

# Investigating Technostress as Moderating Information Quality and E-Learning Effectiveness on Students in Jakarta During the Covid-19 Pandemic

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**Abstract**—Uncertainty over the end of the Covid-19 pandemic in Indonesia, especially in Jakarta, inevitably causes adjustments to the online lecture method that must be carried out even though in its implementation there is a policy adjustment in technical implementation. Covid-19 is an unexpected event and lasts a long time. This makes universities must prepare strategies in online teaching methods that can be adapted to several types of conditions. However, this policy is quite a complex challenge with the presence of several problems for lecturers and students in the lecture process using information communication technology media in the form of e-learning. The existing e-learning media comes with all forms of strengths and weaknesses. Ranging from easy to use to complex ones. This study aims to investigate the effect of information quality on the effectiveness of e-learning by using the technostress factor as a moderator. This quantitative research uses the Structural Equation Modeling (SEM) model with Partial Least Square (PLS). A total of 127 students who are at least in the 2nd year of private universities in Jakarta were sampled in this study. The results of this study explain that technostress as a moderating factor has an influence on the relationship of information quality to the effectiveness of e-learning. In addition, quality and technology directly affect the effectiveness of e-learning. Subsequent research may involve other factors that can affect the effectiveness of e-learning such as cost loads, limited connections in certain areas, or the ability of students to provide adequate equipment. This suggestion is expected to enrich understanding of the effectiveness of online media used in universities with certain time conditions such as a pandemic.

**Keywords**—*technostress, effectiveness, e-learning, information, quality*

## I. INTRODUCTION

In 2020 visitors, the Covid-19 pandemic continues while causing the number of cases to increase. Based on the official website of the Indonesian government regarding Covid-19, data on the distribution of Covid-19 as of November 28 consisted of 527,999 confirmed cases and 441,983 recoveries [1]. Education is one aspect that has been impacted so that e-learning is implemented [2]. This also happened in China and Hong Kong [3] and in several countries in Africa [4]. This happens because of the policy to stop the teaching and learning process face-to-face in class to maximize the social distancing process from the government. This closure also occurred in several countries such as other countries in Asia (India, Pakistan, Philippines, Qatar, South Korea), Africa (Egypt, Kenya, Nigeria, Oman), and America (United States, Argentina, Brazil, Chile), Europe (Ireland, Italy, Luxembourg, Moldova) [5]. Teaching and learning methods in Indonesia are generally carried out face-to-face in class. However, not a few universities have adopted online technology in recovery as a combination or complement. This online method can form independence and technological literacy for both users [6] [7]. But on the other hand, this prolonged pandemic can form a tendency for student stress and anxiety about delays in the academic process [8] and also concerns about the financial condition of parents which can affect payment for studying [9]. Furthermore, several studies have explained that online teaching methods have an impact on stress [10] [11] [7] [12] [13] [14] [15]. Stress in the use of technology in online learning media which is inconvenient and excessive workload forms technostress [16]. Techno-overload has a positive effect on teaching-learning performance while Techno-complexity and Techno-insecurity have an effect [17]. The inability to use e-learning technology results in fatigue and boredom [18]. Several studies have examined online learning methods during the Covid-19 pandemic, but only a few involve technostress factors. Based on the above phenomena, this study aims to complement the understanding of the effectiveness of e-learning by involving student technostress factors.

## II. LITERATURE REVIEW

### A. Technostress on learning

Many studies and researches discuss the notion of technostress, especially in learning. Technostress refers to the process of adaptation due to an individual's inability to deal with the development or adjustment of information and communication technology in a dynamic manner. The main characteristics of technostress symptoms are seen from the inability to concentrate on one problem, tend to be irritable and the formation of feelings of loss of control [2]. The use of technology in online teaching can help individuals to achieve several goals such as being able to complete more work, being comfortable in doing work, and increasing productivity [3]. The completion of the work, in this case the teaching and learning process, indicates that the material delivered in terms of quantity and quality is achieved. The support of technological sophistication in online lecture media can create clearer and more maximal delivery of material. Thus the quality of information also has an impact on the effectiveness of the media used in online lectures. Therefore, this study proposes the following hypothesis:

