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Self Evaluation and Test Scores (SETS): Correlation of post -course self-reported confidence and satisfaction with test scores in a nurse training evaluation

ABSTRACT

Research on self-directed learning has gained momentum in the last decade when the notion of deriving better learning from students' ownership of learning became widely explored. Based on the Kirkpatrick's model, this study was carried out to examine the relationship between post-course self-rated confidence and satisfaction scores, with post course test marks. The study used a cross-sectional design on a single group and was conducted with 56 nurses from 8 nursing homes. Data were collected using two questionnaires containing self-reported statements on confidence and satisfaction, and a knowledge test.

No significant differences were found in confidence levels between the high scorers and the low scorers and in satisfaction levels between the high scorers and the low scorers. Our findings suggests that self-evaluation does not meaningfully correspond to theoretical knowledge. Our study suggests that educators should re- look into the purpose and usefulness of routinely collecting course satisfaction and confidence data.

INTRODUCTION

Evaluation is an imperative element in education as it assesses quality of training and learning. The Kirkpatrick model is a commonly used model for objective evaluation of training by dividing the evaluations into 4 levels (Kirkpatrick, 1998, 2006, 2008, 2012). Each successive level of evaluation represents a more precise way of measuring training effectiveness and requires more rigorous development and time.

Many training courses examine participants' immediate reaction (level 1 Kirkpatrick evaluation) (Haas et al., 1998; Andrade et al., 2007). It is important for every training programme to conduct evaluation at this level to look for areas for improvement as the learners' reactions to learning can impact learning. A positive reaction may or may not lead to learning but a negative reaction is very likely to

inhibit learning (Kirkpatrick, 1998, 2006, 2008).

The testing of knowledge retention (level 2 evaluation) has been traditionally done at the end of a training programme but is sometimes done midway through the programme to identify weaker students who require remedial actions. Level 2 testing requires more time for questionnaire development and more time spent to complete the test. This can also cause more stress for students.

Training programme evaluated

Tele-geriatrics is an on-going programme funded by Ministry of Health, Singapore in 2010, to enable timely geriatric specialist care access to nursing homes via videoconferencing. In order to equip the nurses in the nursing homes with the knowledge and skills to help geriatricians in assessing and managing nursing home residents, a 6-month Telegeriatrics Training Course (TNTC) was developed. The role of a TNTC- trained nurse is to conduct telemedicine-specific duties such as early identification of signs and symptoms, forming an assessment of these signs and symptoms, and presenting the summarized findings to the geriatrician in the acute hospital. The TNTC curriculum involves teaching methods such as didactic lectures, role-play, examining patients at bedside, and on-the-job training.

Self-confidence is defined as the belief in one's abilities to accomplish a task and is important to effective performance. A few studies have shown that self-confidence is associated with nurses' competence to carry out care effectively (Rautava et al., 2013; Mohamadirizi et al., 2015). In a recent cross-sectional study conducted on 150 nursing and midwifery students, self-efficacy is found to be a significant predictor of a student's clinical performance (Mohamadirizi et al., 2015). Academic self-reported satisfaction is found to be strongly related to the quality of students' learning (Chen et al., 2002, Kantek et al., 2012; Astin, 1999) and hence can impact actual performance (Sebaee et al., 2017).

Nurses need to develop self-evaluation skills to assess their knowledge level and identify knowledge gaps, to constantly keep their knowledge and practice up-to-date, in order to provide safe and effective care. However, evidence on validity of self-evaluation in nursing are limited and no studies have examined its effectiveness in preparing nurses for tests or clinical practice. This study explores the

relationship between Kirkpatrick's level 1 and 2 evaluations. We assess the relationship between self-evaluated scores of confidence and satisfaction of the course (level 1) with post course knowledge test scores (level 2). Through this study, we hope to gain a better understanding of whether self-assessments can be an indicator of acquired knowledge.

METHODS

Study design

This is a pilot, cross-sectional study that measures the relationship between self-assessment scores and test scores. The study's data collection period spanned from September 2016 to July 2017.

Participants

All nurses who have completed the 6-month Telegeriatrics Nurse Training Course (TNTC) were recruited. A total of 56 nurses from 8 nursing homes participated in the study.

Ethics approval

Ethics approval was obtained from Domain-Specific Review Board of National Healthcare Group, Singapore (21/07/2015; Protocol 2016/00537).

