Disability Assessment: The Efficacy of Multimedia Interactive Nurse Education

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Introduction
Assessing physical functions and disabilities is an important part of clinical evaluation, as it shows the ability of an individual to function in general areas of life (Fountoulakis et al., 2012). In practice, the healthcare team, including physicians, nurses, occupational therapists, physical therapists, and others, rely on their professional assessments to formulate care plans and goals. Disability is an important element of care planning and intervention effectiveness. Disability assessment enhances patient management intervention design and health reporting. Therefore, healthcare needs are necessarily accompanied by disability assessment.

Nearly 3% of Taiwan’s population is defined as disabled (Council for Economic Planning and Development, Executive Yuan, 2009). Disabled refers to people with disorders affecting activities of daily living (ADLs), instrumental ADLs (IADLs), and cognitive and mental functions. Taiwan’s population of 573,752 disabled individuals in 2008 is estimated to rise to 1,398,628 in 2046. At the close of 2011, Taiwan had 1,093,219 officially registered mentally or physically handicapped citizens. This represents 4.71% of the total population and a 0.06% increase over 2010 levels (Ministry of the Interior Department, 2011). The number of disabled individuals who failed to function in over three ADL categories totaled 256,653 people in 2008. This number is expected to increase to 759,432 by 2046, highlighting a rapidly growing disabled population in Taiwan (Kao & Chiu, 2004).

Disability generally refers to defect-related limitations on daily living performance (Ling & Chiou, 2004). Long-term care is a series of long service measures designed for people with congenital or acquired dysfunctions or difficulties, which can be adjusted according to degree of disability. This makes accurately assessing the disabled even more important. To address this challenge, several instruments have been developed to date, and a large number of concepts and definitions have been developed and put into operation (Noonan et al., 2009).

Disability assessment is a complex and multifaceted process of exploration and evaluation (Hesse & Gebauer, 2011). Kane and Kane (1981) suggested that disability assessments include the assessment of ADL accomplishments. ADLs include 10 daily activities such as eating, shifting, personal hygiene, ABSTRACT

Background: Nearly 3% of the population in Taiwan is classified as disabled. Disability assessment directly relates to long-term care quality and resource allocation.

Purpose: The purpose of this study was to explore the effects of a multimedia interactive DVD on enhancing nurse knowledge and disability assessment skills.

Methods: The study was a quasi-experimental design. The experimental group received multimedia interactive DVD, and the control group received conventional classroom education. The study gathered data using scales assessing knowledge related to disability assessment and case studies. Scales were implemented before and after multimedia interactive DVD interventions at weeks 2 and 4. In-depth interviews with voice recording were used to collect qualitative data to elicit differences in perception between the experimental and control groups.

Results: This study found significant improvements in the experimental group in terms of disability assessment knowledge and case study assessment skills. These improvements lasted through at least 1-month posttest. Analysis of interview data for the experimental group showed that the multimedia interactive DVD provided a more flexible approach to learning than classroom education and improved participant self-confidence to conduct disability assessments.

Conclusions/Implications for Practice: The study showed the effectiveness of the developed multimedia interactive DVD in significantly improving the disability assessment confidences of nurses. Study findings can be used as a reference guide for continuing educational efforts in long-term care settings.

Key Words:
multimedia, disability assessment.

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toileting, bathing, walking, climbing stairs, putting on clothing, and stool and urine control.

However, basic daily activities do not guarantee that individuals can live independently in society. Such relies on the ability to handle certain daily activities such as cooking, doing laundry, outing, and so on. IADL assessment items include eight daily activities such as housework, shopping, and financial management. IADL-related disability means an individual is limited to perform necessary daily activities and needs care assistance to live independently within the community. It is true that existing disability measures are either comprehensive and lengthy or short and unidimensional. There is a need for a user-friendly, relatively short but comprehensive, simple, cost-effective, and sensitive measure of disability in long-term care. ADLs and IADLs are the most commonly used measures for long-term care needs (Fountoulakis et al., 2012) and are applied to governmental resource allocation and budget funding estimation (Chou, 2006; Chou et al., 2005). The 10-year long-term care plan in Taiwan is expected to be implemented in 2016 for long-term care insurance. This plan uses ADLs and IADLs to assess degree of disability and define the subsidy standard for service delivery (Department of Social Affairs, Ministry of Interior, Taiwan, ROC, 2007).

