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The Relationship of Online Learning and Information Technology with Cognitive, Affective, and Psychomotor Abilities

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Abstract

The COVID-19 pandemic had a significant impact on education in nursing programs. Changes in the learning system were followed by changes in learning methods and information technology as a means of support. In fact, mastery of learning methods and information technology support is still not optimal. To improve students' cognitive, affective, and psychomotor capacities, lecturers must grasp numerous learning approaches and information technology. This study aimed to examine the relationship of mastery of online learning methods and information technology assistance with nursing students' cognitive, emotional, and psychomotor capacities in Indonesia. The design of this study was a cross-sectional internet-based survey. The instrument was an online questionnaire using a Google Docs form. The sample size was 582 participants. Simple random sampling was used as the sampling technique. Statistical analysis used Pearson's correlation test. In terms of education level, the results of the research show that the majority of the participants are from the diploma level (44.2%), followed by undergraduate (26.1%), professional nursing (18.6%), master (8.8%), specialist (1.4%), and doctoral (1.0%). A significant relationship ($p < 0.05$) was found between mastery of online learning methods and information technology support and cognitive and psychomotor abilities in a positive direction. No relationship was found with affective abilities. Mastery of learning methods and information technology support were correlated with the achievement of cognitive and psychomotor abilities. Specific online learning methods are needed to achieve students' effective abilities.

Keywords: COVID-19, information technology, learning methods, nursing, pandemic

Abstrak

Hubungan Pembelajaran* Online *dan Teknologi Informasi dengan Kemampuan Kognitif, Afektif, dan Psikomotor. *Pandemi COVID-19 berdampak buruk pada pendidikan di program studi keperawatan. Perubahan sistem pembelajaran diikuti dengan perubahan metode pembelajaran dan teknologi informasi sebagai sarana penunjang. Kenyataannya, penguasaan metode pembelajaran dan dukungan teknologi informasi masih belum optimal. Dosen dituntut menguasai berbagai metode pembelajaran dan teknologi informasi untuk mencapai kemampuan kognitif, afektif, dan psikomotorik mahasiswa. Tujuan penelitian yaitu mengetahui hubungan antara penguasaan metode pembelajaran online dengan dukungan teknologi informasi terhadap kognitif, afektif, dan psikomotorik kemampuan mahasiswa keperawatan di Indonesia. Desain penelitian ini adalah survei* cross sectional *berbasis internet, prosedur penelitian ini yaitu dengan mengirimkan kuesioner melalui aplikasi* Google Docs. *Besar sampel sebanyak 582 partisipan. Teknik sampling yang digunakan adalah* simple random sampling. *Analisis data menggunakan uji Korelasi Pearson. Hasil penelitian partisipan dari jenjang diploma 44,2%, sarjana 26,1%, perawat profesional 18,6%, magister 8,8%, spesialis 1,4%, dan doktor 1,0%. Ada hubungan yang signifikan ($p < 0,05$) antara penguasaan metode pembelajaran* online *dan dukungan teknologi informasi dengan kemampuan kognitif dan psikomotorik dalam arah yang positif, dan tidak ada hubungan dengan kemampuan afektif. Penguasaan metode pembelajaran dan dukungan teknologi informasi berhubungan dengan pencapaian kemampuan kognitif dan psikomotorik. Metode pembelajaran* online *khusus diperlukan untuk mencapai kemampuan efektif mahasiswa.*

Kata Kunci: *COVID-19, keperawatan, metode pembelajaran, pandemi, teknologi informasi*

Introduction

The Corona Virus Disease-19 (COVID-19) pandemic affected many facets of life around the world. Its impact is still felt today in online learning. Government measures included learning from home as a whole or as a hybrid setup to ensure that students' rights to acquire educational services were met throughout the COVID-19 pandemic. This policy required all higher education institutions to continue providing educational services to students remotely, which resulted in different learning advances in various fields of study, including higher education in nursing. Various developments have occurred in educational practice (Belawati & Nizam, 2020; Mukhtar et al., 2020). These rapid changes have confused the educational process.

