

# Enhancing the Integration of Physical Assessment Techniques into Clinical Studies

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## Abstract

Occupational therapy students learned three basic physical assessments (measurement of range of motion; measurement of muscle strength and functional assessment of hands) in the first year of study. They are required to conduct these assessments on patients during their clinical attachments in a professional standard. To facilitate their bridging of knowledge to clinical practice, this project was developed with the main aim of enhancing the integration of physical assessment techniques learned in school into clinical studies by means of a more interactive teaching-learning method. Three video packages were produced with instructions given to students in the following areas: measurement of range of motion, measurement of muscle strength and functional assessment of hands. The instructors conducted the practical sessions by first introducing the procedures, rationale and precautions of the assessment. The practical sessions were then followed by demonstrations. The students were asked to practice among themselves during the practical sessions. In order to reinforce learning practical skills, students reviewed the video programmes after the practical sessions to further identify the correct positioning techniques, placements and the administration of each assessment. In the next practical sessions, students were asked to demonstrate the assessment procedures. During these sessions, their performances were video-taped. Feedback was conducted by the subject lecturer on the positioning, methods of administration and recording.

The efficacy of this teaching learning method was evaluated in three methods. The first method was the focus group discussion. Students found the video programmes to be very professional and useful to reinforce the acquisition of the assessment techniques. They also expressed that the visual feedback and self-evaluation were beneficial to their practice. However, some students commented that the areas covered in each video package were too broad and that more detailed demonstrations were needed. Student suggestions included more practical sessions to allow more feedback and input from subject, and more detailed procedures of assessment in the video packages. The second method was a comparison of the results of student performances in the practical tests. Results of their performance in this subject were comparatively higher than the previous groups of students who were not exposed to these video-teaching methods. The third method was the students' performances during clinical placements. The overall comments from the clinical educators on their performance were positive. They pointed out that the video programme could also be reinforced during the clinical placement. Besides, they suggested that advanced assessment techniques should be covered in the video packages as well.

## Introduction

Occupational therapists have to conduct systematic assessment on client's social, physical and psychological functions in order to identify the problems that clients encounter due to physical injury, disease or trauma (Trombly, 1996). Physical assessments include assessment on muscle

strength, range of motion and functional hand assessment, which are often conducted on patients with musculo-skeletal injuries in physical settings.

Occupational therapy students learned three basic physical assessments (measurement of range of motion; measurement of muscle strength; and functional assessment of hand) in the first year of study. They are required to conduct these assessments at a professional standard on patients during their clinical studies. However, they often encounter difficulties in the acquisition of these practical assessment techniques merely by learning from books, lecture notes or a few practical sessions. Feedback from clinical educators in the field also indicates that students often have difficulties in conducting physical assessment on patients. To facilitate their bridging of knowledge to clinical practice, this action learning project was developed with the main aim of enhancing the integration of physical assessment techniques learned in school into clinical studies by means of a more interactive teaching-learning method.

## **Problems of Current Practice**

Occupational therapy students have to learn different practical techniques during their course of study. It is often a challenge for teaching professionals to facilitate the acquisition of these techniques to a professional standard in an educational setting. When teaching practical techniques, an instructor usually provides background knowledge of the skill, demonstrating the skill and asking the students to practice the skill (Bazyk and Jeziorowski, 1989). This mode of the teaching-learning method has been practiced in the occupational therapy faculty in the past decade. Yet, students were found to have difficulties in mastering these physical assessment techniques. They also were found to be unable to conduct them on actual patients with musculo-skeletal problems.

Two main reasons accounted for students' difficulties to master these assessment techniques. First, the students were not clear about the concepts and purposes of different assessment techniques. For instance, students were often confused with the concepts of the assessment of range of motion and those of muscle strength. Hence, they were not able to choose the appropriate assessment during their clinical studies. Second, students were not familiar with the assessment procedures, such as the positioning of instruments, client and therapist and the grading system. It was observed that students seldom practiced these assessment techniques on their own time. One possible reason was that the learning materials, i.e., lecture notes and textbooks, were not interesting enough to stimulate students to study by themselves. Indeed, the retention of practical techniques is best achieved by frequent practice (Cooper, 1985). In other words, self-study and practice are essential learning methods for students to master practical techniques.