The Instrument

Instruments used in this study were not validated but were developed based on two senior geriatricians' advice and literature review. The instruments were all self- reported and were as follows:

1. Self-rated course confidence questionnaire:

This is a 10-item 5-point Likert scale questionnaire that measures the participant's confidence both in basic nursing skills (basic clinical tasks) and in telemedicine-specific skills and knowledge (advanced clinical tasks). The basic clinical tasks are nursing skills and knowledge which were pre-requisites for the nurses. The confidence questionnaire assesses how confident the nurses were in performing the tasks (both basic and advanced clinical tasks) and was customized based on the TNTC's objectives. We did not use a validated confidence questionnaire for this study as the TNTC had specific skills- based objectives for the students and measuring the nurse's confidence based on these objectives

would be more appropriate. Confidence in basic clinical tasks serves as a check for confounding baseline confidence as the knowledge test did not test on basic clinical tasks.

2. Self-rated course satisfaction questionnaire:

This is a 15-item questionnaire made up of four main sections: (i) curriculum and instruction, (ii) clinical educators, (iii) academic and professional development, and (iv) overall course satisfaction. All sections, except for the section on overall course satisfaction that uses a 10-point Likert scale, were reported on a 5-point Likert scale.

3. Knowledge test:

Assessment of TNTC-specific knowledge was done using a 50-question written multiple-choice test with a passing mark of 75%. The questions were developed by two trainers of the TNTC and they tested on advanced clinical tasks taught during the TNTC. The marks were reported as a percentage of the total score, and nurses who scored 80% and above were categorized in the higher scorers group while the remaining were categorized as lower scorers. The cutoff mark of 80% was chosen as it reflects the median test mark in this group of nurses.

Procedure

The same research assistant who developed the instrument invited TNTC students to participate in this study via email. All 56 students who received the invitation participated in this study and none dropped out from the study. Prior to the survey, the research assistant briefed the participants on detailed information about the study (i.e., aims, methods, nature of voluntariness, risks, and benefits, and participant confidentiality). A participant information sheet was distributed among the participants during the briefing and the participants gave written informed consent. The participants completed both the confidence and satisfaction surveys before attempting the knowledge test in the nursing home they worked in. The whole procedure took approximately 1.5 hour.

Data Analysis

All statistical analyses were performed using IBM SPSS Statistics (version 22). A descriptive analysis of the responses to each questionnaire item at post-TNTC was conducted. Measures of central tendency (mean and median) and dispersion (standard deviation) were calculated for quantitative data and frequencies/ percentages for qualitative variables. Univariable analysis was performed to study the differences between high scorers and low scorers. Chi-square test was used for categorical independent data. Due to our study's small sample size, we used Mann–Whitney U test, a non-parametric test, to analyze continuous independent data. In addition, we examined the strength of association between domains of the confidence and satisfaction using Spearman's rank order correlations. Strong, moderate and weak correlations are defined as > 0.60, 0.30 – 0.60 and < 0.30 respectively.

RESULTS.

Baseline characteristics of the 56 nurses who participated in the study are shown in Table 1. Majority of participants were female (78.9%), came from Philippines (57.1%), and were staff nurses (58.7%). The mean number of years of nursing experience in this group of nurses were 14.1 years while the mean number of years working as a nursing home nurse were 8.3 years. No significant differences in the baseline characteristics (i.e., gender, age, nursing experience etc.) were found between the low scorers and the high scorers. Mean scores for individual items of confidence and satisfaction in both high scorers and low scorers, and their p-values were presented in Table 2.

The median knowledge test mark was 80% (range 54 – 100). The total score for each domain are shown in Table 3. The high scorers did not differ statistically from the low scorers in their satisfaction across all confidence domains (i.e., course curriculum, the clinical educators, the academic and professional development, and overall satisfaction). In addition, the high scorers did not differ statistically on their self-reported ratings on confidence in both basic and advanced clinical tasks compared to the low scorers.

The overall satisfaction item was moderately correlated to the confidence's basic tasks and advanced tasks domains, with Spearman's rank correlation coefficients of 0.377 ($P<0.01$) and 0.423 ($P< 0.01$)

respectively (Table 4). The satisfaction's academic and professional development domain was also significantly correlated with both the confidence's basic tasks domain (Spearman's correlation = 0.452, P<0.01) and the advanced tasks domain (Spearman's correlation = 0.364, P < 0.01), at a moderate level.

DISCUSSION

The aim of this study is to observe the relationship between self-evaluated confidence, satisfaction scores and knowledge test scores. Better understanding can help explore ways of improvement in self-learning ability in individual nursing students.

