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Development and Psychometric Evaluation of Faculty Evaluation for Online Teaching (FEOT)

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Abstract

With the shift of the instruction from the traditional Face-to-face instruction to online, there is a need to develop a valid and reliable instrument that is responsive to the current demands of instruction. Hence, the objective of the study was to develop and evaluate the psychometric properties of the Faculty Evaluation for Online Teaching (FEOT) among University Students. A descriptive methodological study was used and a convenience sample of 2985 students were employed. The 20-item FEOT confirmed the four-factor loadings following the domains in the Denison Framework for Teaching. The factor loadings of the items were between 0.619 to 0.791 while the CFA model revealed a $\chi^2/df = 2.35$, root mean square error of approximation= 0.071, comparative fit index= 0.962, goodness of fit index=0.957, Tucker-Lewis index= 0.956, incremental fit index= 0.962, and standard root mean square residual= 0.023. The overall Cronbach's alpha of the instrument was 0.923 while the sub-domains have Cronbach's alpha of 0.906 for Planning and Preparation, 0.942 for Classroom Environment, 0.929 for Instruction and 0.921 for Professional Responsibilities indicating high reliability and the item-total correlations ranges from 0.764 to 0.868. At the item level, 60.60% of the ratings had a CVI of greater than 0.78. The FEOT was shown to be valid and reliable in assessing the competencies of faculty members in an online environment.

Keywords: Faculty evaluation, online teaching, psychometric properties, reliability, validity

The success in which an educational institution provides an atmosphere that allows students to effectively achieve worthwhile learning goals, including adequate academic standards, has been described as the quality of education (Gordon & Partington, 1993). Central to the achievement of these learning goals are the support of teachers and the student-faculty relationship. Research revealed the support of faculty members in the classroom has a positive impact on the success of students (Lee, 2007). It was also discovered that the student-faculty relationship is a critical component of teaching effectiveness (Soriano & Aquino, 2017). According to Walsh and Maffei (1994), the student-faculty relationship has three effects on education: first, a good student-nursing instructor relationship increases both student and nurse educator educational experiences; second, a strong relationship improves student assessments of faculty; and third, a strong relationship enhances student learning. However, these will become a challenge as we face the “new normal”, where Face-to-face learning is minimized, and the delivery of instruction will be done in an online classroom.

Despite the rapid advances and exponential growth in information, communication, and technology that have paved the way for online education around the world in recent years, e-learning or online learning was not the ideal or preferred method of teaching and learning in a developing country like the Philippines before the COVID-19 pandemic. Due to the continued rise in COVID-19 cases and the pandemic's non-linear evolution, schools, colleges, and universities around the world are increasingly adopting a more versatile learning scheme in the delivery of training, such as e-learning or online learning (Oducado & Soriano, 2021). However, at present, higher educational institutions are faced with the problem of transitioning from the traditional face-to-face instruction to online classroom. Thus, it is important that faculty members are adept in navigating through the use of different technologies in order to become effective in the delivery of online instruction.

Several pieces of training have been given in order to assist teachers in the preparation of their online learning modules, however, one important factor which is critical in the success of online classroom is teacher performance. According to Stronge (2010), teacher evaluation is a structured and standardized method of evaluating teacher results. It serves as a focal point in determining effective and ineffective teachers since they are mandated to perform effectively so that students will be able to meet the learning outcomes (Ngoma, 2011).

Successful teachers are supposed to be knowledgeable about their subjects, have excellent teaching skills, adhere to performance expectations, share professional expertise with their colleagues, care deeply about their students' progress, and possess unique attributes that define their effectiveness (Akram & Zepeda, 2015). Further, the rapid expansion of online learning necessitated the creation of teacher evaluation tools tailored specifically to the demands of the online classroom.

While there is a large body of research on faculty assessment in traditional contexts, there have been fewer studies on the self-reported perceptions of evaluation processes among online faculty members. The existing evaluation scales, such as those used in traditional instructional contexts, have been questioned as a result of the rapid rise of online education (Berk, 2013; Eskey & Schulte, 2012; Hathorn & Hathorn, 2010; Mandernach et al., 2005; Rothman et al., 2011; Schulte, 2009; Tobin, 2004). As these evaluation methods were put to the test, concerns grew that their accuracy, effectiveness, and sufficiency in the online classroom might be questioned (Berk, 2013). In the online context, Creasman (2012) discovered a number of changes in instruction. The asynchronous style of environment, non-linear forums that allow students to participate in several discussions at once, student-teacher interactions, and an increasing volume of information are examples of such variations. As a result, while developing and conducting assessments for online instructors, the intricacies of the online environment must be considered (Berk, 2013). With these, there is a need to develop a valid and reliable instrument that is responsive to the current demands of instruction.

