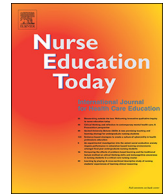




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Students' approaches to learning in a clinical practicum: A psychometric evaluation based on item response theory

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ABSTRACT

Background: The investigation of learning approaches in the clinical workplace context has remained an under-researched area. Despite the validation of learning approach instruments and their applications in various clinical contexts, little is known about the extent to which an individual item, that reflects a specific learning strategy and motive, effectively contributes to characterizing students' learning approaches.

Objectives: This study aimed to measure nursing students' approaches to learning in a clinical practicum using the Approaches to Learning at Work Questionnaire (ALWQ).

Design: Survey research design was used in the study.

Settings and Participants: A sample of year 3 nursing students ($n = 208$) who undertook a 6-week clinical practicum course participated in the study.

Methods: Factor analyses were conducted, followed by an item response theory analysis, including model assumption evaluation (unidimensionality and local independence), item calibration and goodness-of-fit assessment.

Results: Two subscales, deep and surface, were derived. Findings suggested that: (a) items measuring the deep motive from intrinsic interest and deep strategies of relating new ideas to similar situations, and that of concept mapping served as the strongest discriminating indicators; (b) the surface strategy of memorizing facts and details without an overall picture exhibited the highest discriminating power among all surface items; and, (c) both subscales appeared to be informative in assessing a broad range of the corresponding latent trait. The 21-item ALWQ derived from this study presented an efficient, internally consistent and precise measure.

Conclusions: Findings provided a useful psychometric evaluation of the ALWQ in the clinical practicum context, added evidence to the utility of the ALWQ for nursing education practice and research, and echoed the discussions from previous studies on the role of the contextual factors in influencing student choices of different learning strategies. They provided insights for clinical educators to measure nursing students' approaches to learning and facilitate their learning in the clinical practicum setting.

1. Introduction

Students' approaches to learning, or learning approaches, have been widely investigated in educational research and demonstrated to relate to academic success (Biggs et al., 2001; Mansouri et al., 2006; Salamonson et al., 2013). Understanding how students learn is important for preparing students to become effective life-long learners and can help teachers to adopt appropriate teaching strategies to facilitate student learning. Among a body of literature on student learning measurement, the widely adopted Study Process Questionnaire (SPQ, revised version; Biggs et al., 2001) identified the learning process into deep and surface approaches. Learners adopting a deep approach are intrinsically motivated and search for maximizing meaning by

interrelating new and existing knowledge. Learners adopting a surface approach are motivated by a fear of failure and focus on reproduction and memorization through rote learning.

Approaches to learning have been demonstrated to depend on contextual factors such as disciplinary differences (Zhang, 2000), cultural variations (Phan and Deo, 2007) and learning environments (e.g., heavy workload, insufficient time for learning; Tiwari et al., 2005). Specific to the context of nursing education (Beccaria et al., 2014; Mansouri et al., 2006; Martyn et al., 2014; Salamonson et al., 2013; Snelgrove, 2004; Tiwari et al., 2005, 2006), a number of studies showed that student nurses' approach to deep learning related positively and significantly with their academic performance (Salamonson et al., 2013; Snelgrove, 2004). It is also evident in medical education that the

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adoption of different learning approaches and the shift between deep and surface approaches depends on disciplines (Bengtsson and Ohlsson, 2010; Mansouri et al., 2006) and learning environments (Al Kadri et al., 2011).

Whilst the majority of medical education literature put emphasis on the approaches to learning in classroom settings (Emilia et al., 2012), the investigation of learning approaches in the clinical workplace context has remained an under-researched area. The learning process engaged at the workplace fundamentally shares the same nature as that engaged in the classroom setting; however, workplace learning may be more concerned about problem-solving and critical thinking (Kirby et al., 2003a,b). Kirby et al. (2003b) developed and administered the Approaches to Learning at Work Questionnaire (ALWQ) in workplace settings, describing workplace learning approaches as deep (understand content thoroughly, active learning), surface-rational (follow logical orders, pay attention to details) and surface-disorganized (lack of comprehension). The ALWQ has been successfully employed in several clinical workplace settings (Delva et al., 2002, 2004; McManus et al., 2004). These studies reported acceptable reliability and examined the associations between the ALWQ subscales and external variables such as workplace climate and performance outcome.