Based on the observations of students' learning modes and reflections on the teaching-learning methods, the researchers realised that the conventional teaching-learning methods were not effective in enhancing students' integration of these physical assessment techniques. Therefore, a more interactive teaching-learning approach had to be adopted to enhance students' learning of these assessment techniques.

## **Literature Review**

### **The Use of Video Programmes in Enhancement of Practical Techniques**

The visual element that is provided by teacher demonstration and media use is one of the distinguishing characteristics of instruction within the allied health professions (Griffith and MacLannon, 1964; Waggoner, 1984). Video programmes are therefore useful to empower students to be their own teachers during self study as they have to generate strategies to solve problems

encountered in self practice (Welch et al., 1992). On the other hand, videotaped demonstrations have become more prevalent in preparing students to be clinicians (Bazyk and Jeziorowski, 1989). They can bring clinical experiences into classroom situations without actually involving the real patients. Patients will not feel embarrassed in front of a big group of students. Instructors also have better control of the teaching-learning process.

Spitzer (1989) conducted an evaluative study of a videotaped class offered to undergraduate education students at Boise State University and made comparisons with a conventionally taught class. Results indicated that student achievements and attitudes in the videotaped class group were better than those of the conventional groups.

However, Bazyk and Jeziorowski (1988) conducted a study to compare the effectiveness of videotaped and live instruction in demonstrating evaluation techniques to occupational therapy students. Twenty-three students were randomly assigned to either the videotape group or the live instruction group. The videotape group watched a 25 minute commercially available videotape demonstrating the Milani-Comparetti Motor Development screening test. The live group received the same information from an instructor. A written examination that assessed student knowledge of the purpose and procedures of the evaluation tool served as a pre- and post-test. Results indicated no difference in test scores between the two groups. However, from the students' feedback, they preferred live demonstrations to videotaped instruction because of the opportunity to ask questions and interact with the instructor.

Undoubtedly, the use of live demonstrations and videotapes as a type of learning method have their own advantages in enhancing students' learning of practical techniques. A well-blended programme of these two methods can bring out the best result in each. Commercially available videotapes, however, generally do not meet the specific needs of students as well as the specific demands of teachers. Hence, a tailor-made video programme that is geared towards the needs of students can achieve the best effects of audio-visual aids.

On the other hand, video programmes can be produced as self-paced learning packages. By means of the videotapes, students can stop the programme at a certain place to examine in detail a certain assessment procedure and rewind or fast-forward the programme according to their pace of learning (Rae, 1993). This type of manipulation is certainly not possible in live demonstrations. Video programmes are therefore useful in reinforcing students' learning on their own pace and in their own time.

### **Demands of Teaching Staff in Preparation of Practical Sessions**

From instructors' perspectives, videotaped demonstrations can be more systematic in the delivery of the practical sessions and can have more control over the performance of the skill that is demonstrated (Armsey and Dahl, 1973). Instructors can also highlight areas that are of utmost importance to students when using video programmes. Additionally, video programmes are more convenient and efficient because they do not require the amount of time and energy necessary to arrange for live demonstrations (Armsey and Dahl, 1973). The instructor can therefore spend more time on feedback and provide more guidance to students. Obviously, use of video programmes can resolve the problems of limited contact hours of tertiary education teaching.

Another advantage of using videotaped teaching techniques is that video programmes can be used for teaching repeatedly over a period of some years, although a lengthy period of time is initially needed to prepare an instructional video programme. The teaching staff usually has to use a considerable amount of time to prepare the scripts and content of video programmes, and to be involved in the videotaping, editing and the preparation of the manual. However, once the video programme is completed, it can provide a more comprehensive and informative demonstration to students. As the video programme can be re-used, teaching staff can also save time in preparing

live demonstrations each time the subject is taught. Furthermore, they can spend more time to engage in other scholarly activities (Mitchell, 1985; Rogers, 1986).