The objective of the Study

The objectives of the study were to:

1. Determine the validity of the Faculty Evaluation Instrument for Online Teaching in terms of:
 - 1.1 Content Validity
 - 1.2 Construct Validity
2. Analyze the reliability of the Faculty Evaluation Instrument for Online Teaching in terms of:
 - 2.1 Internal consistency reliability
 - 2.2 Item-total correlation
3. Develop a valid and reliable Faculty Evaluation Instrument for Online Teaching

Theoretical Framework

Measures of teacher performance have changed from teacher action to student achievement, and from clinical supervision to assessment, in tandem with broader shifts in education policy over the last few decades. Based on her experiences at the Educational Testing Service, Danielson published her groundbreaking thesis, *Enhancing Professional Practice: A Framework for Teaching*, in 1996. The Danielson Framework for Teaching is focused on student achievement and evaluation in assessing the competence of teachers. This model consists of four domains namely: 1) Planning and Preparation, 2) the Classroom Environment, 3) Instruction, and 4) Professional Responsibilities.

The model is based on core principles such as what students should understand, the meaning of learning and how to promote it, the purposeful nature of teaching, and professionalism's nature. The model also has a variety of important features, including being comprehensive, research-based, public, generic, structure-coherent, and independent of any particular teaching methodology (Danielson, 2007). Further, Danielson's model (see Table 1) captures the multifaceted nature of teaching, provides a structure for teacher self-assessment and reflection, and provides a language for dialogue regarding teacher competence (Marzano et al., 2011)

Danielson (2007) further discussed how the structure should be used for supervision and assessment, emphasizing the value of a straightforward, research-based concept of teaching that represents the "professional wisdom" of those who will be implementing the method. (p. 177).

Table 1.

A Blueprint for Teacher Evaluation: Components of Professional Practice

Domain 1: Planning and Preparation	Demonstrating Knowledge of Content and Pedagogy
	Demonstrating Knowledge of Students
	Setting Instructional Outcomes
	Demonstrating Knowledge of Resources
	Designing Coherent Instruction
	Designing Student Assessments

Table 1.*Continued*

Domain 2: Classroom Environment	Creating an Environment of Respect and Rapport
	Establishing a Culture for Learning
	Managing Classroom Procedure
	Managing Student Behavior
	Organizing Physical Space
Domain 3: Instruction	Communicating with Students
	Using Questioning and Discussion Techniques
	Engaging Students in Learning
	Using Assessment in Instruction
	Demonstrating Flexibility and Responsiveness
Domain 4: Professional Responsibilities	Reflecting on Teaching
	Maintaining Accurate Records
	Communicating with Families
	Participating in the Professional Community
	Growing and Developing Professionally
	Showing Professionalism

Materials and Methods***Study Design***

This study utilized a descriptive-cross sectional study using an online survey method in order to evaluate the psychometric properties of the Faculty Evaluation for Online Teaching (FEOT).

Sampling and Setting

The study included a total of 4971 students who were recruited through convenience sampling. Eligibility criteria included those who have been oriented with the use of Canvas, the official Learning Management

System (LMS) of the University, who have been enrolled during the period of August 2020 to February 2021, and an undergraduate student.

Recruitment of the participants was done by posting the letter of invitation and the link to the online survey through their Canvas accounts.

Procedure

The study secured ethical clearance from the San Beda University-Research Ethics Board (SBU-ERB) with Protocol No. 2020-023. The permission to conduct the study was granted by the Vice President for Academics (VPA) and communicated through the Information and Communications Technology Center (ICTC) who facilitated the posting of the invitation and the link to the online survey to the respondents' Canvas accounts. The purpose of the study as well as the inclusion criteria, and risk were explained in the letter of invitation.

