

Making and Validating of a Scale for Measuring Students' Self- Directed Skills in E-learning Courses at the Corona Virus Era

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Abstract

This study aimed for making and validating of a scale to measure students' self- directed skills in E-learning courses during Corona virus. The research methodology was survey and cross-correlation research. The statistical population of the study consisted of students of the country's universities in the academic year of 2020-21. A random convenience sampling method was chosen for this study. The sample size was determined to be 620 people according to the Krejci-Morgan model ($\alpha=0.05$). A researcher-made self-administered questionnaire was used to collect data. The validity of the tool was calculated by using the opinion of expert professors, and the reliability of the instrument was calculated with Cronbach's alpha coefficient of 0.95. The results of exploratory factor analysis, using the main elements factorization method and considering the factor load more than 0.40, showed that three factors of spontaneity, recognition of learning needs, and responsibility in learning can be extracted and explain 55.285% of the total variance. In general, the factors of the self-administrated questionnaire measure the independent and separate dimensions of the Self-directed learning scale to a large extent, and it is a valid and appropriate tool.

Keyword: Validation, self- directed learning, students, E-learning, Corona virus era.

Introduction

Success in e-learning courses requires a diverse set of skills. Within the electronic learning environment, students need the ability to communicate effectively with classmates and instructors, access information resources and course content, as well as complete and submit assignments. These skills can

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be categorized into three main groups: technical skills, psychological skills, and social skills (Bonk, Lee, Kou, Xu & Sheu, 2015).

Among these skills, self-direction stands out as a particularly important one for effective learning in the digital environment, as it encompasses technical, social, and psychological aspects. Consequently, many studies on e-learning emphasize the significance of self-directed skills as a foundational requirement for learners (Teo et al, 2010).

Numerous research studies indicate that self-directed skills play a vital role in various aspects of e-learning, such as fostering acceptance of the electronic learning environment, enhancing academic satisfaction, promoting academic success, and facilitating the development of metacognitive skills. A study by Karatas and Arpaci (2021) found that student teachers equipped with metacognitive skills, lifelong learning skills, and self-directed skills are better prepared to engage in electronic courses. Similarly, research conducted by Rajagopal et al (2020) revealed that learners need a combination of self-regulation skills, media and digital literacy, learning motivation, and interactive and collaborative skills to thrive in distance learning courses.

Considering the significant role of self-direction in academic success and satisfaction within e-learning environments, various theoretical frameworks (e.g., Williamson, 2007) have been proposed to develop assessment tools for measuring the self-directed skills of adults. Building upon these theoretical foundations, researchers (Watkins, Leigh, & Triner, 2004; Suh et al., 2015) have devised tools to measure students' self-direction skills specifically in electronic learning environments. However, a review of the existing research background indicates that the standardized and accredited tools available thus far for assessing students' self-direction skills in e-learning are designed for students who voluntarily choose to enroll in electronic courses. These students may already possess some of the necessary skills required for succeeding in such courses. Conversely, the learning culture in Iran tends to lean towards teacher-centered and content-focused learning environments, rather than learner-centered and activity-based ones. Iranian students generally prefer teacher evaluations and external assessments over self-evaluation and peer evaluation (Seraji, 2011).

This disparity between the existing assessment tools and the learning culture in Iran highlights a gap that the current research aims to address. The primary objective of this study is to develop a reliable tool at a global level to measure students' self-directed skills in e-learning environments, specifically during the COVID-19 pandemic. By establishing the components (factors and items) of this self-direction assessment tool, the research intends to contribute to the advancement of knowledge in this field.

Methodology

The current research follows a quantitative approach as its main strategy. The research method employed is descriptive-correlational in terms of technique. The statistical population for this study comprised students from various academic fields in the country's universities during the academic year 2020-2021. The sample size was determined to be 620 individuals using the Morgan-Kregci model and considering a significance level of $\alpha = 0.05$.

Data collection was conducted using a self-administered questionnaire. To design the self-assessment questionnaire, the researchers extracted components of the variables to be measured from the relevant literature on the research subject. They then modified and edited these components based on expert opinions. Additionally, a preliminary sample was utilized to refine the questionnaire. The final version of the self-assessment questionnaire consisted of 29 closed-answer items, rated on a five-point Likert scale.

Subsequently, the data collected was entered into statistical software, namely SPSS v. 23 and Amos software. Prior to the analysis, the normality of data distribution was checked. The analysis involved using exploratory factor analysis and confirmatory factor analysis tests.

Findings

In order to validate the self-assessment questionnaire, a comprehensive procedure was followed, which included extracting components of the variables to be measured from relevant research literature. The questionnaire was then localized with the help of experts' opinions. A preliminary sample was used to refine the questionnaire further. Initially, the designed questionnaire was given to ten individuals with expertise in the subject matter. Their feedback was collected, and necessary adjustments were made based on their opinions. Following this, the revised questionnaire was distributed to 15 members of the statistical community as a preliminary sample. The feedback received from this group was also taken into account to ensure the relevance and appropriateness of the questions for the targeted statistical population.

To assess the validity of the self-administered questionnaire, both content validity (face validity with an agreement coefficient above 0.90) and construct validity were employed. The number of questions was adjusted based on the input and opinions received from seven experts. After multiple iterations of compiling, implementing, and modifying the questionnaire using expert opinions, the final version of the questionnaire was prepared, consisting of 29 items. This version was then distributed among the sample population for data collection.

To assess the reliability and internal consistency of the students' self-assessment scale, Cronbach's alpha was calculated, and it yielded a high value of 0.95, indicating strong internal consistency. Factor analysis was performed several times to identify the best factor structure. The data adequacy test was conducted, and the Kaiser-Meyer-Olkin (KMO) value obtained was 0.95, demonstrating that the data were suitable for factor analysis and that the correlation matrix was appropriate for the analysis.

The results of the exploratory factor analysis indicate that the data are suitable for analysis, as evidenced by the significant Bartlett's test value of 10378.39 at the $p < 0.001$ level, indicating compliance of data independence. The factor analysis revealed the presence of three factors that can be extracted to explain students' self-directed learning. These factors are:

1. Spontaneity with a reliability coefficient of 0.93.
2. Recognition of learning needs with a reliability coefficient of 0.87.
3. Responsibility in learning with a reliability coefficient of 0.88.

These factors collectively account for 55.285% of the total variance in the self-assessment questionnaire. Among the three factors, spontaneity had the largest contribution in explaining the variable, with a specific value of 24.144. The factors of recognizing learning needs and responsibility in learning followed, with specific values of 17.309 and 13.833, respectively.

To further confirm the construct validity of the self-assessment questionnaire, a confirmatory factor analysis was conducted using Amos software. The model was estimated using the maximum likelihood method, and several fit indices were utilized to assess the model fit:

- Goodness of Fit Index (GFI)
- Adjusted Goodness of Fit Index (AGFI)
- Comparative Fit Index (CFI)
- Bentler-Bonett Index
- Root Mean Square Error of Approximation (RMSEA)
- Root Mean Square Residual (RMR)

The results from these fit indices demonstrated that the investigated model has good construct validity. Additionally, the model was found to be generalizable to the population and capable of explaining students' self-directed learning.

Conclusion

The factors extracted from the self-assessment questionnaire in this research demonstrate that they measure distinct and independent dimensions of the self-directed learning scale to a significant extent. This indicates that the questionnaire is effective in capturing different aspects of students' self-directed skills. By emphasizing the three components of spontaneity,

recognition of learning needs, and responsibility in learning through its 29 items, the validated tool contributes to the advancement of knowledge in the field of measuring students' readiness skills for e-learning courses.

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