Furthermore, major municipalities are required to regularly supervise and evaluate nursing agencies within their jurisdiction and require that every resident have a comprehensive disability assessment and related records (Department of Health, 2007). Accurate disability assessments improve quality of care and can be applied to educational training programs for care managers to enhance long-term care service appropriateness and government resource allocations. However, some studies have pointed out that most of Taiwan’s long-term care practitioners are not professionally trained on disability assessment (Lau & Shyu, 2006; Mao, Chi, & Wu, 2007). This situation can be expected to have a significant and negative impact upon quality of care and resource control.

Nurses are qualified to perform disability assessments. Disability assessment is a complex procedure and almost impossible to handle in conventional classroom settings. This study thus developed a multimedia interactive disability assessment DVD to address this problem.

In recent years, advanced technology has been applied to improve multimedia-assisted interventions in nursing practice and education (Lin, Yang, Li, & Wang, 2005; Lin, Yeh, Chen, & Chen, 2006) to strong and positive results. For example, multimedia has been applied to solve the chronic issue of low efficiency/high cost in traditional educational training (Chen & Chen, 2006) as well as to enhance student understanding of subjects (Chang, 2008; Fann & Gau, 2008; Lo, Hsu, Lee, & Lin, 2005; Tsai et al., 2006). Although there are no significant differences in attitudes and behaviors, it shows a progressive increase (Tsai et al., 2006). The most important feature for multimedia instructions is freedom from time and space constraints. Also, course contents can be stored directly on the digital medium, learners can repeat lessons based on individual needs (Huang et al., 2006), and most students think multimedia instructions increase learning effectiveness and efficiency (Williams, Brown, & Archer, 2009). At present, the study of multimedia interactive DVD in nursing education has given more emphasis to the development of teaching materials (Huang et al., 2006; Tu, Chen, & Sung, 2007). When we apply multimedia interactive education, the normal focus is on patients rather than nurses (Ong, Miller, Appleby, Allegretto, & Gawlinski, 2009). In addition, there are no studies that have investigated the efficacy of multimedia interactive DVD on the disability assessment capabilities of nurses. This study was thus designed to investigate the efficacy of using an interactive multimedia DVD to train nurses to conduct disability assessments. It is hypothesized that the interactive multimedia DVD will improve the disability assessment knowledge and case study assessment capabilities (accurate assessment of ADLs and IADLs) of nurses. This study further gathered qualitative data using interviews to better understand participants’ subjective experiences.

**Methods**

**Study Design and Participants**

This study used a quasi-experimental research design with purposive sampling in two public hospitals. The authors prevented contamination between control and experimental groups by recruiting the two groups from two distinct public regional hospitals. The experimental group contained 30 participants recruited at one hospital, and the control group contained 32 participants recruited from the other.

Participant criteria included (a) licensed nursing staff, (b) presently working in a nursing home or rehabilitation or chronic wards for more than 1 year, and (c) willingness to participate and sign the consent form. Nurses in the target units had regular opportunities to conduct disability assessments. Enrolled participants were informed regarding research aims and were not told to which group they would be assigned to avoid the Hawthorne Effect.

**Ethical Considerations**

The ethics committees of the participating hospitals approved this study. Participants filled out the consent form after researchers explained study purpose, methods, processes, and steps. Participants were informed that they could withdraw from participation at any time and assured that all personal identification information and provided data would remain anonymous.

**Measures**

Measures included quantitative and qualitative data. The former was measured using the disability assessment questionnaire, and the latter was measured via in-depth interview.
**Disability assessment questionnaire**

a. **Personal demographic data:** Nine items including participant gender, age, education, specialty, working years, and so forth.

b. **Disability assessment knowledge scale:** A 59-item scale was adopted to evaluate the nurses’ knowledge regarding ADLs and IADLs. The scale applied a dichotomy response (right/wrong) with “I don’t know” included to prevent guessing. Content validity was verified by a panel of five experts, with each item rated on a scale of 1–4, with 4 indicating highest appropriateness and applicability. Items with a mean panel-wide score of less than 3 were deleted, resulting in a final questionnaire of 36 items. The final questionnaire earned a content validity index score of 0.91 and Kuder-Richardson 20 score of 0.88. The possible score range for the scale was 0–36, with higher scores correlating to a higher level of disability assessment knowledge.

