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Health Profession Education Students' Satisfaction toward Online Courses during the COVID-19 Pandemic

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Abstract

Background: Given the extensive use of e-learning, especially during the COVID-19 pandemic, a validated instrument is deemed important for continuous evaluation. This study aimed to measure health profession education students' satisfaction toward the e-learning process within all health sciences cluster (HSC) courses, following further validation of the satisfaction scale for the e-learning process.

Methods: A cross-sectional study using an exploratory factor analysis (EFA) was conducted to validate the 29-item Indonesian version of the satisfaction scale for the e-learning process. That the validated tool was used to measure 2,471 students' satisfaction toward the e-learning process.

Results: The EFA resulted in 19 items divided into three subscales: the teaching process (5 items), the instructional content (4 items), and the interaction and evaluation (10 items). The scores of students' satisfaction toward the e-learning process are at 84–94% of the possible maximum score of the whole instrument or each subscale.

Conclusions: The Indonesian version of the satisfaction scale for the e-learning process serves as a valid tool to measure students' satisfaction toward e-learning. Current students have relatively good perceptions toward e-learning used in all HSC courses, including the interaction domain, which is an important aspect in an e-learning system. Strategies are warranted to maintain and further improve the e-learning process.

Keywords: e-learning, online learning, health professions, students, validity

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has forced every educational institution to undergo a significant transformation of their teaching and learning processes. The transformation takes place in various formats and on different aspects of the educational program. A scoping review on the development of medical education in the midst of the COVID-19 pandemic shows that approximately 50% of articles reported changes to online learning, both synchronous and asynchronous. Other changes include more attention to students' well-being, the use of telehealth, and the modification of the student selection methods.¹

Given the fact that changes into online learning are the most prominent, how students' react to the online learning and how they perceive it should be evaluated. Furthermore, students' perceptions of the learning environment will affect their satisfaction, behavior, and success in their study.² This also applies to the learning

environment created by the online teaching and learning processes. Rodriguez *et al.* demonstrated that comfort and motivation to learn and use the learning technology are related to the satisfaction toward the online course and are subsequently associated with the course quality as perceived by the students.³

Baber investigated Indian and South Korean undergraduate students and identified several factors influencing the students' satisfaction toward the online classes and the perceived learning outcomes. These factors include the interaction in the online classroom, student motivation, course structure, instructors' knowledge, and instructors' facilitation.⁴ The implementation of online classes may result in different outcomes depending on related factors. For example, Owusu-Fordjour *et al.* identified problems such as Internet accessibility and the lack of technical knowledge on the Internet may be the factors related to decreased students' scores.⁶ However, Almusharraf and Khahro revealed students' satisfaction during the course management and the faculty preparedness for online learning.⁵ The study also showed the students' scores were improved alongside the online course improvement.

The satisfaction toward online course is based on several factors, such as the level of support received from teachers, the feedback and interaction in class, and the

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various teaching methods employed, such as group discussion, games and quizzes.⁵ Students' attitudes toward online learning are highly correlated to their satisfaction, and their satisfaction is then associated with their success in the online course.⁷ Therefore, the quality of the online learning should also be examined, as the quality relates to the students' responses and satisfaction. The quality of online learning is determined by various factors, such as the quality of the Internet, instructors, and learning materials.^{8,9}

The courses within health sciences cluster (HSC) consist of both multiprofessional education (MPE) and interprofessional education (IPE) courses. MPE is defined as the groups of students from various professions learn together to increase their understanding of certain learning materials, whereas IPE is more specific, in which students from different backgrounds learn with, from, and about each other to improve collaboration.¹⁵ Thus, the MPE and IPE courses, which are integrated courses involving more than one health profession, are relatively more complex than the uniprofessional ones given the involvement of teachers and students from different health professions background. We argue that it is even more important to evaluate the students' perceptions on online learning. One of the means to achieve this aim is through a validated instrument or scale. Gulbahar developed a scale to evaluate university students' satisfaction and readiness in the e-learning environment and has conducted a confirmatory factor analysis.¹⁰ The scale, the satisfaction scale for the e-learning process, has since been used in a dental educational setting by Kolcu *et al.*¹¹ Since this particular scale has already been used in a health profession's education setting, it is deemed to be content relevant. Furthermore, Abriya *et al.* has adapted the scale into the Indonesian language and has proven its appropriateness to evaluate students' perceptions of online learning in an Indonesian setting through an expert review and a pilot study process.¹² Thus, the adapted scale should be validated through an exploratory factor analysis. The current study aimed to measure health profession education students' satisfaction toward the e-learning process within HSC courses, following further validation of the satisfaction scale for the e-learning process through an exploratory factor analysis. Understanding the students' perceptions and satisfaction toward online learning will help educational leaders develop and improve various factors related to online courses and learning environment.

