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Key Elements for E-Learning Success in the Context of the Coronavirus Crisis

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TOPSIS; Coronavirus Pandemic; Critical Success Factors; Distance Learning.

Abstract

Using the Analytical Multi-Criteria Hierarchy (AHP) approach and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), this article seeks to discover crucial success criteria for e-learning during COVID-19 in order to enhance process education. Based on established assessment criteria and multi-channel e-learning methodologies, data was gathered by interviewing 69 e-learning leaders in educational institutions during COVID-19. We discovered that managing technology, assisting management, educating students about the usage of the e-learning platform, and requiring a high level of information technology exchange from the lecturer are all important. Universities, staff, and students have had the biggest influence on online learning during COVID-19. The most useful of the five learning models is blended learning. These findings show that e-learning preparation plays a significant impact in boosting the educational process during the COVID-19 pandemic, regardless of the specific technology used by an educational institution.

Kata kunci:
AHP-TOPSIS; Faktor Kesuksesan Kritis; Pandemi Virus Corona; Pembelajaran jarak jauh.

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Abstrak

Tujuan artikel ini adalah untuk mengidentifikasi faktor penentu keberhasilan e-learning selama COVID19 menggunakan proses Analytical Multi-Criteria Hierarchy (AHP) dan Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) untuk meningkatkan proses pendidikan. Data dihasilkan dengan mewawancarai 69 pemimpin e-learning di lembaga pendidikan selama COVID19 berdasarkan kriteria penilaian yang ditentukan dan pendekatan e-learning multi-saluran. Kami menemukan bahwa mengelola teknologi, mendukung manajemen, meningkatkan kesadaran siswa tentang penggunaan sistem e-learning, dan membutuhkan teknologi informasi tingkat tinggi dari sharing dosen. Staf, siswa, dan universitas adalah faktor yang paling memengaruhi pembelajaran daring selama COVID-19. Di antara kelima sistem pembelajaran tersebut, blended learning adalah yang paling praktis. Hasil ini menunjukkan bahwa terlepas dari teknologi tertentu suatu institusi pendidikan, kesiapan e-learning memainkan peran penting dalam mendorong proses pendidikan selama pandemi COVID19.

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INTRODUCTION

In educational institutions around the world, e-learning was growing by roughly 15.4% annually prior to the COVID-19 pandemic, without posing any instability or pressure on these institutions or students (Teräs *et al.*, 2020; Greenhow, Lewin dan Staudt Willet, 2021). However, a significant change in the environment occurred when this study was carried out during COVID-19. Due to stringent international measures to stop the spread of COVID-19, educational institutions have begun to offer the majority of their services online, including faculty and a variety of examinations through several platforms, to more than 60% of students worldwide (D'Orville, 2020; Tumwesige, 2020; Chaaban, Sawalhi dan Du, 2021). In accordance with information released by the World Health Organization (WHO), COVID-19 has been recorded in more than 216 countries, and there are locations where millions of cases have been confirmed (Dong, Du dan Gardner, 2020; Roser *et al.*, 2020). In order to avoid the anticipated waves in the upcoming hybrid, many nations have taken preventative steps, such as closing schools and colleges and converting to full e-learning mode during the coronavirus outbreak (Teräs *et al.*, 2020). To stop the spread of COVID-19, the WHO strongly advises social separation (Thi Van Pham dan Thi Thao Ho, 2021). This activity complies with those criteria. Both the professor and the students weren't prepared for this course to start in the middle of the spring semester.

To improve upcoming e-learning systems, various studies have examined Critical Success Factors (CSFs) in the field of education from the perspectives of both teachers and students. The most important CSFs that must be met to reenergize the project's mission can be determined by organizations. These studies have, up to this point, examined the CSF of online learning across conventional time spans. However, for a number of reasons, it is anticipated that CSFs during the COVID-19 pandemic will be different from CSFs under normal circumstances. First, and contrary to expectations, all educational institutions are welcome to participate in COVID-19's transition to E-learning. Because not all institutions have incorporated e-learning in the past, as opposed to those that have and have planned and invested for suitable learning, not all institutions have the chance for a smooth transition. Second, COVID-19 presents an unusual situation since it involves various aspects other than schooling, such as political and health considerations, that have an impact on the process. If a student doesn't have a decent internet connection at home, as can be the case during COVID-19 when children are subject to a curfew, they can, for instance, travel to the library, participate in tutoring sessions, or even go to locations with good internet speeds.