c. **Case study assessment:** Case study assessment measured the accuracy of participants’ assessment of three case studies. The first two used a clinical scenario questionnaire and asked participants to perform disability assessments. The third asked participants to watch a videotape and make a disability assessment based on what they had seen. Case study assessments can test clinical skill performance and skill competency with regard to disability assessment and can link training content to practice (Damron-Rodriguez, 2008). There were 10 ADL items and eight IADL items for each case, with scores ranging from 0 to 30 for ADLs and 0 to 24 for IADLs. Higher scores correlated with better assessment accuracy. The three cases were reviewed by five experts who rated each on a 4-point scale from “not relevant” to “quite relevant.” The average score for each case was greater than 3.

**In-depth interview**

Conventional paper tests emphasize memorization and recitation and provide no insight into learners’ learning and thinking processes (Huckstadt & Hayes, 2005). To further understand the subjective experience of multimedia-assisted teaching, three open-ended questions were asked, including (a) please share your general feelings toward the DVD-based disability assessment learning process, (b) please share your thoughts regarding multimedia-assisted teaching, and (c) please share your thoughts on the applicability of disability assessment DVDs to the field of long-term care.

**Intervention**

The intervention was developed considering three main components: theory, evidence, and practical issues. We used the four-step theoretical domains framework to guide the DVD intervention design process (French et al., 2012). Step 1 identified target behaviors and population for disability assessment. Step 2 chose the theoretical framework most likely to elicit the pathways of learning effectiveness and efficacy. Step 3 determined DVD content categories, including creating standardized assessment materials, interactive teaching, and mechanisms to remind and consult based on disability assessment barriers and enablers. These three approaches helped preserve intellectual integrity for disability assessment. Step 4 used quantitative (disability assessment questionnaire) and qualitative (in-depth interview) outcomes to evaluate the effectiveness of disability assessment in nurses.

Disability assessment is a highly complex situation requiring critical decision making. Participants must acquire practical competence in various environments to provide accurate assessment results. Practical competence not only highlights “know-what” knowledge but also conducts procedures and tasks to acquire “know-how” knowledge (Schunk, 2007). To that end, researchers designed the intervention in three ways as follows.

**Creating standardized assessment materials**

To create the teaching manual for the disability assessment, we based the standardized disability assessment workbook on research by Hwu, Cheng, Hsiao, Chen, and Her (2007) and the teaching blueprint on ADLs and IADLs.

The multimedia DVD, named “practice of the disability assessment in XX city,” was jointly developed by a research team that included care managers, nurses, rehabilitators, social workers, clinical experts, scholars, and professional photographers. Development referenced the literature and involved several long-term care center meetings, two focus groups, and two professional discussions to select case studies. Furthermore, to make the presentation more realistic, we invited experienced caregivers and volunteers in the long-term care center as actors. The final DVD introduced assessment standards and techniques and used text, photos, audio, video, and animation to portray patients realistically. The teaching DVD included three parts: (1) basic information and background introduction; (2) case study presentations; and (3) actual assessment results, which clearly identified eligible items and reasons for disability assessment decisions. There were four cases in this teaching DVD: minor disabled (9.14 minutes), moderate disabled (7.52 minutes), severe disabled (7.09 minutes), and a community-dwelling IDAL sufferer (15.46 minutes). The entire case presentation time was 39.21 minutes. A background music track was added to make the DVD more engaging for users.

**Interactive teaching**

The experimental group was gathered in the conference room. The instructor told participants how to use the disability assessment operation manual and allowed about 20 minutes to address participant questions. The DVD was then played, with an immediate follow-up group discussion to clarify concepts. Three questions were then asked to test participants’ understanding. We also produced a DVD to distribute to all
participants in the experimental group, so all participants received a DVD to take home for review and practice. This DVD was designed as an interactive, computerized, multimedia clinical simulation platform to enhance disability assessment. The interactive format allowed participants to self-select any section for review and repeat viewing to meet the goal of user-directed clinical experiences. The instructor offered feedback directly to participants to reinforce critical points and skills and clarify unclear parts. In addition to the main outcomes of the study, the training program also gained comments from the participants.