### **Feedback Mechanisms to Improve Learning**

Feedback is an essential element to reinforce the learning of practical techniques as it helps students observe their performance and identify areas for improvements (Lawrence, 1994). Feedback is often given by teachers, but can also be given by peers or the students themselves. Boyce (1996) conducted a study to compare the effectiveness of peer, teacher and video feedback during elementary students' skill development units. Pre- and post-testing indicated that teacher-directed feedback was best for younger students whilst video feedback with teacher cueing was best for older students. Although this study was conducted on elementary students, the concept of using video feedback with teacher cueing could be adapted to tertiary education for older groups of students.

Video-feedback was developed to be used by teachers as a type of self reflection on their teaching methods (Storeygard, 1995). When this principle of self assessment of video-feedback applies to student learning, students not only receive feedback from teachers and peers, but are also able to comment on their own performance. Hence, video-feedback is believed to be effective in reinforcing learning through self evaluation.

According to the feedback of the clinical educators, they usually have difficulties in providing feedback to students on their performance during the physical assessment as students did not perceive their own mistakes. Sometimes, they are not aware of their posture, positioning and the sequence of assessments. Hence, video feedback has the advantage of providing clinical educators and students themselves with feedback on the performance of practical techniques.

### **Development of the Action Learning Project**

After analysing students' problems in mastering physical assessment techniques, an action learning project was developed to focus on the demands of students in learning physical assessment techniques, including assessment of range of motion, manual muscle testing and functional hand assessment, all during the study of the occupational therapy programme.

In addition to previous teaching-learning modes, that is, live demonstrations by instructors and students' practice under the guidance of the instructor, a series of video programmes and a video feedback mechanism were introduced to enhance students' performance in physical assessment techniques.

This action learning project was developed in four phases :

#### ***Phase One : Production of Video Programmes***

Three video programmes were produced with instructions given to students in the following areas: measurement of range of motion, measurement of muscle strength and hand function assessment. Each video programme consisted of the introduction and explanation of the assessment principles; the introduction of the instruments for measurement as well as the measurement procedures; and demonstrations. Although there are commercially-produced video programmes, their contents can not fulfill the needs of occupational therapy students. They are either too specific or too broad. To meet the requirements of clinical practices, the contents of the videos were designed by the researchers to facilitate students' learning of the physical assessment techniques and transfer these learned techniques into clinical practice.

### ***Phase Two : Re-structuring of Existing Teaching-Learning Methods***

The schedule of the practical sessions was re-structured to incorporate the video programmes as part of the teaching-learning mode. The instructors first introduced the procedures, rationale and precautions of the assessment. They then showed the video programme on one assessment technique to the students.

After students grasped the preliminary concepts of the assessment procedures from the video programme, the instructor performed live demonstrations with the focus on the use of the instruments, the positioning issues and necessary precautions to be taken during assessments. Students were asked to raise questions or comment on the live demonstrations based on their knowledge gained from the video programme.

Thereafter, students were asked to practise the assessment techniques with their partners. The instructor walked around the classroom, giving guidance to those students who encountered difficulties and clarifying uncertainties during students practices. Students were also asked to refer to the video programmes if they had queries.

### ***Phase Three : Video-Feedback***

Immediate feedback is essential in reinforcing one's learning process. The researchers also felt that feedback given by instructors, fellow classmates and the students themselves are most beneficial. Hence, the feedback session was conducted in a group situation. The instructor asked a pair of students to perform an assessment technique, such as measurement of the range of shoulder abduction, to the whole tutorial group. To enable students' self evaluation, video-feedback was used in which students' performance was videotaped. The videos were reviewed by the instructor, peer students and the demonstrators to further identify the correct positioning techniques, placements and administration of each assessment and recording.

The advantages of videofeedback are two-fold. First and most important, videofeedback is objective, so students are able to receive evaluation in an unbiased manner. Moreover, students who perform the demonstrations can evaluate their performance in a reflective manner. Second, videofeedback allows repetitive or slow-motion playback in which students are able to examine the measurement procedures in detail.

During the review, both the demonstrators and their fellow classmates were encouraged to comment on the performance. After comments were made and suggestions for further improvement were given, the demonstrators were asked to perform the assessment technique once again to reinforce their concepts and to strengthen their practical techniques.

To further reinforce the learning process of these assessment techniques, students were encouraged to practise these techniques during their own time. Moreover, they were advised to use the video programmes as reference to reinforce the correct positioning techniques, placement of measurement instruments, sequence of the assessment procedures and the administration of the assessments.