Instrument

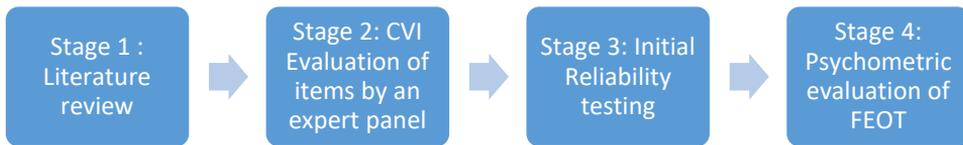
The purpose of the FEOT is to assess the competencies of the faculty members in terms of the conduct of online instruction. The instrument was developed in two phases (Figure 1). In the first phase, an extensive literature review was conducted in order to generate the initial set of items for the instrument. Keywords which includes the combination of the words "assessment" and "evaluation" with "online teaching", "online education", "online instruction", "e-learning", and "online course" were used in different online databases such as PubMed, Google Scholar, ProQuest, EBSCO, Science Direct, and Scopus. Published literatures from 2010 to 2020 were evaluated. The searched items were evaluated and loaded following the Denison's Framework for Teaching. A total of 33 items were generated from the comprehensive review of the literature. An expert panel of six faculty members and four university administrators were asked for feedback. The expert rated each of the 33 items for relevance using the content validity index method following the method described by Polit et al. (2007).

After establishing the final list of items, initial reliability testing was conducted among 150 students for pilot testing of the instrument for clarity and feasibility. Preliminary analyses revealed a Cronbach's alpha coefficient of 0.837 for Planning and Preparation, 0.907 for Classroom Environment, 0.863 for Instruction, and 0.877 for Professional Responsibilities whereas the entire scale got an alpha coefficient of 0.961. This sample's FEOT mean was 4.41 (SD=11.69).

In the second phase of the study, the psychometric properties of the instrument were assessed which includes the content validity, construct validity and internal consistency reliability.

Figure 1.

Stages of the development, validity, and reliability testing of FEOT



Data Analysis

The SPSS version 21.0 was used for data management and statistical analysis (IBM Corporation, Armonk, NY). Internal consistency was calculated using Cronbach's alpha coefficient, as well as item-total correlations, to determine the FEOTs reliability among the university students. The appropriate parameters were an item-total correlation of greater than 0.30 (Ferketich, 1991) and a Cronbach's alpha coefficient of greater than 0.70 (Polit & Beck, 2014 as cited by Soriano & Calong Calong, 2019). Further, the Item-Content Validity Index (I-CVI) and Scale- Content Validity Index (S-CVI) were assessed. Additionally, a modified Kappa index was computed to estimate the I-CVI.

A confirmatory factor analysis (CFA) with maximum likelihood estimation was used to confirm the instrument's factor structure following the Denison's Framework for Teaching. The variances of the variables were set to 1 which provided the identification in the analysis. In order to approximate the model fit, the following values were used: relative chi-square (χ^2/df) ≤ 3 , (b) root mean square error approximation (RMSEA) ≤ 0.08 , (c) comparative fit index (CFI) ≥ 0.90 , (d) goodness of fit index (GFI) ≥ 0.95 , (e) Tucker-Lewis index (TLI) ≥ 0.90 , (f) Incremental fit index (IFI) ≥ 0.90 , (g) standardized root mean square residual (SRMR) ≤ 0.08 (Kline, 2016).

Results

Sample

The study included 2895 students in the study after deleting cases not meeting the inclusion criteria. On average, majority of the participants were 20 years old (64.23%), male (54.24%) and were Level 1 students (72.45%)

Content validity

Content validity is the degree to which items or measures adequately represent a given construct. An expert panel consisting of six members determined the content validity of the instrument. A total of 10 experts were employed which consists of six faculty members and four university administrators.

Table 2.

I-CVI and S-CVI of FEOT

Item	No. of ratings of 3 or 4	I-CVI ^a	p ^{c b}	k* ^c
Planning and Preparation		S-CVI= 0.92		
1.Provides key learning information such as learning outcomes, course objectives, and/or standards as well as instructional materials (e.g. videos, PowerPoint, web-based resources) and references	10	1.00	0.001	1.00
2. The module completion requirements and/or prerequisites are utilized to provide course structure, pacing and flow.	9	0.90	0.010	0.90
3. The schedule of synchronous (online class in a real-time/live) and asynchronous (online class given to students to complete on their own time/not being delivered in person/real-time) activities are indicated in the student modules and course syllabus	8	0.80	0.044	0.79
4. Communication expectations for online discussions, email, and other forms of interaction are clearly stated	6	0.60	0.205	0.50
5. Provides clarity on what the students are supposed to accomplish / achieve in terms of learning.	6	0.50	0.205	0.50