METHODS

This study has received ethical clearance from the Faculty of Medicine Universitas Indonesia Research Ethics Committee (number KET-832/UN2.F1/ETIK/PPM.00.02/2021). The current study was conducted in the Health Sciences Cluster Universitas Indonesia (HSC UI), an integrated campus of five health professions' education: medicine,

dentistry, public health, nursing, and pharmacy. The cluster oversees the development and implementation of multiprofessional and interprofessional educational courses applied for all health profession students within the HSC UI. The courses are distributed into the odd semester (Basic Biomedical Sciences 1 and 2, Health Communication, Ethics and Law in Health, and Collaboration of Healthcare Team 2) and the even semester (Disaster Management, Health Research Methodology and Teamwork, and Collaboration of Healthcare Team 1). During the pandemic, all courses are delivered through an online mode. The MPE courses include Basic Biomedical Sciences 1 and 2, Health Communication, Ethics and Law in Health, Disaster Management, and Health Research Methodology, whereas the IPE courses include Teamwork and Collaboration of Healthcare Team 1 and 2.

The current study employed a cross-sectional design to obtain primary data on students' perceptions of the online MPE and IPE courses of the HSC UI following an exploratory factor analysis further to validate the satisfaction scale for the e-learning process. The study included health sciences students from five faculties, medicine, dentistry, pharmacy, nursing, and public health who have completed six courses (Disaster Management, Health Research Methodology, Teamwork and Collaboration of Healthcare Team, Basic Biomedical Sciences, Health Communication, and Ethics and Law in Health) in 2021. The total sampling approach was used to collect data samples. At the end of each semester, students were invited to complete the survey. A total of 2,471 responses were obtained during both semesters in this study.

The instrument used in this study was the Indonesian version of satisfaction scale for the e-learning process. The Indonesian version of the satisfaction scale for the e-learning process was adapted and piloted by Abriya *et al.*¹² from the original version.^{10,11} The 29-item scale consists of four subscales: communication and practicality (7 items), teaching process (8 items), teaching content (4 items), and interaction and evaluation (10 items). Each item of the scale is evaluated using a 5-point Likert scale: from 1 (never) to 5 (always). The complete scale of the Indonesian version of the satisfaction scale for the e-learning process is presented in Table 1. In line with the study objective, i.e., to establish the validity of the scale using exploratory factor analysis (EFA), the minimum required sample is at least 300 participants to validate one instrument or at least 5–10 participants per item of the scale.^{13,14} The scale consists of 29 items; thus, the minimum required sample in the current study was 145 participants. Therefore, the 2,471 responses obtained in this study were sufficient for the EFA.

The survey was administered through an online format, google form, and sent to participants via email and chat-

based platform (WhatsApp). Participants provided their consent to participate in the study by completing the survey. The survey was anonymized and would not affect the students' performance in their study in any way. Data obtained through an online survey was transferred into the SPSS version 20.0 format to first undergo EFA. Based on factors produced from the EFA, factor scores were calculated, and differences between the scores of each factor based on each HSC course were analyzed.

RESULTS

The requirement to perform EFA on the dataset was fulfilled, marked by the Kaiser–Meyer–Olkin (KMA) value of 0.968 (>0.5) and Bartlett's test of sphericity of 0.0001

(<0.05). Thus, the factor analysis process can be continued. Four iterations were performed on the obtained data to examine the communality extraction values. Items with <0.5 communality extraction values were eliminated. In total, ten items were eliminated (item 4, 9, 2, 8, 10, 3, 6, 28, 1, and 5) leaving 19 items for factor extraction. Originally, the scale consists of four scales, i.e., transmission and usability (7 items), teaching process (8 items), instructional content (4 items), and interaction and evaluation (10 items). Based on the item elimination process, only one item is left in the transmission and usability factor, five items in the teaching process factor, and nine items in the interaction and evaluation factor. However, the number of items in instructional content remains the same.

TABLE 1. Distribution of each survey item into each factor and its factor loading

