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Evaluating the Effectiveness of Teaching and Learning in Higher Education

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ABSTRACT
This paper aims to develop a psychometric scale for assessing teaching and learning performance in higher education institutions, grounded in Kirkpatrick's four-level evaluation model. The study establishes content validity through expert reviews, pre-testing, and pilot testing, employing Exploratory Factor Analysis (EFA). The EFA identifies the dimensionality of the measures, with Cronbach's alpha coefficients ranging from 0.894 to 0.904, indicating strong internal consistency in the pilot testing phase. Subsequently, Confirmatory Factor Analysis (CFA) using Structural Equation Modelling (SEM) validates the one-dimensionality, convergent, discriminant, and construct validity, as well as the reliability and normality of the teaching performance scales, based on a survey of 592 student evaluations. The field study data further confirm the measurement model, verifying the constructs of the teaching and learning performance scales. Establishing this psychometric scale using Kirkpatrick's evaluation model represents an innovative contribution to enhancing teaching quality and effectiveness. Theoretically, this study introduces a novel perspective on psychometric evaluation, focusing on Kirkpatrick's reaction (level 1) and learning (level 2). Practically, the scale offers a valuable tool for trainers and academic staff to evaluate their performance through student feedback within higher education contexts.

KEYWORDS: *Confirmatory Factor Analysis (CFA), Higher Learning, Kirkpatrick's Evaluation Model, Psychometric Scale, Structural Equation Modelling (SEM) and Teaching Performance*

INTRODUCTION

Performance management is closely linked to an individual's competency, proficiency, and behaviour's in strategic planning, as well as in monitoring and evaluating their performance (Stiffler, 2006). Modern performance management practices in organizations encompass a wide range of areas, including the balanced scorecard, Six Sigma, financial reporting, data analysis, business intelligence, performance appraisals, competency management, training evaluation, incentives, compensation, and other aspects related to both organizational and individual performance (Breunig & Hydle, 2013; Stiffler, 2006).

Performance management in higher education is often tied to an individual's proficiency and competency. Factors such as beliefs and values, skills, experience, personality traits, motivation, emotional well-being,

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and intellectual abilities influence both competency and proficiency (Zwell & Michael, 2000). Beliefs, in particular, play a significant role in shaping behavior; for instance, individuals who believe they lack creativity or innovation are less likely to explore new or alternative ways of accomplishing tasks.

Zwell and Michael (2000) also identified key behaviors essential for effective performance management, including delivering high-quality and efficient work, clearly defining expected outcomes for tasks, and actively seeking feedback. Additionally, differences between an ideal performer and others, referred to as performance gaps, are typically reflected in either behaviors or work outcomes (Rothwell & Graber, 2010).

In higher education, the primary skill of academics lies not in the mere accumulation of knowledge but in effectively communicating that knowledge to others. Educators must ensure that teaching materials are understood and retained by students, enabling them to apply and recall the knowledge when needed. This process is closely tied to academics' presentational behavior, encompassing both verbal and non-verbal communication. Regardless of their personality, academics must exhibit behaviors that support and facilitate student learning (Rae & Leslie, 2002).

Jones and Sanghi (2006) emphasize that individual behavior is expressed through job performance, which reflects the interplay of dynamic and complex human processes. These processes include the relationships between personality traits, behavior, performance, and environmental factors.

Evaluating the performance of academic staff in higher education involves assessing various aspects such as teaching, learning, supervision, research, publications, and community service, all aligned with their roles and responsibilities as well as other essential attributes. However, systematic evaluation methods for teaching and learning performance in higher education remain relatively underdeveloped compared to those in corporate and industrial sectors. Consequently, scholars have recommended adopting frameworks from workplace training to create models that support effective teacher performance (Lawless & Pellegrino, 2007; Naugle, Naugle, & Naugle, 2000; Steinert et al., 2006). Notably, literature offers limited models specifically designed to predict teaching and learning performance among academic staff in higher education institutions.

In its early stages, Bell (1983) introduced the term "high-performance trainer" to describe an individual who demonstrates efficiency, effectiveness, and excellence in identifying and assessing needs through structured learning. This approach aims to develop the key competencies required for individuals to succeed in their current or future roles. A review of the literature highlights several models and constructs closely associated with job performance.