Since COVID-19 first appeared, social distancing was shown to be the most successful preventive measure, while a vaccine, therapy, or both were being developed. It discouraged students from gathering in lecture halls, small-group areas, or learning studios. To offer personalized education for "anytime/anywhere" asynchronous learning, several instructors have "flipped" the classroom in recent years. Nonetheless, in clinical education with standardized patients and in real patient care settings, students still congregate for small-group discussions, laboratory sessions, simulations, and technological sessions.

Given developments in telehealth, adaptable research procedures, and flexible methods for clinical trials, the COVID-19 pandemic heralded a sustained revolution in the nursing and health sciences. Numerous examples exist of how science, healthcare, and discoveries have been changed by lessons learned from challenging encounters. To acquire and implement new ideas and procedures going forward, educators and students could collaborate to record and examine the effects of modifications made throughout the pandemic. In addition to being an opportunity to advance education through active curriculum innovation and change, this could also be a turning point for many academic fields (Rose, 2020).

The offline lecture approach is now entirely or partially online (hybrid). Online learning is supported by a computer network linked to other computer networks all over the world. This e-learning application can support formal and informal learning activities as well as teaching and learning processes. Instructors and students have their own responsibilities in implementing e-learning. Lecturers work as facilitators and mentors in learning activities, while students operate as knowledge architects, independent learners, and problem solvers. Computer-based learning, web-based learning, virtual classrooms, virtual schools, virtual Zoom, and other applications are all examples of e-learning (Almarzooq et al., 2020; Windhiyana, 2020).

Online learning systems that use various online media can cause various issues for students and lecturers. According to the findings of multiple student interviews, these issues were having difficulty with the e-learning system, a large number of assignments being assigned by lecturers, limited internet quota packages, and signal interference. Currently, online learning methods are still used to support learning processes because they have great benefits related to flexibility and time in the transfer of science, especially in the lecture learning method. According to interviews with several lecturers, the problems encountered included the need for adaptation to new learning methods, new learning media, the time required to prepare learning materials in virtual or audiovisual form, and lecturers' constant need to think creatively in order to develop models and learning methods to be used. To attract more students, mastery of instructor learning methods is essential (Pranyoto, 2020).

Online learning requires complete information technology support, and necessary technology, such as audiovisual and e-learning programs, is needed to support the learning process. Thus, information technology support is also essential.

The possibilities for teaching and learning with technology are increased by e-learning. Over the past 10 years, this terminology has been consistently used. E-learning, also known as online learning and distant learning, is a vast and dynamic field that is quickly becoming the norm for educational delivery methods aimed at enhancing performance and knowledge. Web-based teaching and learning approaches are being used by numerous educational institutions, corporations, and other entities to provide education entirely or partially online via electronic platforms. By incorporating advanced learning techniques, such as communities of practice or adaptive learning among learners, employee groups, and learners, the learning value chain—including its management and delivery—has produced multimodal systems, content, and processes that increase accessibility, measurability, and cost effectiveness.

Changes in learning methods and technology used may affect the achievement of students' cognitive, affective, and psychomotor abilities (Baruah, 2018; Long, 2017). However, in reality, lecturers had no optimal mastery of online learning methods and did not have optimal information technology support from educational institutions. Researchers are interested in examining the relationship of mastery of online learning methods and information technology assistance with the cognitive, affective, and psychomotor abilities of nursing students in Indonesia during and after the COVID-19 pandemic.

Methods

An internet-based cross-sectional survey design was used for this study. All nursing education providers in Indonesia were included in the research population. With a sample size of 582 participants, the sampling technique used was simple random sampling. Nursing study programs and willingness to become participants were the inclusion criteria. The exclusion criteria were not completing the questionnaire. The instrument used was an online questionnaire using a Google Docs form, which was compiled by a team from the Indonesian Health Higher Education Independent Accreditation Institute. The instruments used had been tested with valid and reliable results. The research was carried out from March to July 2020 across the territory of Indonesia.