Not just for CSF but also for e-learning system methods, the list might go on forever. The legitimate distinctions listed above are only a few that should be taken into account in a pandemic. In this article, we discuss crucial success factors from the viewpoints of managers from various educational institutions who use multi-criteria decision-making techniques to guarantee the integrity and continuity of educational goals and student well-being in the educational process while respecting the social recommendations of the World Health Organization (WHO). This gives us a look at individuals in charge of e-learning from their point of view, enabling us to comprehend the best methods to follow when faced with an unpredictable crisis that can compel educational institutions to switch to electronic learning.

By enhancing the most crucial preparation aspects, this can assist institutional decision-makers in conducting education more effectively during times of crisis.

METHODS

Three components make up the approach for this study: a survey, the AHP method, and the TOPSIS method. The next subsections will offer more information. To establish a consistent picture of the problem, researchers visited 69 educational institutions and planned numerous discussions with people in charge of distant education. The majority of participants (90%) hold doctoral degrees, while associate professors (45%) make up the largest title category. The management assessed the standards for each e-learning program. Discuss the following selection criteria during the initial meeting: faculty and student characteristics, information technology, support, topic expertise in technology, instructional design teaching, online learning environments, collaboration, and knowledge management. The important alternatives are synchronous learning, asynchronous learning, face-to-face learning, blended learning, flipped classrooms, and ICT enabled learning. During the COVID19 pandemic, e-learning managers assessed each criterion associated with each e-learning CSF-based e-learning system, as indicated in Table 1.

Table 1. Demographic data of e-learning management staff

Dimension	Criteria	Frequency	Percentage
Age	29-38	16	24%
	39-48	23	34%
	49-58	27	41%
Gender	Male	56	82%
	Female	11	16%
Nationality	Indonesia	48	70%
	Non-Indonesia	19	28%
Academic Degree	Master	6	9%
	PhD	61	89%
Job	Lecturer	6	9%
	Assistant to Professor	18	27%
	Associate Professor	30	44%
	Professor	11	16%
Discipline	Political Science	5	8%
	Engineering	18	27%
	Medicine	1	2%
	Business	21	31%
	Artss	3	5%
	Science	8	12%
	Education	6	9%

Method of Analytic Hierarchy Process

The following actions are taken in order to use the AHP approach (Almobarek *et al.*, 2021; Suman *et al.*, 2021). Step 1: Think about each requirement and make a conclusion. There are rankings. The pairwise comparison matrix will be ranked 7 for the characteristics of lecturers if classroom administrators decide that, during the voting process and based on the criteria and rankings, instructor characteristics students are highly preferred compared to

student characteristics (i.e., online instructor characteristics have a greater impact on the learning process than student characteristics).

Otherwise, there are also intermediate sizes (2, 4, 6, and 8). If the second alternative is selected above the first, the reciprocal score (1/9, 1/8, etc.) is used, awarding the point when comparing the alternative with that name. In this illustration, the instructor's traits are compared to those of the student at a ratio of 1/7, meaning that the student's traits are seven times more advantageous than the instructor's management; Step 2: Create a pairwise comparison matrix and assign each pair of decision possibilities a relative weighting. According to the numerical notes, the choices are listed in a horizontal matrix (the second alternative) and vertically (the second variant); In step three, a normalized matrix is created by dividing each integer in the pairwise comparison matrix column by the sum of that column; Find the median priority vector average across all rows of a normalized matrix in step 4. then employ these techniques to produce a priority vector of all possibilities related to the criterion, where the vector's sum equals 1; The consistency ratio can be calculated in step 5 and used to gauge the subjective input. A desirable ratio is one under 0.1. Subjective data are taken into consideration for re-evaluation for ratios greater than 0.1; Step 6: Using the outcomes of Step 4, construct a preference matrix to generate priority vectors for each criterion; Steps 2 and 3 are used to normalize the matrix and step 4 is used to extend the priority vector criteria. Steps 7 and 8 are used to expand the overall preference vector by multiplying the priority matrix in step 6 by the priority vector created in step 7. Step 7: Create the following pair of criteria development matrix used to generate a surrogate pairwise comparison matrix using the notes from step 2. Each of these procedures is carried out using Microsoft Excel.

Table 2. AHP ratings

Linguistic rating	Numerical rating
Extremely preferred	9
Verey strongly preferred	7
Strongly preferred	5
Moderately preferred	3
Equally preferred	1

RESULTS AND DISCUSSION

Results

As of 79 e-learning managers were interviewed to gather the data. Round 1 and Round 2 interviews both had 100% response rates. AHP software and Microsoft Excel 2013 were used to compute the weights of each factor. To ensure equal weighting across all participants, consistency ratios were computed. The most significant success element impacting the e-learning COVID19 pandemic in this study is knowledge management (0.37996), followed by support (0.169233), student characteristics (0.1111681), and information technology (0.10655).