LITERATURE REVIEW

Research specifically focused on teaching and learning performance among academic staff in higher education institutions is limited. However, several studies have explored related aspects of job performance (Taylor, 2001; Hubbal & Burt, 2006; Milanowski, 2011) and examined its connections to personality traits (Van den Berg & Feij, 1993, 2003; Loveland et al., 2005; Chunping, Dengfen, & Fan, 2009; James, 2010), supervision (Emilsson & Johnson, 2007; Mainhard et al., 2009), and decision-making (Sukirno & Siengthai, 2011).

Previous research highlights the growing significance of performance indicators (PIs) in higher education. Taylor (2001) emphasized that engaging university academics in the development of PIs can enhance their effectiveness. Dissatisfaction with current PIs often stems from their inability to fully capture the multifaceted nature of academic work, with many academics favoring research over teaching.

The teaching and learning performance of academic staff in higher education also includes the evaluation of supervision quality. Emilsson and Johnson (2007) and Mainhard et al. (2009) highlighted the critical role

of the supervisor-student relationship in the success of Ph.D. projects. Insights into doctoral students' perceptions of their relationships with supervisors can provide valuable feedback for enhancing supervision quality. Emilsson and Johnson (2007) identified five key elements essential to effective supervisor-supervisee relationships: trust, theories, tools, training, and time.

Additionally, other studies have examined the impact of participative decision-making on lecturer performance in higher education institutions. Sukirno and Siengthai (2011) found that participative decision-making and academic rank significantly influence lecturers' performance. Their findings suggest that involving lecturers in educational decision-making processes not only enhances their individual performance but also contributes to overall institutional effectiveness.

Kirkpatricks' Four Levels of Evaluation Model

Previous studies have focused on a few relevant research efforts related to performance evaluation, with many using Kirkpatrick's Four Levels of Evaluation model to assess training effectiveness in various contexts. These studies have employed different methodologies and analytical tools (Bian et al., 2015; Rouse, 2011; Chang, 2010; Praslova, 2010). According to Kirkpatrick's model, the evaluation consists of four levels: the reaction level, which measures trainees' perceptions of the training; the learning level, which assesses the outcomes in terms of the knowledge and skills gained from the training program; and the behavioral and results levels, which evaluate the impact of training on work performance. The model also takes into account the productivity gains of the entire organization. As Praslova (2010) noted, the model is comprehensive, multilevel, and dynamic, addressing both immediate and long-term effects.

Previous studies have also supported the adoption and adaptation of Kirkpatrick's Four Levels of Evaluation model (Peirera et al., 2016; Bian et al., 2015; Al-Yahya & Mat, 2013; Rouse, 2011; Lin et al., 2011; Praslova, 2010; Chang, 2010; Jason et al., 2008; Heidi et al., 2004; Gomez, 2003; George et al., 1997). Since its introduction in 1959, the model has been widely studied and proven effective for evaluating workplace training and teaching performance (Arthur et al., 2003; Praslova, 2010; Roos et al., 2014). For instance, Praslova (2010) adapted Kirkpatrick's model to assess training criteria and learning outcomes in higher education institutions. Evaluating the effectiveness of education offers valuable feedback to higher learning institutions (Peirera et al., 2016), particularly for external stakeholders such as prospective students, parents, local governments, regulatory bodies, professional organizations, and accreditation agencies. However, selecting appropriate indicators of educational effectiveness can be challenging if the criteria are not clearly defined. Adapting Kirkpatrick's model for higher education helps clarify these criteria and provides a framework for assessing educational outcomes. The specific instruments and indicators align with the corresponding criteria, offering a comprehensive approach for understanding the role of various indicators across different assessments.

In an empirical study, Rouse (2011) emphasized the importance of evaluating the impact and effectiveness of courses, suggesting that improvements should be made based on identifying strengths and weaknesses. The study applied Kirkpatrick's Four Levels of Evaluation to propose a model that instructors could use to enhance standard course evaluation forms. This model focused on the first three levels of the framework and highlighted the conditions necessary for transferring learned knowledge and skills to on-the-job applications. The study provided practical tips for health information management (HIM) instructors to assess the effectiveness of their courses and programs.