Reminding and consultation mechanism
Learning bags containing the standardized disability assessment workbook, one multimedia DVD, and a learning card were produced. The learning card presented a 2-week day-by-day study schedule for user convenience. It also included the instructor’s contact telephone number for participant contact convenience. The instructor reminded participants to view the DVD during the ward’s morning meeting. Hence, participants viewed this teaching DVD at least once a week for a period lasting 2 weeks. These interventions reflect best learning effectiveness practices for the clinical setting, which should be designed to include reminder, audit, and feedback procedures (French et al., 2012).

The Data Collection Process

Quantitative data collection
Each questionnaire was assigned a number rather than participant name to prevent instructor–evaluator overlap that would increase the risk of response bias. The questionnaire was delivered and collected by unit head nurses. The intervention program was included in the normal in-service education schedule for two sessions, helping ensure all experimental group participants had the chance to join the class. In a quiet conference room with audiovisual equipment, the instructor explained the purpose of the study, asked participants to fill in the pretest disability assessment questionnaire, and then delivered the multimedia teaching intervention. Second and third questionnaire rounds were administered at 2 weeks and 4 weeks postintervention to assess the lasting effects of the intervention.

The control group received conventional classroom education on disability assessment, and the two postintervention evaluations were administered during routine ward meetings.

Postintervention interviews
After implementing the multimedia DVD teaching intervention, the instructor interviewed the 23 participants in the experimental group who agreed to be interviewed. The entire interview process was recorded, and the average interview time was 8–10 minutes. Recorded content was transcribed for further data analysis.

Data Analysis
Data were coded and input into a computer, checked for accuracy, and then analyzed using SPSS 13.0 software. Descriptive statistics and analytical methods certified equivalency between the groups at pretest; a chi-square and $t$ test were used to test basic attributes of both groups; and analysis of covariance (ANCOVA) was used to compare group knowledge, ADL, and IADL score means between experimental and control groups. Finally, to ensure DVD learning effectiveness over time, participant knowledge, ADL, and IADL responses were compared among the three time points (pretest and two posttests) using a repeated measures analysis of variance. Specifically, researchers performed a series of one intersubject variable (experiment vs. control) and one intrasubject variable (pretest, 2 weeks posttest, 4 weeks posttest) repeated measures tests, with level of significance set at .05.

Using SPSS, we standardized scores for the three scales (knowledge, ADL, and IADL) to the 0–100 range to make evaluations easier to understand.

Interview data analysis included (a) listening to and transcribing interview content as original study data, (b) reading transcripts repeatedly to elicit meanings, and (c) summarizing experimental group participant perspectives and feelings.

Results

Sixty-two subjects were enrolled in this study, with 30 in the experimental and 32 in the control group. The response rate was 100%. Researchers further conducted one-on-one interviews with 23 experimental group participants. Analysis results follow below.

Participant Demographic Characteristics
Table 1 illustrates intergroup homogeneity, obtained using a chi-square test and independent sample $t$ test. With the exception of the question, “Have you ever used Barthel ADLs,” there was no significant intergroup difference ($p > .05$). An independent sample $t$ test found no significant difference in the accuracy of pretest assessment ADLs ($t = .259, p > .05$), indicating that ADL accuracy assessment should not be affected by whether the participant had used the ADL scale assessment tool.

Knowledge of Disability Assessment and Assessment of Case Studies in Nurses:

Pretest
Using an independent sample $t$ test, we found no significant difference between the two groups in terms of case study ADLs and IADLs ($t = .259, df = 60, p > .05; t = -.132, df = 60, p > .05$) and significantly greater disability assessment knowledge in the control group than the experimental group ($t = -3.399, df = 60, p < .05$).
TABLE 1.
Comparison of Subject Demographics (N = 62)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental Group (n = 30)</th>
<th>Control Group (n = 32)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>n</td>
</tr>
<tr>
<td>Age</td>
<td>29.87</td>
<td>7.33</td>
<td>33.25</td>
</tr>
<tr>
<td>Working years</td>
<td>4.09</td>
<td>3.80</td>
<td>3.49</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>3.3</td>
<td>0</td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>96.7</td>
<td>32</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior college</td>
<td>13</td>
<td>43.3</td>
<td>18</td>
</tr>
<tr>
<td>Undergraduate and graduate</td>
<td>17</td>
<td>56.7</td>
<td>14</td>
</tr>
<tr>
<td>Specialty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>22</td>
<td>73.3</td>
<td>17</td>
</tr>
<tr>
<td>Long-term care</td>
<td>8</td>
<td>26.7</td>
<td>15</td>
</tr>
<tr>
<td>ADLs education experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>43.3</td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>56.7</td>
<td>19</td>
</tr>
<tr>
<td>ADLs application experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23</td>
<td>76.7</td>
<td>31</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>48.4</td>
<td>1</td>
</tr>
<tr>
<td>IADLs education experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>26.7</td>
<td>7</td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>73.3</td>
<td>25</td>
</tr>
<tr>
<td>IADLs application experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>46.7</td>
<td>17</td>
</tr>
<tr>
<td>No</td>
<td>16</td>
<td>53.3</td>
<td>15</td>
</tr>
</tbody>
</table>

Note. ADLs = activities of daily living; IADLs = instrumental activities of daily living.
a t test. b Fisher’s exact test. c 2 test.

Nurse Education DVD Effect on Disability Assessment

After using ANCOVA to eliminate the interference of pretest differences between two groups (Ho, 2007), posttest results showed that the experimental group had significantly greater disability assessment and knowledge and case study assessment capabilities (ADLs and IADLs) than the control group (Table 2). Results were as follows: (a) in knowledge of disability assessment, after the intervention of the multimedia teaching program, the means of posttest adjusted by pretest of the experimental group at 2 weeks and 4 weeks were 97.12 and 96.08, respectively, with adjusted posttest means for the control group of 85.71 and 87.46, respectively. Thus, the experimental group scored significantly better in these areas than their control group peers (p < .001). (b) In case study assessment capabilities, the accuracy of ADLs in the second and fourth weeks after the intervention of the multimedia teaching program was higher in the experimental group than the control group. The adjusted posttest mean of the experimental group on the second week was 88.80 points; the control group was 83.11. The adjusted posttest mean for the experimental group on the fourth week was 87.39, and the control group was 79.94. Both showed statistically significant differences (p < .05; p < .01). (c) In terms of case study assessment capabilities, accuracy of IADLs in the experimental group was higher than the control group. The second-week adjusted posttest mean was 86.24 for the experimental group and 80.47 for the control group; the fourth-week adjusted posttest mean was 88.96 for the experimental group and 84.56 for the control group. Both showed statistically significant differences (p < .05, p < .01).

The Impact of the Multimedia Teaching Program on Learning Effectiveness

Because the assumption of sphericity was not met, we applied a Greenhouse–Geisser correction. After a significant repeated measures result, pairwise comparisons with least significant difference were used to determine at which points knowledge, ADLs, and IADLs of disability assessment differed.
Table 3 presents participant knowledge, ADLs, and IADLs of disability assessment across the three time points. There are significant main effects of time across the three in terms of knowledge, \(F(1.40, 4433.47) = 37.33, p < .01\); ADLs, \(F(1.79, 246.28) = 3.89, p < .05\); and IADLs, \(F(1.73, 415.11) = 4.22, p < .05\). There were significant main effects of Time \times C2 Group interaction on knowledge, \(F(1.40, 2882.93) = 24.25, p < .01\), and ADLs, \(F(1.79, 233.06) = 3.68, p < .05\), except on IADLs, \(F(1.73, 182.75) = 1.86, p > .05\).

Pairwise comparisons revealed that pretest disability assessment knowledge differed significantly from 2 and 4 weeks posttest. The increase of disability assessment knowledge in the experimental group was greater than in the control group, and differences between three scores all achieved significance. Using least significant difference to compare binately the averages of those three lots showed that the accuracy of pretest ADLs and IADLs differed significantly from 2 and 4 weeks posttest. The last two time points did not significantly differ from each other. This indicated that the DVD intervention achieved a lasting increase in knowledge, ADLs, and IADLs in the experimental group.