Course satisfaction

Course satisfaction has been suggested to contribute to student knowledge retention and as a way to measure faculty effectiveness (Howell & Buck, 2012). Two important factors that contribute to course satisfaction are perceptions of teachers' expertise level and the teachers' level of support for the students. The high scores in our study suggest that course satisfaction was achieved in this course (Lee et al., 2011; Paechter M et al., 2011).

Multiple choice questions are effective measures of learning outcomes, especially in the domain of knowledge retention (Brady, 2005). Knowledge tests measure level two training effectiveness and the degree to which the nurses acquire their intended knowledge. Benefits of multiple-choice tests include time-efficient administration, objective grading of answers that make them measurable and reliable, as well as testing of the breadth of a student's knowledge in a single setting (Xu et al., 2016). However, such tests are subjected to "lucky guesses", and if the test questions are not well worded, they are prone to only test the student's retention of facts and not critical thinking (i.e, application and analysis) (Bloom et al., 1956).

In our study, course satisfaction was not significantly associated with test marks. The lack of significant association could have resulted from students' high ratings on the course satisfaction scale. Based on the factors that contribute to course satisfaction, the result is not surprising as course satisfaction seems to be a measure of the teacher's ability to teach rather than the student's ability to learn.

Course confidence

Confidence is a measure of one's belief in own abilities and has been considered a psychological trait (Morony, Kleitman, Lee, & Stankov, 2013). Confidence measures were reported to be consistent across cultures as compared to other measures of psychological traits such as self-efficacy and self-concept (Paek, Lee, Stankov & Wilson, 2008). While some studies have shown confidence levels to be strongly correlated to other measures of learning outcomes (Thomas et al., 2014; Stankov et al., 2014), there is insufficient evidence of correlation in other studies (Barnsley et al., 2004, Weiss et al., 2005; Mullan et al., 2010; Shoemaker, 2010; Liaw et al., 2012; Favazzo et al., 2014; Dowd, J.E., 2015).

In the later studies, people tended to over rate their knowledge on specific subject matters (Dunning, 2004; Eva et al.,2005). On the other hand, people who are capable in the task tended to rate themselves slightly lower than actual performance. A study conducted on nursing students' perceived performance in responding to simulated emergency situations concluded that self-evaluation in nursing education to evaluate clinical competence requires reconsideration (Baxter et al., 2011). The study only found 1 significant correlation (out of 16 in total) between self-assessment and the objective structured clinical examination total scores. Our study results concurred with these studies in that we did not find any meaningful correlation of confidence level and test scores. *Lack of Correlation between level 1 and Level 2 Kirkpatrick Model of Learning.*

Our study results supported the studies that showed no correlation between course satisfaction, course confidence and test scores across various domains of knowledge taught in the course. This finding is supported by a paper which summarized an analysis of 355 research reports (Russell, 1999). Interestingly, moderate correlations were found between some domains of confidence and satisfaction. This suggests that there may be some correlation in level 1 evaluations (confidence and satisfaction) but not between level 1 and level 2 evaluations.

A negative study is important as it prompts us to revisit our usual practice. Many courses still routinely carry out course satisfaction or confidence surveys. Given the opportunity cost of carrying out evaluations, the results prompts educators to rethink the need to collect level 1 data. While course

satisfaction has a role in improving services (teacher's effectiveness in teaching etc.), examining course confidence may not be meaningful in an educator's evaluation toolkit.

Limitations of our study

Our pilot study is limited by its sample size. The TNTC is highly practice-based and therefore only allows a small class size of a maximum of 6 students for each run. As a result, we approached every nurse in the small group of TNTC-trained nurses and did not do any statistical power calculation and sampling. The small sample size also limits analysis to determine causation.

The lack of correlation in this study drives the need for future research on correlations between different evaluation tools. While level 2 evaluations are important outcome measures, they are usually tedious and can be stressful for the students. Effort must be made to study the factors that contribute to course satisfaction and confidence. The underlying factors can then be re-evaluated for its usefulness in a course and its correlation with test score. The eventual aim would be to find an assessment tool that can be easily administered early in the course in order to identify weaker students.

Conclusion

Based on Kirkpatrick's model, level 1 evaluation affects level 2 evaluation. However, our study did not find any direct association. This does not negate the importance of level 1 evaluation, but the use of level 1 evaluation may be more useful for looking at improving services than in predicting test scores. Our study suggests that educators should re-look into the purpose and usefulness of routinely collecting course satisfaction and confidence data.