Additionally, Chang (2010) conducted empirical research in the hospital industry that supported Kirkpatrick's Four Levels of Evaluation theory. The study suggested that for organizational results to be achieved, positive changes in behavior (job performance) and learning must occur. By examining Levels 2 and 3, the study helped explain and predict the outcomes of Level 4. Chang's study evaluated a sales training program within an organization, assessing employees' training outcomes in terms of knowledge,

skills, job performance, and the overall impact on the organization. The findings, tested using paired-samples t-tests, correlation, and hierarchical regression analysis, supported the study's hypotheses.

Another example of empirical research by Lin et al. (2011) applied Kirkpatrick's Four-Level Evaluation Model to examine the impact of organizational commitment on employee reactions to educational training. The study aimed to explore the causal relationships between golf club employees' reactions to training, learning, training behaviors, and organizational commitment (Level 4), using Kirkpatrick's model as the foundation for the conceptual framework and testing the causal model. A questionnaire survey method was used to collect data from 494 respondents in central Taiwan, with Structural Equation Modeling (SEM) employed for analysis and hypothesis testing. The SEM results indicated that the overall fit indices met the theoretical thresholds. The findings revealed that golf club employees' reactions to training influenced their organizational commitment through training learning and training behaviors. These factors—training, learning, and training behaviors—acted as mediators in the causal model. The study concluded that employees demonstrated stronger learning outcomes and behaviors when they had positive reactions to educational training.

Earlier, Heidi et al. (2004) used Kirkpatrick's Level 1 evaluation to assess the effectiveness of an instructional environment where students learned to use a computer simulation tool for engineering design tasks. The evaluation was triangulated with an instructor's assessment of student-generated products as they used the learning modules to design an ice-cream manufacturing process. The simulation tool, commonly used in engineering design, is frequently taught to undergraduates as part of system design education. Therefore, the evaluation of this tool in the learning environment ensured that students could use it effectively.

Furthermore, Buckly et al. (2009) emphasized the need for an integrated approach to evaluating training effectiveness using Kirkpatrick's Four Levels: reaction, learning, behavior, and results. At the reaction level, both students and trainers evaluate their responses to the training, including their attitudes toward the training organization, content, and methods used. The learning level focuses on the principles, facts, and techniques students acquire during the training. The behavior level examines changes in job performance resulting from the training, specifically how students apply the knowledge they gained. Finally, the results level assesses the impact of training on organizational performance, such as reduced costs, improved quality or quantity, and increased profits.

Based on the literature, it is appropriate to apply the first two levels of evaluation (reaction and learning) from Kirkpatrick's Four Levels of Evaluation model to assess teaching and learning performance in the context of higher education institutions. The specific aim of this paper is to establish the psychometric properties of scales for measuring teaching and learning performance, using Kirkpatrick's model to address the existing research gap.

METHODS

Various methods have been developed to measure individual and organizational performance. This study specifically focuses on creating measures for teaching and learning performance, based on the duties and responsibilities of academic staff (the unit of analysis) in higher education (Sukirno & Siengthai, 2011). Twenty-six items were developed, using Kirkpatrick's Four Levels of Evaluation Model, specifically Levels 1 (Reaction) and 2 (Learning), as the foundation for assessing teaching and learning performance, as outlined in Table 1.

Table 1: Teaching Performance constructs in higher learning (Source: Kirkpatrick's Four Levels of Evaluation; Sukirno, Sununta Siengthai, 2011; Smeenk et al, 2009; Yu et al, 2009).

1) Level 1 (Reaction)	Explain the lesson's objectives.
	Made it clear what students expected to learn in the lesson.
	Covered all topics planned for the class session.
	Made use of class time to teach the materials related to learning.
	Present the lesson content in an orderly, clear and logical manner.
	Use relevant examples to reinforce understanding of the lesson content
	Establish a connection between the theoretical and practical applications.
	Used teaching aids effectively.
	Stimulate students' interest in learning.
	Interact with students.
	Promote good class discussion.
	Teach at a level / speed appropriate to the students' abilities.
	Started and ended the class session on time.
	The class session conducted in accordance with the official schedule.
	Told students they could consult after class.
	The objectives of the lesson achieved.
	Show great interest in the lesson.
	Participate actively in class discussions.
2) Level 2 (Learning)	The topics covered are apparently relevant and be used in future subjects or work environments.
	Understanding of the lesson improved the result of attending the class session
	Able to define the important concepts, principles, facts and techniques learned in the class.
	Able to apply the concepts, principles, facts and techniques learned
	The knowledge has increased after attending the class session
	The skills improved the result of attending the class session.
	The environment in the class had motivated students to learn and apply knowledge.
	Expect to get a high grade in the course