Table 2.*Continued*

Item	No. of ratings of 3 or 4	I-CVI^a	p_c^b	k*^c
Planning and Preparation		S-CVI= 0.92		
6. Instructional materials were presented to us in a format appropriate to the online environment, and are easily accessible to and usable to student	9	0.90	0.010	0.90
7. Organizes course content in a clear, methodical, and logical manner from one topic to another.	6	0.60	0.205	0.50
Classroom Environment		S-CVI= 0.95		
8. Learning activities include student-student interaction (e.g. discussions, constructive collaboration and peer reviews)	8	0.80	0.044	0.79
9. Provides class expectations such as participation rules, etiquette expectations, code of conduct, late work and make-up work; and technology requirements.	9	0.90	0.010	0.90
10. Provides accessible text and images in files, documents, LMS pages, and web pages to meet the needs of students.	6	0.60	0.205	0.50
11. Creates a safe and positive online learning environment in the classroom.	6	0.60	0.205	0.50
12. Creates a schedule for meaningful and active involvement of students in online sessions and activities.	8	0.80	0.044	0.79
13. Online activities in the course have kept the students more interested and motivated to study their lessons.	8	0.80	0.044	0.79
14. Provides opportunities that promote student engagement and active learning.	8	0.80	0.044	0.79
15. Learning activities include student-teacher interaction (e.g. teacher is actively engaged in authentic conversations and provides quality feedback)	9	0.90	0.010	0.90

Table 2.*Continued*

Item	No. of ratings of 3 or 4	I-CVI^a	p_c^b	k*^c
Instruction		S-CVI= 0.95		
16. Utilizes a variety of assessments methods (e.g., discussions, individual and/or group assignments and quizzes) in the delivery of the course	10	1.00	0.001	1.00
17. Opportunities for course feedback were present and available to students throughout the duration of the course.	8	0.80	0.044	0.79
18. The grading criteria and policies were reflected in the syllabus and were clearly explained.	6	0.60	0.205	0.50
19. Assessments were appropriately aligned with the learning outcomes and course objectives	6	0.60	0.205	0.50
20. Online course content has developed a deep understanding of different topics/lessons	6	0.60	0.205	0.50
21. Various opportunities for collaborative work, research, projects, and laboratory work among students were provided.	6	0.60	0.205	0.50
22. Provides formative assessments that will give opportunity to build knowledge and skills on a step-by-step basis.	8	0.80	0.044	0.79
23. Uses plenty of visual, media, interactive tools, and learning activities	6	0.60	0.205	0.50
24. Communicates and responds to students in a timely manner (e.g. SMS, email, chats and other feedback tools) to establish online presence in the course as well as to check on students' academic and other concerns	8	0.80	0.044	0.79
25. Conducts online classes confidently	8	0.80	0.044	0.79
Professional Responsibilities		S-CVI= 0.93		
26. Supports learners in understanding online security and computer safety	8	0.80	0.044	0.79
27. Acknowledges sources of data/information by citing the author/publisher	6	0.50	0.205	0.50

Table 2.*Continued*

Item	No. of ratings of 3 or 4	I-CVI ^a	p _c ^b	k* ^c
Professional Responsibilities		S-CVI= 0.93		
28. Uses school-appropriate, clear, and concise language to communicate	6	0.50	0.205	0.50
29. Comes to class well-prepared	8	0.80	0.044	0.79
30. Respects the time and engagement of the student.	9	0.90	0.010	0.90
31. Demonstrates compassion, care and emotional support.	9	0.90	0.010	0.90
32. Counterchecks that students attending synchronous classes are officially enrolled in the course.	8	0.80	0.044	0.79
33. Reminds student regarding data privacy and security policies of the schools	6	0.60	0.205	0.50

^aI-CVI (content validity index) = number of experts providing a rating of 3 or 4/number of experts

^bp_c (probability of chance occurrence) = $[N!/A!(N-A)!] \times 0.5N$, N = number of experts; A = number of experts agreeing on a rating of 3 (quite relevant) or 4 (highly relevant)

^ck* (modified kappa) = (I-CVI-pc)(1-pc)

The content validity index (Grant & Davis, 1997) was determined by dividing the number of items with a relevance rating of 3 or 4 on a 4-point Likert-type scale by the total number of items and then expressing the result as a percentage. The index was then calculated and was graded on a four-point Likert scale, which was interpreted as (1= not relevant to 4= highly relevant). With more than 5 experts, the I-CVI should not be lower than 0.78 (Polit & Beck, 2006).