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Table 1

Participants' Characteristics

	n (%)
Mean age (±SD)	33.4 (±8.4)
Gender	
Female	44 (78.6)
Male	12 (21.4)
Country of Origin	
Phillippines	32 (57.1)
Myanmar	13 (23.2)
India	5 (8.9)
Singapore	3 (5.4)
China	2 (3.6)
Malaysia	1 (1.8)
Designation	
Staff Nurse	33 (58.9)
Enrolled Nurse	20 (35.7)
Nurse Manager/Director	2 (3.6)
Nursing Aide	1 (1.8)
Mean no. of years of nursing experience (±SD)	14.1 (±8.7)
Mean no. of years of nursing experience in nursing home	8.3 (±4.2)

Table 2:

Association in mean scores of self-reported post course satisfaction and confidence among high and low scorers

Statement	Low scorers N= 23 Mean±SD	High scorers N=33 Mean±SD	P-value
Post Course Satisfaction			
Course curriculum			
I was provided with the course syllabus.	4.30 ± 0.60	4.55 ± 0.51	0.115
I was informed of the course grading system.	4.22 ± 0.52	4.24 ± 0.94	0.404
The course objectives were clear.	4.30 ± 0.60	4.45 ± 0.56	0.314
The objectives for this course were achieved.	4.30 ± 0.60	4.33 ± 0.48	0.913
The environment is conducive for learning.	4.26 ± 0.54	4.42 ± 0.50	0.282
Clinical educator			
Clinical Educators motivated me to learn well.	4.48 ± 0.59	4.55 ± 0.51	0.752
Clinical Educators were knowledgeable about the subjects taught.	4.52 ± 0.59	4.63 ± 0.49	0.576
I received timely feedback from Clinical Educators during the course.	4.04 ± 1.02	4.34 ± 0.48	0.290
Clinical Educators teach well.	4.30 ± 1.11	4.30 ± 0.92	0.653
The delivery of the course was interesting and engaging.	4.36 ± 0.58	4.27 ± 0.91	0.961
Academic & professional development			
Training course is relevant to my practice.	4.09 ± 1.44	4.36 ± 1.22	0.371
Training course fulfills my learning objectives.	3.78 ± 1.59	4.15 ± 1.18	0.442
Training course has met my expectations.	3.65 ± 1.53	4.12 ± 1.93	0.133
I would recommend this course to my colleague.	4.13 ± 1.06	4.39± 0.61	0.405
Overall satisfaction			
I am overall satisfied with the course.	6.37 ± 3.62	7.59 ± 2.65	0.237
Post Course Confidence			
Take history from resident.	4.09 ± 0.60	3.97 ± 0.77	0.489
Assess accurately resident's vital signs.	4.39 ± 0.50	4.58 ± 0.50	0.178
Convey resident's condition and problem to doctors.	3.96 ± 0.71	4.03 ± 0.53	0.81
Perform a physical examination on residents.	3.83 ± 0.58	3.76 ± 0.75	0.812
Apply clinical impression and identify clinical problems in residents.	3.74 ± 0.69	3.88 ± 0.33	0.33
Make recommendations and discuss management of residents with doctors.	3.74 ± 0.92	3.76 ± 0.61	0.84

Table 3:

Associations between Self-reported Post Course Satisfaction and Confidence by Domain

Domain	**Low scorees N= 23 Mean± SD**	**High scorers N= 33 Mean± SD**	**P-value**
Post Course Satisfaction			
Course curriculum (5 items, total score=25)	23.17 ± 2.37	22.67 ± 2.40	0.428
Clinical educator (5 items, total score=25)	22.14 ± 2.66	21.67 ± 4.39	1.000
Academic & professional development (4 items, total score=20)	15.95 ± 4.8	16.91 ± 4.09	0.353
Overall satisfaction (1 items, total score=10)	6.37 ± 3.62	7.59 ± 2.65	0.237
Post Course Confidence			
Basic Clinical tasks (3 items, total score=15)	12.43 ± 1.47	12.30 ± 2.37	0.429
Advanced clinical tasks (4 items, total score=20)	14.74 ± 3.87	15.21 ± 1.92	0.672

Table 4

Spearman's rank correlation of confidence domains with satisfaction domains

	Course curriculum	Clinical educator	Academic & professional development	Overall satisfaction
Basic clinical tasks	0.035	0.235	0.452**	0.377**
Advanced clinical tasks	-0.177	0.173	0.364**	0.423**

** Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).