### ***Phase Four : Evaluation***

This teaching-learning method was evaluated by four methods. It was first evaluated by a focus group interview, which has the advantage of generating rich and multi-faceted information through interaction among group members in a relatively short period of time (Morgan, 1988). The interview was semi-structured, as the researchers had an agenda, but the students were encouraged to freely express their opinions. Besides, comments outside the scope of the discussion topics were also welcome. Eight students were randomly selected from the whole class of 45 students and invited to participate in the interview. Owing to personal matters, one invited

student was absent in the interview. The interview was facilitated by the researchers to encourage group interaction. Topics for discussions included students' knowledge of the assessment techniques, the structure of the teaching-learning methods, the effects of video programmes to facilitate learning and the use of video feedback as a feedback mechanism. The whole interview was audio-taped and then transcribed for the purpose of analysis.

The second method was a formal practical test on these physical assessment techniques. All students were required to take a practical test in which they were asked to perform one of these assessment techniques. The performance was evaluated on the following aspects: the positioning techniques, measurement procedures and recording methods. Results of the practical test were compared with the performance of previous classes who were instructed by conventional teaching methods.

The third method was to receive feedback from clinical educators on students' performance on practical techniques during the clinical placement. As the students participated in clinical studies at the end of the academic year, clinical educators were asked to comment on students' performance of the physical assessment techniques in clinical studies. In other words, the researchers were interested to examine students' competence in transferring the assessment techniques learned in college into clinical practices.

Finally, the researchers, that is, the instructors of the subject, conducted a self critique on this mode of the teaching-learning method. Methods of self-reflection included discussions on the advantages and disadvantages of adopting this new teaching-learning method for students; observations of students' performance in practical sessions; and the degree of usage of the video programmes as a self-paced learning package.

## Results

### Focus Group Interview: Quality of Learning Experiences

Both positive and negative comments on the video programmes were received. In general, students found the production of the video programmes very professional. However, some students expressed that they did not gain a very clear picture of the assessment techniques, as the demonstrations in the video programme were shown in discrete steps. For instance, when measuring the range of shoulder flexion, shots included the starting position of the client; the placement of the goniometer (measuring instrument) at this starting position; the finishing position (the shoulder flexes to its limits); and the placement of the goniometer at this end position. Students suggested that the demonstrations should be presented in continuous and sequential flow so that they could have a thorough demonstration of the whole assessment procedure.

Other students commented that some demonstration procedures and techniques were not consistent with the textbook or the lecture notes. Therefore, they were not certain which method was correct during their self practice. This concern, indeed, reflects the actual situation in that most assessment techniques carried out in clinical practice are not consistent with those described in textbooks. One major reason for this inconsistency is that therapists modify assessment techniques to accommodate individual conditions of clients. Another practical concern about the video programmes was insufficient copies of videotape programmes to share among students for self study; students sometimes had to wait for days before they could gain access the video programmes. Despite these pitfalls, students acknowledged the usefulness of the video programmes in clarifying the uncertainties raised during self-practice as well as reinforcing the correct assessment procedures and techniques during self-study.

Regarding the use of video feedback, students found it a very useful feedback mechanism to enhance their understanding of their own performance. Students pointed out that they gained

more insight towards their own strength and weakness. Compared to feedback without videotaping, students commented that video-feedback allowed them to review the assessment procedures in greater detail through playback, which enabled them to make more specific comments on fellow classmates' performances. Furthermore, students expressed that they gained a deeper understanding and could recall the 'right and wrong' elements during their own practice.

Owing to the fact that students only practiced the assessment techniques with their fellow classmates, some students therefore expressed worries of conducting the assessments on patients with disabilities during clinical practice. For instance, they might not know the how to position the patient and the assessment instruments due to the patients' disabilities, deformities and pain.

### **Practical Test**

Results of students' performance in the practical test were comparatively higher than the previous groups of students who were not exposed to this video-teaching method. Three students (6.8%) failed the practical test under the new programme while eight students (8%) failed last year without the introduction of video programmes and video feedback. The mean scores of the practical test for this year and last year were 68 and 66 respectively. Students commented that the practical test was stressful, partly because of the broad syllabus and partly because of the 'only one attempt' characteristic of the practical test.