Expert review, pretesting and pilot study

Expert review is a critical step in the questionnaire design process. In this study, the questionnaire was reviewed and validated by two groups of experts: one specializing in measurement and evaluation (education) and three subject matter experts in human resource development. These experts were independent and not part of the study population. The subject matter experts were consulted for various purposes, including evaluating the questionnaire's content, ensuring the relevance and alignment of the measures with the research objectives, reviewing item wording and terminology, identifying the most appropriate respondents (e.g., university roles/titles), assessing the sensitivity of the information requested, and refining the questionnaire's language and format. Following the expert review, pre-testing and a pilot study were conducted to finalize the questionnaire.

The purpose of pre-testing is to ensure that the questionnaire is valid, reliable, appropriate, and sufficient for the study. For this phase, the questionnaire was self-administered to 20 student respondents selected from the target population, though not through random sampling. Pre-testing assessed the time required to complete the questionnaire, and respondents were debriefed afterward to gather their feedback. The information collected during pre-testing was analyzed to clarify instructions, and necessary revisions were made to the questionnaire. As Cooper and Schindler (2003) state, "An important purpose of the pre-test is to determine the participant's reactions to the questions." When using pre-designed and pre-validated research instruments, the pilot test further enhances the tool's validity, ensuring clarity and coherence. According to Foreman (2008), the pilot test also provides an opportunity to refine and improve the questions before the actual data collection phase.

The researcher then conducted a pilot study to refine and validate the research methods, assess the reliability of the measurement tool, and estimate the required sample size for the final study. The pilot study followed the same approach as the actual field study, with data collected from 110 student respondents. Responses to the 26 questionnaire items were recorded using a 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree").

The pilot study results, summarized in Table 2, indicated that the research framework, questionnaire layout, and duration were well-designed, yielding a Cronbach's Alpha score above 0.7 for the teaching performance construct (sTP) evaluated by students. However, prior to reliability analysis, an Exploratory Factor Analysis (EFA) was conducted. This analysis revealed that several items had factor loadings below 0.6, necessitating their removal. The questionnaire was subsequently revised based on the EFA results and prepared for data collection in the actual field study.

Table 2: KMO and Bartlett's Test for Students Responses on Academic Staff Teaching Performance

Constructs	**Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)**	**Bartlett's Test of Sphericity**	**Sig.**
Students Responses on Academic Staff Teaching Performance (sTP)	0.941	3324.112	0.000

Field study

In the actual field study, the researcher distributed self-administered questionnaires to 2,250 students from selected faculties (business, accounting, management, and economics) at higher education institutions in Malaysia, using a multi-stage sampling design. Each questionnaire was accompanied by detailed instructions for completion. A total of 592 completed questionnaires were returned, representing a response rate of 26%.

During the data collection process, the researcher obtained permission from the deans of the respective faculties and secured a list of academic staff and students, along with their class schedules, to serve as the sampling frame. Respondents were selected randomly using computer-generated random numbers, which were then matched with the corresponding names in the sampling frame.

Once the respondents were identified, the researcher visited their lecture rooms during scheduled classes and obtained permission from the academic staff to distribute the questionnaires. Respondents were allowed to complete the questionnaires at their convenience and return them the next day in sealed envelopes to a designated faculty representative.

To ensure confidentiality, each questionnaire was accompanied by a cover letter explaining the purpose of the study. Additionally, respondents were not required to provide any personal identification on the questionnaire.

CONCLUSION

In conclusion, the Confirmatory Factor Analysis (CFA) evaluated the unidimensionality, validity, and reliability of the student-assessed teaching and learning performance (sTP) measures. The final measurement model for the sTP construct comprises 15 items: nine items under Level 1 (Reaction) and six items under Level 2 (Learning).

Theoretically, this study contributes by modifying and introducing new measures for evaluating teaching and learning performance based on student feedback. These measures were validated through the CFA within a Structural Equation Modeling (SEM) framework. Since the sTP construct is specifically developed from Kirkpatrick's Four Levels of Evaluation model, focusing on Level 1 (Reaction) and Level 2 (Learning), the finalized items can serve as a standardized tool for student evaluations of academic staff performance in higher education institutions.

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