**Hypothesis 1:** The quality of information affects the effectiveness of E-learning

Apart from matters relating to the wider use of technology [4], technostress is also related to mobile applications [5], social media [6], and mobile computing devices [7]. In particular, technostress is formed from aspects such as techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty [19] [11] [20]. However, in the use of communication technology media in online lectures, the burden on students in taking courses tends to be more. Activities such as taking lectures with a certain duration of time, following discussions via online chat, taking quizzes or quizzes. In addition, the availability of devices and the ability to use existing devices is a challenge for students. Technostress also has an impact on the health condition of teachers and this forms a problem in the management of educational organizations [7] [21]). This causes complexity in following existing lectures. Therefore, this study proposes the following hypotheses:

**Hypothesis 2:** Technostress affects the effectiveness of E-learning

**Hypothesis 3:** Information quality affects the effectiveness of E-learning which is mediated by Technostress

## III. RESEARCH METHODS

This research is a quantitative study using structural modeling. Structural modeling can be used in the fields of economics, statistics, psychology, and social sciences [22]. The analysis of this research uses SMART PLS 3.0 by performing several tests such as validity, reliability, suitability of structural models, and hypothesis testing. The sample of this study was 127 students who are at least at the second year level at private universities in Jakarta. This number is considered from a total of 14 indicators which are multiplied by 5 to 10 [23]. In data collection, this study used a questionnaire with a Likert scale range of 1 (Strongly Disagree) to 5 (Strongly Agree).

## IV. RESULTS AND DISCUSSION

Female students in this study dominate from the gender aspect as shown in table 1. The respondents consisted of 81 female students (63.78%) and 46 male students (36.22%). From the background of the respondent's majors, the management, finance and accounting majors dominate with the number of 81 people (63.78%), then the law and public administration majors with 30 people (23.62%). Furthermore, from the respondent class in higher education, students who are in the third year level dominate the research respondents, namely as many as 85 people (66.93%) then respondents from the fourth year follow with 37 people (29.13%). This result is in line with the sample character desired by the researcher where the measurement of experience using e-learning should be carried out on students who have used face-to-face learning methods in class and also e-learning although not in full.

TABLE I. RESPONDENT PROFILE

Profile	N
<b>Gender</b>	
Female	81
Male	(63.78%) 46

Profile	N
	(36.22%)
<b>Major</b>	
Management, Finance,	81
Accounting	(63.78%)
Communication Studies, Design,	15
Photography	(11.81%)
Law, Public Administration	30
Other	(23.62%)
	1
	(0.79%)

The PLS-Algorithm result in Figure 1 explains that all constructs have met the requirements with values above 0.7. In the previous process, one item (Qualinf1) was eliminated on the information quality variable because it did not meet the requirements. The outer loading variable consists of Qualinf2 = 0.789, Qualinf3 = 0.744, and Qualinf4 = 0.839. Then the outer loading results on the Technostress variable items consisted of Techstress1 = 0.860, Techstress2 = 0.779, Techstress3 = 0.718, Techstress4 = 0.837, Techstress5 = 0.763 and Techstress6 = 0.743. Furthermore, outer loading on the variable of e-learning effectiveness consists of Effect1 = 0.975, Effect2 = 0.908, Effect3 = 0.927, and Effect4 = 0.932.