In addition, the I-CVI was estimated using a modified Kappa index (Polit et al., 2007). The modified Kappa (k*) is an index of agreement among experts that indicates beyond chance that the item is relevant, clear, or another characteristic of interest (Polit et al., 2007). The formula suggested by Polit et al. (2007) was used in the estimation (Table 2). Fleiss (1981) and Cicchetti and Sparrow (1981) proposed standards were employed to interpret k*.

Based on the findings, the instrument had an I-CVI of 0.60 to 1.00 and an S-CVI ranging from 0.92 to 0.95. Twenty out of 33 items (60.60%) had a rating of 0.78 or higher and were included in the final version of the FEOT.

Internal Consistency Reliability

The corrected item-total correlations for all 20 items ranged from 0.764 to 0.868, suggesting that each item's internal consistency with the composite score from the other items was moderate to high.

Table 3.

Factor Loading, Cronbach's alpha, and Item-Total Correlations for the FEOT (n=2895)

Item	Factor Loadings	Corrected Item-Total Correlation	Cronbach's α if item deleted
Planning and Preparation			
Item 1	0.711	0.790	0.922
Item 2	0.788	0.837	0.922
Item 3	0.651	0.778	0.922
Item 6	0.714	0.800	0.922
Classroom Environment			
Item 8	0.633	0.773	0.922
Item 9	0.662	0.804	0.922
Item 12	0.778	0.854	0.922
Item 13	0.785	0.864	0.922
Item 14	0.775	0.856	0.922
Item 15	0.791	0.865	0.922
Instruction			
Item 16	0.705	0.828	0.922
Item 17	0.762	0.857	0.922
Item 22	0.782	0.868	0.921
Item 24	0.695	0.822	0.922
Item 25	0.701	0.827	0.922

Table 3.*Continued*

Item	Factor Loadings	Corrected Item- Total Correlation	Cronbach's α if item deleted
Professional Responsibilities			
Item 26	0.724	0.814	0.922
Item 29	0.715	0.832	0.922
Item 30	0.729	0.817	0.922
Item 31	0.735	0.821	0.922
Item 32	0.619	0.764	0.922

The overall Cronbach's alpha of FEOT was 0.923 which demonstrates a high internal consistency reliability. Specifically, the Cronbach's α for each of the sub-scales 0.906 for Planning and Preparation, 0.942 for Classroom Environment, 0.929 for Instruction, and 0.923 for Professional Responsibilities.

Table 4.**Cronbach's alpha coefficients of the FEOT (n=2895)**

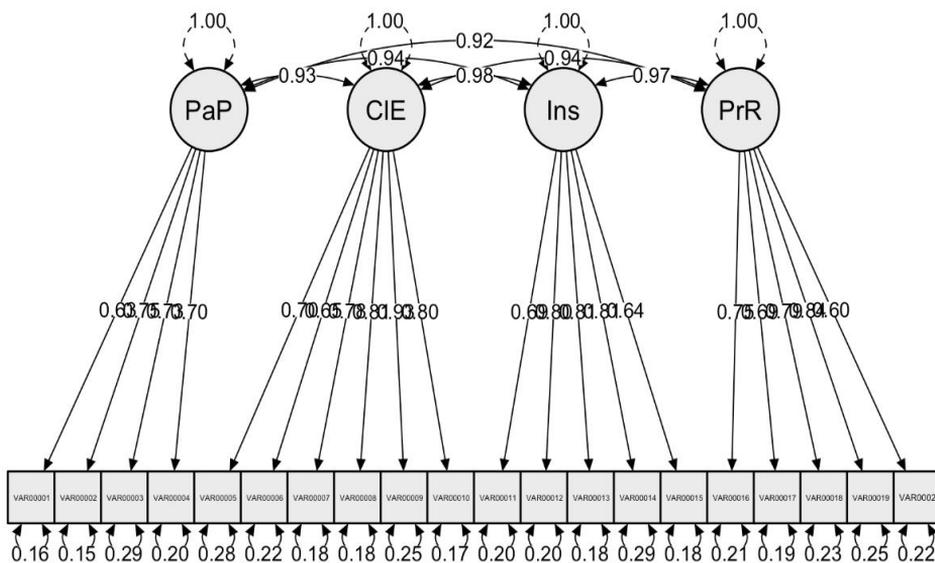
Item	Items	Cronbach's alpha
Planning and Preparation	4	0.906
Classroom Environment	6	0.942
Instruction	5	0.929
Professional Responsibilities	5	0.921
Over-all	20	0.923