Item	Factor		
	1 Interaction and evaluation	2 Instructional content	3 Teaching process
7. Different information and communication technologies (chat, forum, blog, Wiki, etc.) were used to support course activities and assignments.	0.641	0.243	0.260
11. At the beginning of the lesson, the instructors conveyed a welcome message/announcement/video containing general information about the course and directing it to the syllabus of the course.	0.330	0.220	0.662
12. In order to create a positive online learning atmosphere, the instructors planned a comprehensive introduction and meeting activities for students.	0.368	0.176	0.732
13. The instructors provided timely and descriptive feedback on homeworks and activities.	0.254	0.222	0.770
14. The instructors were successful in guiding the teaching process.	0.245	0.271	0.832
15. The instructors were experienced and capable of e-learning.	0.238	0.323	0.778
16. The content is logically and effectively organized.	0.232	0.818	0.249
17. The course content was structured to facilitate learning.	0.305	0.800	0.265
18. The course content is understandable and clearly presented.	0.262	0.803	0.278
19. The teaching materials were adequate, up-to-date, and appropriate in terms of knowledge.	0.348	0.744	0.254
20. Different tools (chat, forum, blog, Wiki, email, etc.) were used for the interaction.	0.718	0.132	0.274
21. Cooperative group activities were held to increase social learning and interaction.	0.723	0.235	0.267
22. Different activities and opportunities were offered to strengthen the interaction between students.	0.756	0.260	0.235
23. Different activities and opportunities were offered to strengthen the interaction between the student and the instructor.	0.670	0.283	0.411
24. The activities that need to be carried out synchronous and asynchronous were specified separately.	0.606	0.410	0.264
25. Various classical and alternative evaluation methods were used together in the course.	0.652	0.510	0.242
26. The evaluation methods used were sufficient to determine student success.	0.602	0.550	0.232
27. The evaluation criteria to be used for the events are clearly stated for each different event.	0.562	0.547	0.263
29. Evaluation percentages, evaluation criteria, and grading information were presented for different activities.	0.606	0.423	0.283
Internal consistency (Cronbach alpha value)	0.936	0.918	0.895

TABLE 2. Distribution of students' satisfaction scores of each course (mean \pm SD)

Course	Domain score			
	Interaction and evaluation (max possible score 50)	Instructional content (max possible score 20)	Teaching process (max possible score 25)	The whole questionnaire (max possible score 95)
1. Basic Biomedical Sciences 1 (N = 198)	45.97 \pm 5.273	18.67 \pm 2.015	23.11 \pm 2.832	87.75 \pm 9.331
2. Basic Biomedical Sciences 2 (N = 277)	45.01 \pm 6.614	18.29 \pm 2.562	22.82 \pm 3.125	86.13 \pm 11.334
3. Health Communication (N = 291)	46.78 \pm 4.332	18.67 \pm 1.933	23.66 \pm 2.131	89.12 \pm 7.519
4. Ethics and Law in Medicine (N = 201)	46.08 \pm 4.744	18.55 \pm 1.870	23.21 \pm 2.853	87.85 \pm 8.641
5. Disaster Management (N = 390)	43.52 \pm 5.604	17.37 \pm 2.368	22.31 \pm 3.070	83.21 \pm 9.769
6. Health Research Methodology (N = 297)	43.69 \pm 5.399	17.45 \pm 2.330	22.54 \pm 2.726	83.67 \pm 9.319
7. Collaboration of Healthcare Team 1 (N = 623)	43.68 \pm 5.662	16.88 \pm 2.849	22.51 \pm 2.914	83.07 \pm 10.373
8. Collaboration of Healthcare Team 2 (N = 194)	43.51 \pm 6.201)	17.09 \pm 2.967	22.11 \pm 3.554	82.71 \pm 11.369

Based on the eigenvalue, three factors were extracted with an eigenvalue of >1 , and the scree plot also demonstrated a point of inflexion at three factors. The 19 items were distributed into three factors as depicted in Table 1, with a Cronbach alpha value of the whole instrument of 0.957, indicating a high internal consistency (note that a reliability coefficient of ≥ 0.70 is considered "acceptable" in most social science research situations).

The new factors produced from the factor analysis mostly consist of items from the original factor, except item 7, in the transmission and usability factor, which is now merging into the interaction and evaluation factor; thus, nine out of their 10 original items have been retained. The content of the item is consistent with the construct measured by the interaction and evaluation factor; therefore, the integration of item 7 (Different information and communication technologies (chat, forum, blog, Wiki etc.) were used to support course activities and assignments) was deemed relevant.

Using these new factors from the factor analysis process, the scores of students' satisfaction toward the e-learning within the MPE and IPE courses were calculated. The score distribution is presented in Table 2. The number of respondents per course varied due to slight differences in the number of student participants and the response rate in each course.

DISCUSSION

The current study has validated an instrument to measure medical students' satisfaction toward the e-learning process. The steps of factor analysis have been conducted comprehensively and produced three factors. Originally there were four factors in the scale: transmission and

usability (7 items), teaching process (8 items), instructional content (4 items), and interaction and evaluation (10 items). The factor analysis process has eliminated most items from the transmission and usability factor, except for one item (7), which now has merged into the interaction and evaluation factor. Kolcu *et al.* revealed that the interaction among students can be achieved through online learning and the use of technologies increased students' interaction.^{11,31,32} Since item 7 is related to the use of various information and communication that can support students' activities, it should therefore be integrated into the interaction and evaluation factor.