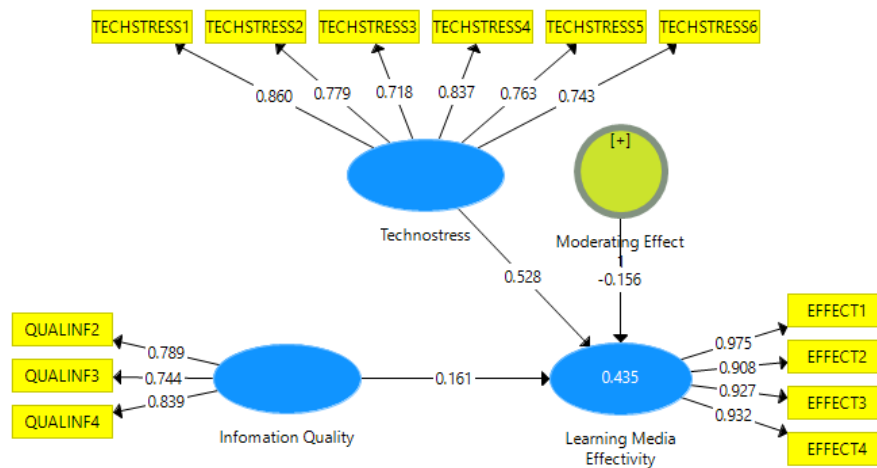


Fig. 1. PLS-Algorithm, SMRT-PLS, n=127

The measurement model (outer model) in table 2 explains that all variables in the study have met the reliability and validity requirements. The quality of information has a Cronbach's Alpha (CA) result of 0.712 and Composite Reliability (CR) of 0.834. These results explain that the quality of information has met the reliability requirements so that it is reliable. Technostress's CA and CR values were 0.876 and 0.906, respectively. These results explain that the Technostress variable has met the reliability requirements so that it is reliable. Furthermore, the CA and CR results on the Learning Media Effectiveness variable have values of CA = 0.952 and CR = 0.966 so that these results also meet the reliability requirements so that they are reliable. The validity of this study is determined from the results of the Average Variance Extracted (AVE) where the value must be > 0.5. The variables in this study have AVE values, namely Information Quality = 0.627, Technostress = 0.616 and Learning Media Effectiveness = 0.876. These results explain that all variables have met the validity requirements so that they are valid.

TABLE II. MODEL MEASUREMENT

Description	Results
<b>Model Measurement (Outer Model)</b>	
Information Quality	CA=0.712* CR=0.834** AVE=0.627*** Reliable & Valid
Technostress	CA=0.876* CR=0.906** AVE=0.616*** Reliable & Valid
E-learning Effectiveness	CA=0.952* Reliable &

Description		Results
	CR=0.966** AVE=0.876***	Valid
<b>Model Structural (Inner Model)</b>		
<u>Hypothesis Testing</u>		
Information Quality → E-Learning Effectiveness	T-Statistic=1.877 <sup>a</sup>	H1 supported
Technostress → E-Learning Effectiveness	T-Statistic=2.345 <sup>a</sup>	H2 supported
Moderating Effect → Learning Effectiveness	T-Statistic=6.561 <sup>a</sup>	H3 supported
E-Learning Effectiveness	R <sup>2</sup> =0.435	Moderate

\*Note: ≥0.7, \*\*≥0.8, \*\*\*≥0.5, <sup>a</sup>>1.96

The results of this study also explained that the quality of information in the lecture process with e-learning and technostress for students contributed 43.5% to the effectiveness of e-learning. Thus, as much as 56.5% there are other factors that can contribute to complement the measurement of e-learning effectiveness for students during a pandemic. The results of hypothesis testing in table 2 explain that the t-statistic value of Information Quality → Learning Media Effectivity is 1,877 (> 1.96). These results explain that Information Quality affects Learning Media Effectivity for private university students in Jakarta. Therefore, these results explain that this study supports Hypothesis 1. The use of technology communication media for e-learning should consider the clarity of the delivery of lecture materials to students. The complexity of lecturers' teaching using e-learning media such as ZOOM, or Google Meet limited the space for lecturers to move. This allows the provision of course information to be limited due to several things such as forgetfulness, nervousness, and stress. This also explains that technostress can not only happen to students but also to lecturers. The results of this study also support studies which explain that teaching strategies determine the quality of material information [24][25][26]. The unfamiliarity of teaching using a computer screen for a relatively long time causes inconvenience to teach for lecturers. This indirectly affects the effectiveness of the transfer of knowledge to students. Therefore, the more lecturers are accustomed to using e-learning, the quality of information on lecture topics can be optimal for students. The complexity of the e-learning used can also make lecturers become technologically illiterate. This can also limit the information that should be conveyed maximally or not in accordance with the existing course syllabus plan. In the long term, this makes students less aware of the lecture material presented so that assignments or quizzes become ineffective. The implementation of e-learning in this case will be a routine formality with a series of procedures and the duration of teaching time that must be fulfilled. The results of this study emphasize that the use of e-learning that has been determined by the university should consider the background of lecturers such as age and ability to adopt technology communication media in teaching such as the explanation of the concept of the Technology Adoption Model (TAM) [27][28]. Therefore, in the context of technology adoption, the ability to use e-learning to deliver teaching materials has an impact on the effectiveness of the media.