### Subjective Experimental Group Feelings About the Intervention of Multimedia Teaching Program

Participants reported that the multimedia DVD positively facilitated learning, improved learning outcomes, and enhanced learning time flexibility, autonomy, and convenience. Multiple reviews of simulated cases on the DVD helped users...

### TABLE 2.

**Posttest Differences Between the Two Groups in Disability Assessment Capabilities (N = 62)**

<table>
<thead>
<tr>
<th>Variable/Measure Time</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp. M SD Con. M SD</td>
<td>Exp. M SD Con. M SD</td>
<td>Exp. M Con. F</td>
</tr>
<tr>
<td>Knowledge of disability assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second week</td>
<td>73.33 17.07 87.58 15.94</td>
<td>93.96 6.56 88.68 16.45</td>
<td>97.12 85.71 25.57***</td>
</tr>
<tr>
<td>Fourth week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of case studies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADLs</td>
<td>Exp. M SD Con. M SD</td>
<td>Exp. M SD Con. M SD</td>
<td>Exp. M Con. F</td>
</tr>
<tr>
<td>Second week</td>
<td>82.55 8.96 81.87 11.48</td>
<td>88.88 6.79 83.02 12.01</td>
<td>88.80 83.11 3.72*</td>
</tr>
<tr>
<td>Fourth week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IADLs</td>
<td>Exp. M SD Con. M SD</td>
<td>Exp. M SD Con. M SD</td>
<td>Exp. M Con. F</td>
</tr>
<tr>
<td>Second week</td>
<td>81.94 8.71 82.29 11.69</td>
<td>86.25 6.84 80.46 11.56</td>
<td>86.24 80.47 3.59*</td>
</tr>
<tr>
<td>Fourth week</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Exp. = experimental group (n = 30); Con. = control group (n = 32); ADLs = activities of daily living; IADLs = instrumental activities of daily living. Adjusted: Mean of the posttest was adjusted by the mean of pretest.

* \(p < .05\). ** \(p < .01\). *** \(p < .001\).

### TABLE 3.

**Learning Effects on Knowledge, ADLs, and IADLs (N = 62)**

<table>
<thead>
<tr>
<th>Variance Origin</th>
<th>Mean Square</th>
<th>Degree of Freedom</th>
<th>F</th>
<th>p</th>
<th>LSD Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental with control group</td>
<td>4433.47</td>
<td>1.40</td>
<td>37.33**</td>
<td>.00</td>
<td>3* &gt; 2** &gt; 1</td>
</tr>
<tr>
<td>Time \times Group</td>
<td>2882.93</td>
<td>1.40</td>
<td>24.25**</td>
<td>.00</td>
<td></td>
</tr>
<tr>
<td>ADLs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental with control group</td>
<td>246.28</td>
<td>1.79</td>
<td>3.89*</td>
<td>.02</td>
<td>2* &gt; 1</td>
</tr>
<tr>
<td>Time \times Group</td>
<td>233.06</td>
<td>1.79</td>
<td>3.68*</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>IADLs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental with control group</td>
<td>415.11</td>
<td>1.73</td>
<td>4.22*</td>
<td>.02</td>
<td>3* &gt; 1, 3* &gt; 2</td>
</tr>
<tr>
<td>Time \times Group</td>
<td>182.75</td>
<td>1.73</td>
<td>1.86</td>
<td>.16</td>
<td></td>
</tr>
</tbody>
</table>

Note. ADLs = activities of daily living; IADLs = instrumental activities of daily living; LSD = least significant difference. 1: pretest; 2: first posttest; 3: second posttest.

* \(p < .05\). ** \(p < .01\).
clarify and correct assessment misconceptions. Posttest practice assessments were significantly shorter in duration, with participants more confident in making assessments (Table 4).

Discussion

This research aimed to explore the effects of using a multimedia DVD intervention to enhance nursing staff disability assessment capabilities. The effectiveness of the intervention was assessed by measuring nurses’ knowledge and disability case study assessment accuracy. Results support the hypotheses that the intervention would effectively enhance nurse disability assessment knowledge and ADL and IADL practices.