### **Comments from Clinical Educators**

Two clinical educators working in physical rehabilitation settings were interviewed individually regarding the clinical performance of this particular group of students during their placement. Several issues were brought up during the interviews, including their comments on production of video programmes, their views on students' performance and further suggestions and improvements on students' learning.

Clinical educators in general welcomed the production of professional video programmes to enhance students' learning of practical techniques for professional practice. These video programmes facilitated systematic teaching in college, which is reinforced in clinical studies. They also provide better communication and integration between clinical educators and teaching staff in enhancing students' learning of professional techniques. Clinical educators also suggested that other skilled programmes could be developed in line with this video package.

Comments from the clinical educators on students' performance in the clinical placements were positive. Although students still needed time to practice on actual patients, they were able to master the assessment techniques faster than previous students who have not been exposed to this teaching method. However, precautions and contraindications for individual conditions were still weak and often required prompting. This was understandable because students were not taught about the pathology of different conditions prior to the clinical placements. Besides, clinical educators pointed out that they were more confident in asking students to conduct assessment on patients as they were more aware of their levels of understanding. To further enforce the integration, clinical educators suggested to put the video programmes in clinical settings.

On the other hand, one clinical educator commented that only one assessment procedure in one physical area was demonstrated in the video programmes. She recommended to include alternate assessment procedures and methods when assessing patients' physical functions in order to give students have a broader understanding of the physical assessment techniques. The inclusion of advanced assessment techniques were also suggested.

As a whole, clinical educators supported the production of audiovisual teaching programmes to enhance students' learning. However, more communication between clinical practitioners and academic staff should be made to achieve better standardisation of procedures of assessment techniques, according to patients' conditions.

## **Researchers' Self-Reflections**

The researchers reflected that during the past few years during which conventional teaching methods were adopted, students often encountered difficulties in applying the fundamental concept of assessments during clinical placements. With this introduction of the new teaching-learning methods, students and teaching staff worked much closer together to look into the matter of learning. Furthermore, teaching staff were more systematic in the delivery of their teaching and could spend more time to discuss individual problems with students.

Although the researchers spent a lot more time and energy in the preparation of the three video programmes, the outcomes of the productions were found to be satisfactory and that students could gain much from the programmes. Thus, staff were reinforced to provide more guidance and feedback in the delivery process. This type of interaction forms a positive chain of teaching-learning, as both teaching staff and students gain more satisfaction during this teaching-learning process.

Moreover, students were observed to be attentive in reviewing the video-feedback and made constructive comments. They enjoyed this learning process though many of them were tense and timid in performing the demonstrations at the beginning. Once they got used to this format of feedback, they were not only active in making constructive comments, some students even volunteered to perform the demonstrations. On the whole, students were found to learn actively and created much fun out of it.

## **Discussions**

### ***Self-Paced Learning***

Video programmes are inevitably an appropriate teaching-learning resource to enhance students' acquisition of assessment techniques. To master a practical technique, guidance and practice are deemed essential. However, there is limited time for the study of these techniques in the occupational therapy programme. Only 12 hours are allocated for the physical assessment techniques: measurement of range of motion; manual muscle testing; and functional hand assessment. As a result, video programmes serve as an important means to provide audio-visual guidance to students. Besides, students can practise these techniques with reference to these video programmes on their own time. In other words, video programmes can be regarded as virtual tutors. On the other hand, students can learn the assessment techniques at their own pace. They can review one specific assessment technique repeatedly until they master it. Because of the advantages of video programmes as learning resources, it was not surprising to observe that students were more competent in performing these assessment techniques, as reflected by the results of the practical test. Moreover, students were found to conduct more self studies by using the video programmes. A possible reason for this outcome was that video programmes were more stimulating than the descriptions presented in lecture notes. Therefore, students were more motivated to practise these assessment techniques on their own time.

The production of video programmes also enables better communications between teaching staff and clinical educators, as the latter are able to gain a clearer understanding of what students had learned in college and thus provide a smoother integration of students' knowledge into clinical studies. Undoubtedly, this process can alleviate students' stress because clinical educators had more realistic expectations from students. On the other hand, when reviewing the video

programmes, clinical educators can comment on the appropriateness and applicability of contents in clinical practices, and introduce recent developments of assessment techniques. These two factors provide the students with better preparation for clinical study.