The procedure for collecting the research data began by explaining the research objectives to the participants. After understanding the research objectives, the participants were asked to agree with a statement of willingness to become research participants, which was conducted online. They were then asked to fill out a questionnaire through the Google Docs link provided and submit the results of the questionnaire. Ethical principles were followed in this study. Univariate analysis was performed using frequency distribution, and the bivariate test was performed using Pearson's correlation test.

Results

Data were collected from 582 participants from nursing school programs in 34 Indonesian regions, ranging from Sabang to Merauke. The research data are shown in Table 1, which illustrates the characteristics of the participants

Table 1. Characteristics of the Participants by Education Level

Characteristics	n	%
Diploma	257	44.1
Bachelor	152	26.1
Magister	51	8.8
Doctor	6	1.0
Profession	108	18.6
Specialist	8	1.4
Total	582	100

Table 2. Mastery of Lecturer Online Learning Methods in Achieving the Cognitive, Affective, and Psychomotor Abilities of Nursing Students

Mastery of Learning Methods	r	p	n
Cognitive ability	0.002	< 0.001	582
Affective ability	-	0.1	582
Psychomotor ability	0.15	0.004	582

Pearson's correlation test

Table 3. Support of Lecturer Information Technology in Achieving Cognitive, Affective, and Psychomotor Abilities of Nursing Students

Support of Lecturer Information Technology	r	p	n
Cognitive ability	0.18	0.001	582
Affective ability	-	0.58	582
Psychomotor ability	0.2	0.03	582

Pearson's correlation test

depending on education level, with diploma (44.1%) being the most common and doctoral degree (1.0%) being the least common. There was a substantial link (p-value 0.05) between lecturers' competence in online learning methods and students' cognitive achievement. Table 2 shows that a correlation value of 0.002 implies a positive connection with a very weak correlation strength. As shown in Table 2, there was no significant association between mastery of lecturers' learning methods and achievement of students' affective capacities ($p > 0.05$). There was a substantial link (p-value 0.05) between lecturers' understanding of online learning approaches and students' psychomotor achievement. A correlation value of 0.15 implies a positive connection with a very weak correlation strength (Table 2). A substantial link (p-value 0.05) was found between lecturers' information technology support and students' cognitive achievement. A correlation value of 0.18 indicates a positive connection with a very weak correlation strength (Table 2).

Table 3 reveals that there was no significant relationship between lecturers' information technology support and students' affective accomplishment ($p > 0.05$). Moreover, a substantial relationship was found between lecturers' information technology support and students' psychomotor achievement ($p < 0.05$). A correlation value of 0.2 implies a positive correlation with a very weak correlation strength.

Discussion

The COVID-19 pandemic resulted in the implementation of several policies to break the chain of COVID-19 virus's transmission in Indonesia. One of the initiatives undertaken by the Indonesian government was to appeal to the public to conduct physical distancing and work from home. This endeavor was directed at the community to stop the propagation of the pandemic. The COVID-19 pandemic also affected education in Indonesia. The government released a policy on the process of teaching and learning activities using an online system and modification of the hybrid learning approach. The online learning system in nursing studies has affected students' competence achievement (Darmalaksana et al., 2020).