This was the first study to examine the effects of multimedia interactive education on nurses’ disability assessment capabilities in Taiwan. Previous intervention studies have primarily focused on participant cognitive abilities. Using participants’ clinical practice abilities as the outcome is a unique aspect of this study. Bandura’s Social Cognitive Learning Theory (Bandura, 2006) posits that change in participant cognition does not guarantee behavioral change. Hence, participant clinical practice abilities should be viewed as the more substantive outcome in terms of predicting multimedia interactive education effects.

Study findings indicate the intervention not only effectively enhanced participant disability assessment knowledge but also cultivated ADL and IADL assessment knowledge. This offers strong evidence to support the effects of this training program. It is thus recommended that all nurses working in units related to long-term care should receive in-service disability assessment education. Improving nurses’ cognitive and practical abilities can better prepare them to make more precise disability assessments and adjust nursing interventions based on actual patient progress to facilitate care quality and outcomes.

The study implemented ANCOVA to analyze the disability assessment knowledge change effect between experimental and control groups (Table 2). It showed effectiveness in both posttest rounds with significance ($F = 25.57, 11.91, p < .001$). The pretest disability assessment knowledge of the control group was significantly higher than that of the experimental group, and increase in disability assessment knowledge in the experimental group was significantly higher than the control group in both posttest rounds. Results of this and other numerous studies show that knowledge is most significantly impacted by multimedia-assisted learning (Chang, 2008; Fann & Gau, 2008; MacDonald, Stodel, & Casimiro, 2008; Tu, Lee, & Chang, 2007).

The content of the multimedia DVD addressed disability assessment and provided real examples appropriate in assessing the disabled population and helping trainees apply classroom learning to practice. From a technical level exploring the effects of the intervention of multimedia DVD on accurate nursing staff assessment of ADLs and IADLs, results shown in Table 2 describe better posttest ADL and IADL accuracy in the experimental group than the control group on both posttests. Research results were similar to those obtained in 2011 that showed that a multimedia DVD teaching program could be viewed and practiced repeatedly to ultimately achieve proficiency (Chiou & Chung, 2011).

This study evaluated the efficacy of a disability assessment DVD for nurses. Intervention messages were found to effectively increase knowledge and disability case study assessment capabilities. Furthermore, this increase was maintained across the 2- and 4-week follow-up assessment periods. According to research done in 2001 (Wang & Liu, 2001), learner perceptions begin to decrease after the second week of implementation. However, the results of this research showed that the change in knowledge and case study assessment capabilities remained significant even through the fourth week. Generally speaking, the attractiveness of interactive multimedia DVD content directly affects learners’ intrinsic motivations to learn and sustained impact (Chang, 2008; Jhong, 2009; Yeh, 2007).

### TABLE 4.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Feelings toward the learning process</td>
<td>1.1. The workbook of standardized disability assessment combined with multimedia DVD enhanced the cognitive impression and learning effects.</td>
</tr>
<tr>
<td></td>
<td>1.2. Participants could select learning contents based on their needs and level and allow repetitive viewing without time limitations.</td>
</tr>
<tr>
<td></td>
<td>1.3. User-friendly and user-centered design lets learning become more flexible.</td>
</tr>
<tr>
<td>2. Comments on DVD</td>
<td>2.1. The format of dynamic interactive multimedia DVD could facilitate learning efficacy.</td>
</tr>
<tr>
<td></td>
<td>2.2. Satisfied with the DVD delivery platform: It could see the video clearly; enjoyed watching the video.</td>
</tr>
<tr>
<td></td>
<td>3.2. Repetitive practices of disability assessment for the simulated cases promoted participants’ critical thinking, knowledge, and skills.</td>
</tr>
<tr>
<td></td>
<td>3.3. Increasing self-confidence to conduct disability assessment.</td>
</tr>
</tbody>
</table>
We identified participants’ subjective feelings toward the multimedia teaching program from experimental group interview data and found that they provided a positive evaluation of multimedia teaching. Participants thought that observation, imitation, clarifying, and correcting could help clear up disability assessment misconceptions and that DVD contents helped give a more immediate and interactive feel with the case studies. This ultimately helped enhance disability assessment capabilities and self-confidence. These results confirmed the learning efficiency of multimedia DVD (Yah, Chiang, Lin, & Hsu, 2010) and showed significant progress in knowledge, attitudes, and behaviors (Huang, 2004; Ruiz, Smith, Rodriguez, van Zuilen, & Mintzer, 2007; Ruiz, Smith, van Zuilen, Williams, & Mintzer, 2006). Therefore, we confirmed that multimedia DVD teaching program can enhance nursing staff disability assessment capabilities.