Finding the optimal alternative with the smallest distance, or Euclidean distance, to the ideal answer is the major goal of the TOPSIS technique. By computing the square root of the sum of squares for the provided criteria for each e-learning system, the data from the alternative criteria-based e-learning systems is displayed. A normalized decision matrix is created by dividing each cell's value by the sum of the squared values' roots. Along with the

best and worst ideals, their Euclidean ranges, and the performance score for each alternative using the TOPSIS approach, a weighted normalized choice matrix is also created.

The research team employed AHP and TOPSIS methodologies along with Microsoft Excel 2017 for analysis. Section 3 offers a presentation of the procedures and analysis. Blended learning seems to be the answer based on the hierarchical analysis of the crucial success elements for e-learning during the COVID19 pandemic. When selecting an online education program in Indonesia during the COVID19 pandemic, educational institutions should give consideration to the best alternative, which has a total weight of 0.811. With a total weight of 0.565, asynchronous learning is ranked as the second-best option, and face-to-face learning with IT Support is ranked third with a total weight of 0.563. A flip class with a total weight of 0,483 came next, and synchronized learning with a weight of 0.066 came last.

Due to the management perspective and the fact that all courses are regulated citations with the same weight, the results demonstrate that the type and content of the courses do not significantly affect learning outcomes, as previous research have demonstrated (García-Peñalvo, 2021). It makes sense to concentrate on giving users—students and instructors—more knowledge management training (Pramukti *et al.*, 2020). In order for online learning to be successful, institutional support is essential. This is in line with Bryson and Andres, which claims that giving pupils computer support and instruction has a beneficial impact on how well they use the teaching system (Bryson dan Andres, 2020).

Discussion

According to the findings of our study, COVID19's educational system heavily depends on the qualities of the students enrolled. The findings also imply that students should be aware of how social distance measurements affect them, form their own attitudes and commitments, and discover strategies to motivate themselves. The findings on student characteristics concur with those of Li et al. study (Li *et al.*, 2021). This article's major objective is to define and rank the essential elements for the effective implementation of e-learning programs during the COVID19 pandemic. This study, which made use of AHP and TOPSIS, can aid educational institutions in better understanding the success variables essential to the adoption of e-learning during the COVID19 pandemic.

In order to obtain good learning outcomes, students must also improve their mindset and dedication, grasp their role during social distance, and find strategies to inspire themselves. Studies by (Kirstein dan Kunz, 2015; Ismail, Sawang dan Zolin, 2018; Valenzuela, Thomas dan Katenga, 2022) are consistent with the findings of student characteristics.

The new study, which focuses on emergencies like the COVID19 pandemic, is important since no prior research has addressed the issue of the entire education system being disrupted on a global scale. Online learning is replacing classroom instruction in many educational institutions. The adoption of an online learning system is not a simple process, nor can a system support all the many businesses and schools worldwide. The capabilities of various systems and key implementation factors are covered in this study.

This study looked at various potential systems and the crucial elements in achieving them. There are many research on general education and e-learning, but the absence of information on the pandemic's effects would be indicative of the state the globe was in during COVID-19.

The fact that multi-criteria decision analysis techniques are so sensitive to the study's point of view is one of its drawbacks. Therefore, depending on whether the problem is tackled from the point of view of the student or the instructor, the identical instruments utilized will provide different outcomes and conclusions. Due to cultural and legal variations, this study may not be applicable to other nations given that it was conducted in Indonesia.

CONCLUSION

The COVID19 pandemic has affected education all across the world. Online learning is essential to school and is growing more and more vital. Keeping the learning process moving forward while ensuring that it remains profitable presents a special challenge for educational institutions during COVID19. Therefore, it is important for these businesses to comprehend what motivates teachers and students to use e-learning systems. This study's primary goals were to categorize and rank e-learning systems during the COVID-19 pandemic and to identify any useful implications. This study uses multiple factors to prioritize various e-learning systems. We discovered that raising students' awareness of using online learning systems and information technology demand are high on the parts of instructors, students, and universities are the most significant factors affecting the success of e-learning during the COVID19 pandemic. This finding must be taken seriously because, regardless of how advanced the technology, e-learning implementation planning is always a key factor in enhancing the educational process. Of the five e-learning systems covered in this survey, blended learning is the most popular. For university administrators who are putting new technologies in education, the study's findings are helpful information.

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