Despite the application of the ALWQ in various clinical contexts, the adaptability of the questionnaire in terms of its psychometric properties in the clinical practicum remains unexplored. Specifically, it is unclear whether the three-factor structure of the ALWQ originally identified applies to the clinical practicum context. Furthermore, little is known about the extent to which an individual item, that reflects a specific learning strategy/motive, effectively contributes to characterizing students' learning approaches. This item-level analysis can yield valuable information for the utility of a learning approach instrument, because some items may possess higher discriminating power in differentiating students at varied levels of a learning approach, and some items may reflect a more difficult learning strategy than others. In response to this research gap, item response theory (IRT; van der Linden and Hambleton, 2013), as a modern measurement theory, offers a promising solution, and it has been increasingly used in nurse education in recent years (Nicholson et al., 2013). Differing from the conventional classical test theory, IRT models the response of an individual to an item as a function of item measures (item discrimination and item difficulty) and person measures (also referred to as latent trait, in a continuum ranging from low to high levels). It provides a sophisticated measure of measurement precision, presenting how precisely/reliably a specific item/scale contributes to the measurement of the latent trait at varied levels.

The current study therefore aims to measure students' approaches to learning in the context of clinical practicum based on the ALWQ using an IRT approach. Specifically, the study was designed to investigate the factor structure of the ALWQ in a clinical practicum setting, to evaluate the item properties (item difficulty and item discrimination) of individual ALWQ items, and the extent to which the ALWQ can be precise/useful in measuring nursing students' approach to learning.

2. Methods

2.1. Study Design, Settings and Participants

Survey research design was used in the study. Third year nursing students who enrolled in the Bachelor of Nursing program at a university in Hong Kong in the academic year of 2015–16 were invited to participate in the study. They undertook a 6-week clinical practicum course at medical and surgical units of local hospitals. Towards the end of the practicum, they were asked to complete the ALWQ (Kirby et al., 2003b) along with other instruments assessing learning experience and performance in the clinical practicum. Participation was voluntary and informed consent was obtained. Ethical approval was granted by the Human Research Ethics Committee at the University of Hong Kong

(Reference Number: EA1606041) and the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (Reference Number: UW 16-383).

2.2. Measure - Approaches to Learning at Work Questionnaire (ALWQ)

The original ALWQ consisted of a total of 30 items measuring three subscales (10 items per subscale). The deep learning subscale measured students' intrinsic motivation and tendency to engage in meaningful learning. The surface-rational subscale contained items about memorization and performance of detailed and structured work. The surface-disorganized subscale revealed students' learning process related to lack of comprehension, organization and effectiveness. Self-report responses were given on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree). Kirby et al. (2003b) reported the reliability coefficients of above 0.70 for all three subscales and that the three-factor structure showed a good fit.

2.3. Data Analysis

Factor analyses were conducted for investigating the factor structure of the ALWQ in the clinical practicum context. An IRT analysis then followed to examine the item properties (item discrimination, item difficulty) of the ALWQ and the extent to which the ALWQ was precise/useful in assessing student's approaches to learning. The IRT analysis procedure included model assumption evaluation (unidimensionality and local independence), item calibration and goodness-of-fit assessment.

3. Results

Two hundred and thirteen third year nursing students at a university in Hong Kong (25.8% male) participated in the study. In this group, approximately 85.9% were registered as local Hong Kong students, and 3.7% were non-local students (10.3% were unidentified). A total of 211 questionnaires were returned (response rate = 99%), of which three cases were eliminated from the data analyses due to substantial missing responses (> 50%). In the final sample ($n = 208$), 85% (177 respondents) completed all items of the questionnaire and the rest (31 respondents) omitted a few items but completed at least 80% of all items.

3.1. Factor Structure Based on Factor Analysis

As an initial observation of the data distribution, response frequencies, means, standard deviations and item-total correlations were computed for individual items. On average, < 2% of the responses selected the response category "strongly disagree" (Table 1), suggesting the necessity to collapse this response category into its adjacent category of "disagree". In comparisons of Cronbach's alphas and inter-item correlations between the 4-response category version and the original 5-response category version, no substantial differences were found (difference of Cronbach's alphas was < 0.01). We therefore decided to proceed with the subsequent analyses based on the 4-response category version for parsimony.

To examine the factor structure of the ALWQ in the clinical practicum context, exploratory factor analysis (EFA) for categorical factor indicators was performed in Mplus 8 (Muthén and Muthén, 2017) with the 30-item ALWQ. Since the ALWQ was first tested in a new clinical learning context, it is necessary to examine its factor structure using an exploratory approach. The first four eigenvalues were respectively 5.59, 4.42, 2.04, and 1.60, suggesting two dominant factors (Kline, 2014). Adopting the change in root mean square error of approximation between two nested models as a criterion (significant if $\Delta RMSEA > 0.015$; Chen, 2007) for determining the factor structure, the significant differences in fit between the one-factor EFA and the two-factor EFA

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