was more favourably regarded with, rather than without, the use of audio-video material.

An important finding of this study was that students perceived that they had increased confidence with application of the manual skills within the laboratory and in clinical practice after using the DVD. This attribute is vital for reasoning and interaction with others (Eva et al 2012), and our findings agree with those of Maloney et al (2013a) that the addition of multimedia resources is associated with improved student confidence. The affective component is an important factor for the learning experience (Sadideen and Kneebone 2012), and it is possible that the self-regulated access to the resource contributed towards the perceived improved confidence.

Despite the students' perception of increased confidence with applying the practical skills, faculty staff suggested that students did not appear to demonstrate any greater ability to translate their taught skills to clinical practice compared to previous cohorts who were not exposed to the DVD resource. However, we cannot corroborate or refute these perceptions because this study did not aim to compare examination scores from students with or without access to the multimedia resource. To date, the literature on the effect of multimedia resources on student examination scores provides equivocal findings. Studies involving physiotherapy (Smith et al 1996, Smith et al 2006) and medical (Brydges et al 2009) students have found a greater retention of ankle assessment and surgical skills when students had access to CD or video instructions, respectively, than those students who did not. Elsewhere, a randomised clinical trial with undergraduate physiotherapy students found no significant difference in clinical examination outcomes between undergraduate physiotherapy students who were taught using traditional practical teaching versus video tutorials and self-videos (Maloney et al 2013b). In the current study, the limited timeframe after introduction of the DVD to when the faculty staff were interviewed is likely to have contributed to the staff perceptions that students did not show clear improvements in their ability to apply manual skills. Future studies could investigate whether students in the same physiotherapy year demonstrate different assessment scores in formal end-of-year examinations with and without exposure to the DVD resource.

The content of the new DVD primarily focussed on the mechanical component of skill acquisition, and therefore could

also explain why faculty staff perceived that student application of techniques were not improved with the addition of the DVD resource. Application of manual techniques in physiotherapy practice needs to be adapted and is context-dependent. For instance, clinicians are required to modify techniques upon individual presentation with given symptoms or co-morbidities (Sizer et al 2007, Triano et al 2012). Communication and clinical reasoning skills, refining discriminate touch, bilateral hand-eye coordination, and the clinician's manual gross sensorimotor characteristics are examples of components that contribute towards effective management of an individual with a musculoskeletal disorder (Jones et al 2008, Sizer et al 2007). For a multimedia resource to better prepare students to the situations encountered in daily clinical practice, the resource may need to present several alternatives or modifications to each technique to respond to common clinical presentations and requirements. This has been achieved previously by relating techniques to cases from professional experience (Duvivier et al 2009, Sadideen and Kneebone 2012) and research evidence that underpins the use of the skills in practical settings (Maloney et al 2012b, Triano et al 2012, Zipp and Maher 2010). Alternatively, if the clinical educator has an understanding of the content of the resource, they could facilitate the student's reasoning processes to modify the techniques to the individual patient or client's requirements.

While the findings suggest that faculty staff found the resource useful, concerns were also raised that students were not using the DVD towards laboratory preparation. Whilst it is accepted that students should be challenged to take more responsibility for their learning, a generic framework should be provided to ensure that learning is appropriate, particularly in the early years of learning (Miflin et al 1999). The DVD was purposefully introduced to the laboratories half-way through the programme to allow comparisons by the students of their experience with and without the resource. As preparation for laboratories was not continually emphasised at the beginning of the programme, this may have affected staff and students' expectations once the DVD was available. The expected learning framework will need to be made more explicit from the outset of future programmes and support for this approach would need to be acquired from all staff involved with teaching.

Many comments sourced from the end-users' evaluations of the multimedia resource indicated that that DVD was perceived as useful and beneficial particularly to visual learners. Learning outcomes are thought to be enhanced by attention being paid to students' different learning styles (Sadideen and Kneebone 2012), and it is likely that the DVD met this need for several of our physiotherapy students. However, this is speculative considering that neither predominant learning style nor performance scores were determined in the current cohort of physiotherapy students. Previous research has shown that while an interactive DVD significantly improved grades awarded to students conducting a clinical examination of the ankle, individual learning styles did not significantly contribute to this improvement (Smith et al 2006). Accordingly, although students and faculty staff perceived that the DVD assisted visual learners in the current study, the actual effects of the DVD on individual assessment scores remain undetermined.

Study limitations and strengths

Although all Year 2 students had the opportunity to complete the quantitative questionnaire, the qualitative interview was limited to a small number of volunteers. It is possible that those with positive experiences and perceptions were more likely to complete the questionnaire and volunteer for the interview, which could bias the results. However, as the qualitative results appear to match those of the questionnaire, the likelihood of such bias is potentially small. The strength of this study is that a mixed-methods design was used, which includes quantitative and qualitative data. This allowed comprehensive analysis of results from different angles, in addition to incorporating both student and faculty staff feedback.

CONCLUSION

Multimedia learning is an established means of facilitating learning in health sciences curricula and provides students with the ability to access resources in a flexible manner. Students and faculty staff generally considered the implementation of the DVD resource to be useful providing an additional method of learning manual skills (particularly for students preferring visual resources) and enabling some consistency between faculty staff teaching laboratories. While faculty staff did not perceive clinical performance of the students to have improved, students reported having increased confidence when performing the skills. Only a limited number of the enrolled students appeared to use the DVD for laboratory preparation, with the majority of students primarily using it for revision and preparation for formal examinations. Although faculty staff noted positive outcomes from incorporating the DVD into teaching, use of the DVD was inconsistent amongst staff and they were concerned that some students appeared reluctant to modify skills to individual requirements. Emphasizing the importance and potential benefits of using the DVD in preparation to laboratories, rather than only in revision, may increase the future value and effectiveness of the resource in teaching manual skills.

KEY POINTS

- Students valued the multi-media DVD resource with manual therapy techniques highly, providing a resource they could access externally to formal teaching sessions, reporting increased confidence for the application of the manual skills.
- While use of a DVD may result in greater consistency of teaching between laboratory groups, there was also concern from faculty staff that some students appeared reluctant to modify techniques as required in clinical practice.
- A framework may need to be provided for students and faculty staff for the optimal use of the DVD to supplement formal teaching sessions.

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