The bivariate test findings revealed a relationship of mastery of learning methods and information technology support with cognitive and psychomotor abilities ($p < 0.05$), but no significant relationship with affective abilities was found. Online learning is education delivered synchronously and/or asynchronously via the internet and does not occur in a typical classroom setting. The more ready the nursing school

is to apply remote learning, the greater the efforts of lecturers and students to master online learning methods. This learning is conducted through the use of online videos, online learning materials, face-to-face online discussions, quizzes, and practices. During the COVID-19 pandemic, instructors used Zoom the most in online learning to deliver spoken instructions on tasks, conduct question-and-answer sessions, and make announcements. Other objectives include online teaching, small-group discussions with lecturers, and prayer at the start of learning. By involving limbs or learning achievement results through skills that are closely associated with the attainment of knowledge competencies (cognitive and affective), psychomotor abilities are linked to the function of physical abilities or work skills. When students have internalized and lived up to the lesson's values, the next step is for them to put their knowledge into practice in their daily lives. Cognitive and affective learning outcomes emerge in the tendency to behave and act in accordance with the meaning contained in them and are shown by students as a psychomotor domain (Wong, 2020).

The availability of well-functioning technology will improve student learning experiences and achieve learning goals (Dumford & Miller, 2018). The implementation of online learning at the beginning of the pandemic received various reactions from students and lecturers (Khasanah et al., 2020). Students experienced problems related to internet quota fees, confusion with the new system, and the affordability of internet connection when accessing it at home. The majority of the participants stated that online learning required adequate information technology support.

Online learning technology has the potential to make learning more efficient and easier for students (Almahasees et al., 2021; Ayu, 2020; Junco, 2014). Because of the disparity in the success rates of reaching learning goals for students in the classroom versus online programs (Dumford & Miller, 2018), online learning must address numerous factors. Students' participation in online learning activities, such as independent study tactics, mathematical reasoning, activities that stimulate higher thinking, and reflective and integrative learning, can help them acquire greater levels of cognitive ability. Interaction with peers through collaborative learning, interactions with other students, and successful learning strategies utilized by lecturers are important components of student involvement. Furthermore, there are contextual factors that contribute to student involvement, such as the quality of contact among students, lecturers, and other staff, as well as a helpful environment for online learning (Dumford & Miller, 2018; Gaytan, 2015).

Online learning includes advantages such as increased flexibility of time and place for learning and teaching, as well as the potential for increased time and cost efficiency (Castro & Tumibay, 2021). Through online learning, students obtain a positive effect on the aspect of autonomy—that is, the flexibility to access learning materials and be oriented on their own. Students have more flexibility in deciding how the task will be completed (i.e., they can complete it in the evening), unlike classroom learning, in which students are frequently asked to collect at the end of class learning sessions. Students can get help from Google to complete assignments. Moreover, watching learning videos is more enjoyable than listening to teachers' explanations in class, as students can replay parts of the video that they find difficult to understand.

No relationship was found between mastering online learning methods and affective abilities during the COVID-19 epidemic. This is expected because affective qualities are generally demonstrated through forms of communication. Nevertheless, direct interaction in enjoyable situations can still occur, for example, in the form of direct interaction with peers, as well as discussions and debates when learning is synchronous. Another advantage of online learning is that students can study at home and on their own schedules. In terms of competency, stu-

dents can learn exciting new skills online. Online learning can help students learn more deeply and broadly, which will ultimately increase their confidence and proficiency in learning. Students are more confident in online learning because they have unlimited time to finish projects. Some students have proposed a shift in the concepts of learning achievement and success. The growing realization that academic grades are not everything, because the grades on their report cards do not fully represent their skills (Wong, 2020).

Prior research has found that technology can improve student engagement. The use of asynchronous technology tools drives student reflection to higher-order thinking, enhances the desire for students to communicate with other students and lecturers, and improves online discussion involvement (Kent et al., 2016). Implementing online programs should be informed by knowledge of how the online environment affects engagement. Interdisciplinary and extracurricular factors play a variety of roles in fostering student involvement. Academic practices can improve content knowledge and overall cognitive processing. They are also associated with a number of success- and achievement-related factors, such as the application of self-regulated learning strategies, quantitative reasoning, higher-order thinking activities, and reflective and integrative learning. Along with student–faculty contacts and the faculty's use of effective teaching approaches, peer relationships through collaborative learning and discussions with various individuals are also significant components of student engagement (Dumford & Miller, 2018).