Confirmatory Factor Analysis

The study confirmed the four-factor model of the FEOT. The CFA model output with factor loadings and standardized estimated is shown in Figure 2.

Table 5.*Model Fit Parameters for the FEOT (n=2985)*

Model	X ² /df	RMSEA	CFI	GFI	TLI	IFI	SRMR
Acceptable Values	≤3.00	≤0.08	≥0.90	≥0.95	≥0.90	≥0.90	≤0.08
Index Values	2.35	0.071	0.962	0.957	0.956	0.962	0.023

Figure 2.*Confirmatory Factor Analysis of FEOT*

The 20 items were loaded on four sub-scales following the Denison Framework for Teaching with factor loadings ranging from 0.619 to 0.791. The result of CFA revealed a $\chi^2/df = 2.35$, $RMSEA = 0.071$, $CFI = 0.962$, $GFI=0.957$, $TLI = 0.956$, $IFI = 0.962$, and $SRMR = 0.023$.

Discussion

The objective of the study was to develop and evaluate the psychometric properties of the Faculty Evaluation for Online teaching (FEOT). The study was conducted because the faculty evaluation instrument being used by the selected University prior to the shift in online teaching was insufficient for assessing the specific needs and demands that online instructors face. Faculty members must be assessed on key competencies for effective online teaching, such as teacher response rate and availability, frequency and quality of presence in the online classroom, facilitation of written discussions, accessibility of instructor-created supplementary material, and overall management of the administrative aspects of the course (Madernach et al., 2005).

To determine the psychometric properties of the FEOT, the content validity, construct validity, and internal consistency reliability were assessed. For the content validity, a panel of 10 experts was formed following the recommendation of Lynn (1986). Afterward, the content validity index was computed. In the study, two measures of content validity index were measured, the I-CVI and the S-CVI. According to Polit and Beck (2006), I-CVI refers to the proportion of content experts who assign an item a significance rating of 3 or 4, while S-CVI refers to the “proportion of items given a rating of quite/very relevant by raters involved,” (Waltz et al., 2005, p. 155). In term of content validity, 60.60% of the items had an I-CVI of 0.78 and higher. and an S-CVI ranging from 0.92 to 0.95 indicating that they are content valid (Polit & Beck, 2006)

The internal consistency of the FEOT among University students was found to be acceptable ($\alpha=0.923$). Similarly, the Cronbach's α for the four sub-scales were 0.906 for Planning and Preparation, 0.942 for Classroom Environment, 0.929 for Instruction, and 0.923 for Professional Responsibilities. These values exceed the recommended Cronbach's alpha coefficient for an instrument (0.70). Similarly, the four sub-scales of FEOT yielded an acceptable value of more than 0.70 (Polit & Beck, 2014 as cited by Soriano & Calong Calong, 2019). Furthermore, items in the FEOT had an adequate item-total correlations ranging from 0.764 to 0.868 which is greater than the recommended value of 0.30. (Ferketich, 1991). The result of confirmatory factor analysis revealed that the factor structure of the instrument is valid and has a good model fit following the recommendations of Kline (2016).

Limitation of the Study

One of the study's drawbacks is that it used convenience sampling and that the participants were recruited in Manila, which limits the findings' generalizability. An item to participant ratio of 1:74, however, allowed for the statistical findings to be robust. In addition, convergent validity, predictive validity and reliability tests were not performed, necessitating the use of additional measures in future studies.

Conclusion

The FEOT has been shown to be a valid and reliable tool for evaluating the competencies of faculty members in an online environment. As a result, this instrument can be used to provide University administrators with a reliable measure of their professional and teaching competence. This can also be seen as a base for designing in-service training programs in enhancing the capability of faculty members in conducting and developing strategies for online learning environment.

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