As a result of the current factor analysis, the instruments are now more concise and structured based on the instructional design components. Basically, instructional design consists of learning objectives, teaching and learning materials, learning architecture (structure and sequence), learning experiences, assessment, and evaluation, which in general highlights how teaching and learning materials are determined, delivered, and assessed.³³ Each factor obtained from the current factor analysis corresponds to one or more instructional design components. The instructional content factor covers learning objectives and teaching and learning materials; the teaching process factor is related to learning architecture; and the interaction and evaluation factor corresponds to learning experience, assessment, and evaluation components. However, although the above factors seem to be clear-cut, the internal consistency calculation demonstrated otherwise. A redundancy for some items in the instrument seems to exist, given the very high Cronbach alpha ranging from 0.895 to 0.936 (for the subscales) and 0.957 for the entire instrument. Kolcu *et al.* revealed a comparable Cronbach alpha value of 0.97, which also indicates some redundancies. Despite the

reduction of item numbers, a similar problem regarding redundancy still occurs; thus, further studies should re-examine the constructs and modify each item to ensure that each group of items measures different constructs. A value of 0.9 is considered to be the recommended maximum Cronbach alpha value.³⁷

Overall current students' satisfaction toward the e-learning process in the IPE and MPE courses of HSC is considered good as indicated by the obtained scores, 84–94% of the possible maximum score of the whole instrument or each subscale. One of the possible explanations is the existing learning management system that has been developed and used long before the pandemic; thus, the degree of students' familiarity toward the online course platform is high. The findings also indicate that the course curriculum developed for the face-to-face teaching and learning process has been quite successfully adapted into the online or distance learning system. The possible barriers for online learning, as formulated by Baticulon *et al.*, include technological (learning management system and Internet connectivity), individual (students' learning styles and students' health), and institutional (curriculum, institutional resources, and teachers' skills), among others.³⁴ Thus, to achieve a favorable online learning process, these factors should be accounted for. We argue that the established curriculum, comprehensive learning management system, clear learning sequences, and the use of active teaching and learning methods before switching to online learning, are among the important factors contributing toward students' satisfaction.

One of the highlights in our findings is the good perceptions toward interaction during the online course. Engagement is important for students' satisfaction and is cultivated through interaction; hence, promoting interaction is important during online learning, either the interaction between students or between the student and the teacher.³⁵ Specifically for the context of IPE, online learning is suitable for facilitating interprofessional interaction in a particular course.³⁶ Moore and Kearsley argued that interaction with other students, teachers, and learning content should be highlighted and examined in all forms of education, either face-to-face or online.²⁷ Consistent interaction with teachers is the most common contributing factor toward students' online satisfaction, especially at the early stages of a course. This is due to the explicit roles of teachers within an online learning environment, which includes providing direction and support for students, conducting assessment and evaluation, becoming a role model, and assisting students in the application of knowledge.^{16,26,28} The interaction between students is also important since it allows student to strengthen, socialize, exchange, and discuss ideas and participate in group activities.^{24,29} Interaction with content is also closely related to the course content quality, which in turn affects the students' satisfaction.²¹ Student

engagement in the learning process will likely increase the students' participation in class and enable them to achieve the learning objectives, which eventually contribute to increased satisfaction in both face-to-face and online learning.^{18,19,22} Thus, an e-learning system should be designed to maximize students' autonomy and involvement in the learning process.²⁸

The use of a cross-sectional research design in the current study could not indicate causal inferences. Thus, future studies may adopt a longitudinal or experimental design to provide more supporting evidence about the relationships between the online course design with students' satisfaction. The study participants may also provide socially desirable responses in the survey, which would introduce a response bias in the current study. However, our study has succeeded in producing a validated instrument to measure students' satisfaction toward the e-learning process. The instrument can serve as a tool to examine students' satisfaction, which in turn will provide important information on how to continuously improve the quality of online courses and enhance students' achievement.

CONCLUSIONS

The 19-item Indonesian version of the satisfaction scale for the e-learning process consists of three domains: teaching process, instructional content, and interaction and evaluation. This instrument serves as a valid tool to measure students' satisfaction toward the e-learning process. The current study shows relatively good perceptions toward the e-learning process throughout all HSC courses, including the interaction domain, which is considered an important aspect in an e-learning system. Despite the course being fully online, the interaction aspect can still be fulfilled. One of the factors influencing the good perceptions is the already established e-learning system used in the courses, even before the COVID-19 pandemic. Thus, sustained use of an e-learning system as a part of daily teaching and learning practices is inevitable.

CONFLICT OF INTEREST

None of the authors reported any conflict of interest.

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