Learners usually differ in terms of gender, age, academic subject, and previous education. This can contribute to students' readiness to participate in online learning and their success in developing affective talents. Several studies have revealed that younger, male, and black students are frequently less able to adapt to online learning (Jaggars & Xu, 2016). However, this condition did not promote the development of affective talents in this investigation. This could be because students require more motivation and self-discipline to be successful in their online learning activities and their affective abilities (Jacob & Radhai, 2016).

This study showed that there was no relationship between mastery of learning methods and information technology support and emotional capacities. It is difficult for lecturers to alter specific activities in online learning, such as performance appraisals, continual assessments, and psychomotor and affective examinations. Because online learning is centered on two-way communication and there is often a considerable lag between sender and receiver, the engagement between lecturers and students is less than in traditional classroom learning. Students have their own specific needs and circumstances that influence their online learning experience (Jacob & Radhai, 2016).

The disadvantages of online learning in terms of autonomy, such as a lack of assistance/direction from lecturers, feeling alone and having to find ways to look for answers to their own assignments, lecturers not being around students to guide them/lack of interaction, and parents who cannot help students in learning online, can cause students to be forced to do what they are told, often feel inadequate, and feel pressured during online meetings. Online learning has shortcomings in competency aspects, such as students not feeling very competent when given assignments and feeling that they do not receive many opportunities to show how capable they are.

Learning passion/excitement for online learning is sometimes lacking. To excel in online learning, students must have extra motivation and self-discipline. Students' low concentration levels and lack of monitoring by instructors and parents are important factors. Physical seclusion limits student interaction. Most students put off their assignments until the last minute. They frequently struggle with break management because once they take a break, it is usual-

ly for several hours instead of a 15-minute break at school. Students also stated that they were uninterested in learning because they did not have a stress-free learning environment at home. Information technology is used to build more student relationships than face-to-face interactions. Students do not need to meet with each other. Most of them meet more often in cyberspace in online games/games. They call each other by their online names instead of their real names, which they prefer. Greetings between students are also done via WhatsApp, Snapchat, and Instagram. There is a change in the form of interaction between students that cannot be avoided, and the learning process should tend toward training (Wong, 2020).

The rapid growth of technology and the widespread use of social media among the younger population, including students, create the potential for education providers to use mobile devices in online learning. This is because students who are younger and work full-time are more likely to use the mobile version (O'Bannon & Thomas, 2015). According to research, because of the special qualities of mobile devices, using a mobile learning management system (LMS) can improve students' academic performance. When factors related to individual background, psychological traits, outside influences, and midterm grades (a fundamental indicator of academic achievement) were taken into account, there was a marginal correlation, but not a statistical one, between the use of mobile learning management systems and the academic achievement of online students.

However, the use of mobile LMS and these factors did not seem to interact in any way to affect students' academic performance. The use of mobile LMS may improve access to online course materials and activities, as anticipated based on prior research. The convenience of using LMS while on the road may also be advantageous. Students' ability to organize and carry out study routines, even when they are not in front of a computer, is made possible by this innovative learning opportunity, which may eventually have an effect on their academic achievement. However, cautious interpretation is necessary because the study's findings only suggest a tenuous connection between student academic progress and the use of mobile LMS (Han & Shin, 2016).

As previously mentioned, mobile LMS can be developed to capitalize on more of the special capabilities of mobile devices, which can improve student learning, in addition to the flexibility of using LMS anytime, anywhere. For example, using mobile LMS can assist students' independent learning with greater metacognitive activities, which can ultimately improve their learning. These features include planning, monitoring, self-assessment, interaction/feedback, and time management (Han & Shin, 2016).

Conclusion

There is a significant relationship with a positive direction and the strength of a very weak relationship between mastery of learning methods and information technology support on cognitive and psychomotor abilities of nursing students, the need for mastery of learning methods and specific information technology support to support the achievement of affective and psychomotor abilities. Specific online learning methods are needed to achieve students' effective abilities.

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