Limitations of This Study

The Max-Mix-Con principle was used to increase the internal validity of this study (Fawcett & Garity, 2009). Detailed procedures are described as follows. (1) Maximize experimental variance: The design of this intervention protocol was guided by the theoretical domains framework. The establishment of assessing standardized materials, interactive multimedia clinical simulations, and reminding consultation mechanism can maximize intervention effects. Participants in the experimental and control group were recruited from different hospitals to prevent cross-contamination and increase experimental variance. (2) Minimize error variance: The instrument for measuring outcomes was developed for this study. The study used quantitative and qualitative methods to confirm the effectiveness of multimedia interactive nurse education. A double-blind procedure was used to control response bias and the Hawthorne Effect. (3) Control extraneous variables: Homogeneous participants and statistical control (ANCOVA) were used to eliminate the influences of extraneous variables.

In light of the limited follow-up period (1 month) and limitation of the sample to two regional public hospitals in Central Taiwan, the authors suggest that future researchers expand the research in terms of both time and space to enhance result rigor. Replication of this study with a larger sample size is also recommended. The findings of this research indicate the need for further study of other disability assessment outcome indicators. Enlarging the sample size to find out whether knowledge and case studies assessment capability enhancements observed in this study remain significant is also recommended.

Conclusions

Multimedia-assisted teaching methods are increasingly popular in nursing practice and education. Such methods offer learning independent of time and spatial limitations. Course contents can be generated based on individual learner needs. Our literature review found that most multimedia nursing teaching researchers focused on patient teaching materials, with a few exploring the effectiveness of multimedia DVD teaching for nurses. This study was thus designed using a quasi-experimental, nonequivalent group to investigate the effects of multimedia interactive nurse education on disability assessment capabilities. Conclusions obtained using comprehensive data analysis showed that multimedia DVD can improve nurses’ disability assessment knowledge, ADLs, and IADLs and, furthermore, stimulate learning motivation, with effects sustained for at least 1 month after intervention completion.

Implications for Nursing

On the basis of the above conclusions and the experiences gained through the research process, researchers presented the following recommendations as a reference for designers of educational training courses. First of all, we recommend first providing a disability assessment structure to assessors before presenting real cases for practice. DVD content is an important factor of influence on learner motivation. Contents should be vivid and lively and show pictures, text, voice, and video/animation to improve student learning effectiveness and avoid rote learning. If the content design of the disc contains more themes, it should be designed with a “single-click” function for users to facilitate learning and maximize time flexibility. Furthermore, combining the multimedia DVD with traditional classroom lectures can balance out disadvantages and help further enhance learning effectiveness.

References


Kao, S. Y., & Chiu, M. K. (2004). *Taiwan’s long-term care service supply and demand in the current situation with the initial estimate.* Taipei City, Taiwan, ROC: The Executive Yuan long-term care system report on achievement of the first year of the planning group. (Original work published in Chinese)


多媒體互動式光碟對護理人員執行失能評估之成效

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背景
失能者約佔臺灣人口的3%，失能者功能評估，攸關長期照護品質及資源分配。

目的
探討多媒體互動式光碟教學方案，對護理人員執行失能評估知識與技能之成效。

方法
採類實驗設計，實驗組接受多媒體互動式光碟教學方案，對照組採課室教學。以失能評估問卷，在多媒體互動式光碟介入前，與之後第2週、第4週，評估二組護理人員執行失能評估知識與案例評估技能之正確性。此外，佐以深入訪談，了解實驗組護理人員對多媒體教學方案之感受。

結果
接受多媒體教學方案之護理人員，其失能評估知識程度、案例評估準確度，皆高於對照組，且達統計學上的顯著差異；此外，成效可長達一個月。訪談資料顯示，護理人員認為多媒體互動式光碟，在學習上具彈性，能提升其臨床評估的自信心。

結論／實務應用
多媒體互動式光碟能提升護理人員執行失能評估的知能，可運用至長期照護實務，以作為長期照護從業人員繼續教育之參酌。

關鍵詞：多媒體，失能評估。