### **Feedback Mechanism**

Students learn and understand their level of performance from feedback. Formal feedback such as written assignments, tests and examinations give student insights on their performance at some discrete points in their study, e.g., at the mid-term and end of the term. Informal feedback such as verbal comments given in classes enables students to understand their competency in the subjects in a continuous manner. Both types of feedback were used in the present study. Formal feedback was conducted in the format of a practical test; whilst informal feedback was given through video-feedback and verbal feedback in classes. Students appreciated the use of video-feedback as it encouraged self critique on one's own performance. Reflecting on one's own performance is a crucial element in the learning process as students learn to analyse their own performance in an open manner. This type of analysis also helps students to view their own mistakes in a positive manner.

On the other hand, students found the practical test (formal feedback) stressful as they were requested to perform one assessment technique within a certain time limit. Students pointed out that their performance might be affected by the time limit, the uncertainty of which assessment technique to be assessed, and having only one attempt for the test. They claimed that their performance in the practical test might not truly reflect their competency level. In view of students' comments, the researchers plan to restructure the format of the practical test so as to alleviate students' stress.

### **Recommendations**

In consideration of students' comments on the inconsistency of assessment procedures described in textbooks and those in the video programmes, an instructional manual will be produced in alignment with the video programmes to maintain consistency. In addition, the instructional manual serves as a self-directed learning booklet in which problem based activities, like questions and answers on concepts of assessment techniques and simulated case studies, will be included.

The incorporation of video programmes and video feedback into the previous teaching-learning methods inevitably enhanced students' learning of physical assessment techniques in an educational setting. However, the transfer of assessment techniques into clinical practice needs to be strengthened in the following three ways. First, demonstrations of assessment techniques on patients with different pathological conditions, such as rheumatoid arthritis, fractures, nerve injuries and tendon injuries, will be added to the existing video programmes. Thus, students are able to observe the procedures of the assessment techniques on actual patients. Second, the principles and precautions of conducting physical assessments on patients will be further strengthened in the classes and in the instructional manual. Last, the researchers will collaborate with clinical educators to plan clinical activities to facilitate students' transfer of knowledge. For example, clinical educators are suggested to perform demonstrations of the assessments on patients with explanations before asking students to perform the assessments on patients. Clinical educators are also expected to emphasise the precautions and principles of conducting the assessment techniques on different patients.

In response to students' comments on the difficulty of understanding assessment procedures due to the discrete steps shown in the video programmes, the video programmes will be reproduced in such a way that demonstrations will be shot in a continuous and sequential manner. The researchers thus hope that students will be able to learn the assessment techniques more easily through the video programmes.

## Limitations of the Study

The initial plan of the project was to develop a video programme in which live demonstrations could be videotaped for students to practice. However, during the production phase, many difficulties arose in allotting suitable venues for the production of the programme. The studio of the Media Resources & Services (MRS) was under construction so that videotaping has to be conducted in our practical laboratory. However, the practical laboratory was utilised for teaching most of the time. The production could only be performed during evening hours when teaching activities were low. Moreover, the practical laboratory was equipped with other equipment and facilities that interfered with the videotaping procedures. Another problem encountered was the difficulty of inviting actual patients for demonstration as they preferred to attend during the day, although the technician employed for filming the video programmes was only available in the evenings. Hence, the videotaping could only be conducted on normal subjects. The videotaping and editing procedures were new to the researchers and therefore many trials and errors occurred that prolonged the whole production process. These problems might be remediated by the introduction of short courses on the production of video programmes in tertiary education or by having adequate technical support from the school.

Owing to the limitation of contact hours of practical sessions, not all students were videotaped for feedback. This factor definitely deprived some students of gaining self reflection of their own performance. Moreover, the quality of videotaped feedback was not satisfactory due to inadequate technical support so that some of the positioning was difficult to comment on due to the viewing angles. This problem might be remediated by adequate professional support or by providing in-service training for our departmental technical staff so as to improve the quality of the outcomes through video programmes.

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