In the next section, the t-statistic for Technostress → Learning Media Effectivity is 2.345 (> 1.96). These results explain that Technostress affects Learning Media Effectivity for students at private universities in Jakarta. Thus, the results of the study support Hypothesis 2. The results of this study also support studies which explain that the teaching strategy determines the quality of material information [24] [29][30][31]. No matter how sophisticated the learning media used, it is not absolute that the results of using the media are optimal without a series of proper forms of communication. The need to explore features of media use in ZOOM or Google Meet can make communication between lecturers and students less rigid and can be more interesting. This can indirectly reduce the symptoms of post-stress for both lecturers and students. This should be adjusted to the teaching ability of the lecturer. The ability of lecturers to operate technology-based teaching media tends to require experience in use. Lecturers must be able to present the lecture

material in a certain duration of time effectively. In addition, the teaching process using e-learning must also consider the interactions that occur such as face-to-face teaching in class. The shift of lecture media from conventional to e-learning still expects students to be active and interact during the online lecture process. This also explains that there are quite a lot of students who are not familiar with technology media for studying. Students who are close to technology may not necessarily be fluent in using e-learning determined by higher education. Experience and habit factors also determine students in forming optimal lecture results. Students who tend to be less able to use e-learning tend to be passive in lecture interactions. Furthermore, the type of device can also determine the smooth use of e-learning for students. Some students only use smartphones to take online lectures, thus limiting the function of e-learning which should be optimal in attending lectures, discussions, and doing quizzes/assignments. The availability of devices owned by students to take online lectures also determines student behaviour in online lectures. This causes different levels of ability to use e-learning. Thus, this can become a burden in attending online lectures with media determined by the college

Furthermore, the result of the t-statistic moderating effect is 6.561 ( $> 1.96$ ). These results explain that Information Quality affects Learning Media Effectivity which is mediated by the Technostress factor of private university students in Jakarta. The results of this study also support studies which explain that teaching strategies determine the quality of material information [24][32][33][34][35]. As explained above, the ability of lecturers to provide clear and quality material using e-learning can have an impact on the optimization of the functions of the e-learning itself. This explains that in the development of information and communication technology, the current lecture process involves lecturers, students and the teaching media used. Therefore, a deficiency in one of these sections can cause the ineffectiveness of the existing lecture results. This is in line with the research concept that technostress as an important factor related to the ability of lecturers to teach using technology media and the ability of students to maximize understanding of material through e-learning affects the existence of the existing e-learning function. Thus, this study suggests that higher education management should have prepared a series of forms of training for lecturers to use online teaching methods. Even though the Covid-19 pandemic happened so fast and lasted quite a long time, forms of online training to introduce e-learning can be carried out by universities.

## V. CONSLUSION

Based on the results and discussion above, this study concludes (1) The quality of information affects the effectiveness of e-learning as a student learning medium, (2) Technostress also has an influence on the effectiveness of e-learning as a student learning medium, (3) Information quality affects the effectiveness of e-learning as a student learning media with the technostress factor as a moderating factor. These results explain that the technostress factor in facilitating the delivery of lecture material from lecturers to students forms the stress level of using online media such as Zoom, Google Meet and so on. This is due to a shift in learning media that changes quickly and thoroughly due to the Covid-19 pandemic conditions in Jakarta. Jakarta, as one of the big cities that still runs a strict social distancing protocol, makes universities still must implement an e-learning process even with various technical adjustments. The need to habituate lectures since the first semester is important in preparing students to be ready to carry out the form of lectures imposed by the higher education as an adjustment to conditions. Thus, the use of learning media that uses technology is not considered to be complex and burdensome for students. Higher education institutions must consider the workload factor for students as well as lecturers in using the e-learning system. This research has limitations on the scope of research carried out in one area, even though the pandemic conditions prevail throughout Indonesia. Although it provides students with the benefit of being able to quickly explain the technostress picture of e-learning, the need for a wider area coverage can provide a deeper understanding of explaining the character of the various areas. This research emphasizes on the technostress factor from the load aspect and the complexity of the lecture which requires additional aspects such as the cost load aspect, limited connections in certain areas, or the ability of students to provide adequate equipment. Supporting matters outside the e-learning system can be an important factor in explaining the effectiveness of e-learning in the long term.

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