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Effectivity and students' satisfaction to a tutorial in statistics through a webinar

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Abstract. The aim of the article was a review of the tutorials through webinars on Educational Statistics courses for students of the Master's Degree in Basic Education of Universitas Terbuka. The focus of the research was students' views on the effectiveness and satisfaction of the webinar in terms of engagement, complexity, and task orientation. The respondents of the study consisted of 74 students of the master's degree program in primary education. Data analysis used PLS-SEM to predict causal relationships among the variables understudied. The results showed that: 1) engagement gave an effect to effectivity, but did not give an effect to satisfaction, 2) complexity brought an effect to satisfaction but did not give an effect to effectivity, and 3) task orientation gave an effect to effectivity and satisfaction. Recommendations: 1) to increase the effectiveness of mathematics tutoring through webinars, it is necessary to increase student engagement and time efficiency of learning activities, and 2) to increase satisfaction with mathematics tutoring through webinars, it is necessary to improve the ease of implementing webinars (technical and procedures) and efficiency of learning time.

1. Introduction

The primary learning activities at the Universitas Terbuka (UT), which implements distance learning systems, can be viewed simply as 1) self-directed learning process by students to learn modular teaching materials, 2) during the learning process, UT provides learning support services to help students to comprehend the teaching materials, 3) at the end of the learning activity there is an examination to measure the achievement of student learning outcomes, and 4) at the end of the learning program certification or credential is carried out based on the achievement of learning outcomes while attending a study program [1]. Self-directed learning by students is an essential component that is the responsibility of students. In contrast, the availability of teaching materials that can be studied independently by students, learning assistance needed by students, and stringent testing is the responsibility of the distance education institution.

Self-directed learning is a learning process that relies more on students' initiative than other parties outside of the students [2]. Self-directed learning skills grow as students study in a distance learning environment that requires students to learn independently [3]. In the process of adaptation to the self-directed learning environment, students will succeed through it or make them drop out. Distance education college students have high dropout rates. For example, the average dropout rates in UK distance institutions tend to have much higher than conventional universities [2]. Therefore, the role of learning support services is critical in distance education in higher education. This article deals with

learning support services through a webinar conducted at the Universitas Terbuka, instead of a face-to-face tutorial since UT canceled the face-to-face tutorial during the Covid-19 pandemic.

As a substitution for the in-site face-to-face tutorial, UT conducted a rough face-to-face tutorial through webinars. A webinar, as defined by Gegenfurtnera & Ebnerb [4], are network-based seminars, where participants and facilitators communicate live through the internet across distant geographical locations using a shared virtual platform and interact in real-time synchronously through audio and video equipment. Many studies focused on webinars can be found in many works of literature. One comprehensive study, using a meta-analysis of research reports, was conducted by Gegenfurtnera & Ebnerb [4] researched the effectiveness of webinars and concluded that learning through webinars was more effective than online learning through asynchronous learning management systems (e.g., Moodle) and learning through face to face meeting, even though the difference in effectiveness was minimal. Furthermore, Gegenfurtner, Zitt, & Ebner [5] conducted exciting research on webinar evaluations with several findings. These included that webinar participants enjoyed the participants' interaction with the instructor, time efficiency for discussion, and the availability of recordings that could be watched again on various occasions. Other research conducted by Fathiyah & Setiyawati [6] had proven that the combination of face-to-face meetings and webinars was effective in training. Lieser, Taff, & Murphy-Hagan [7] researched developing webinars to enrich interactions in a blended learning context. The meta-analysis conducted by McKinney [8] also supported the claim that learning through webinars was effective at increasing knowledge and skills.

From the various studies presented above, research on the effectiveness of most webinars was a confirmative study in nature for the effectiveness of these webinars. Not many studies about webinars examined specific elements that can increase the effectiveness of webinars [8]. This article will fill the void in researches on webinars by examining the effectiveness and students' satisfaction in tutorials through webinars in terms of students' perceptions of engagement, complexity, and task orientation. The research framework was to examine the causal effect of the Engagement, Complexity, and Task Orientation variables on the Effectiveness and Satisfaction variables. This research model adopted the research model by Pérez, Collado, Salmones, Harrero, & Martin [9], who applied it to flipped classrooms. In this study, the research model was used to analyze tutorials through webinars; in addition, the variables' measurement uses different indicators than those used for flipped classrooms.

The characteristics of successful learning, including webinars, had long been the main focus of instructional science studies. The success or effectivity of learning refers to changes in the skills, knowledge, and attitudes of participants after learning is completed [9][10][11]. In addition to effectiveness, learning participants are also expected to gain satisfaction in the learning process. Satisfaction is a positive attitude from the learning participants towards the process that occurs in the learning activity. The components or variables that accompany a learning activity are the primary concern in this study. For learning activities that use information and communication technology, several studies raised the variable of student involvement in learning or engagement [9][12][13][14][15], the complexity of accessing learning [16][17], and efficient use of time for learning in the learning or task orientation [18][19].

2. Methods

The method used was a survey study involving quantitative and qualitative data through the following stages. On the first stage, based on a study of several works of literature that discusses the effectiveness of learning (effectivity), student involvement in learning (engagement), the complexity of accessing learning (complexity), and efficiency of learning time (task orientation), developed instruments to measure each of these variables. For each variable, researchers developed five indicators or instrument items, respectively. Thus, in total, there are 20 instrument items packaged in Google Form format and distributed through social media to students of the Basic Education Master Degree Program, class of 2019 / 2020 for participants in Education Statistics courses registered at UPBJJ-UT Jakarta, Serang, and Bogor. There were 74 returning questionnaires filled out by the students. For information, tutorials through webinars were obligatory for UT postgraduate students;

thus, students who fill out the questionnaire were the students who have experienced themselves learning with tutorials through webinars.

In the second stage, the students responding to the questionnaire were then analyzed to predict the causal relationship between the variables Engagement, Complexity, and Task Orientation on Effectivity and Satisfaction. The statistic used for this analysis is PLS-SEM using SmartPLS software [20]. On the last stage, using PLS-SEM to test the following hypothesis: 1) students engagement in the learning process gives an effect to the effectivity of tutorial through a webinar, 2) students engagement in the learning process gives an effect to the satisfaction of using tutorial through a webinar, 3) complexity in assessing and operating the tutorial gives an effect to the students' perceived effectivity of tutorial through a webinar, 4) complexity in assessing and operating the tutorial gives an effect to the students' satisfaction of using tutorial through a webinar, 5) task Orientation in the tutorial through a webinar gives an effect to the effectivity, and 6) task Orientation in the tutorial through webinar gives an effect to the students' satisfaction.

3. Results and discussion

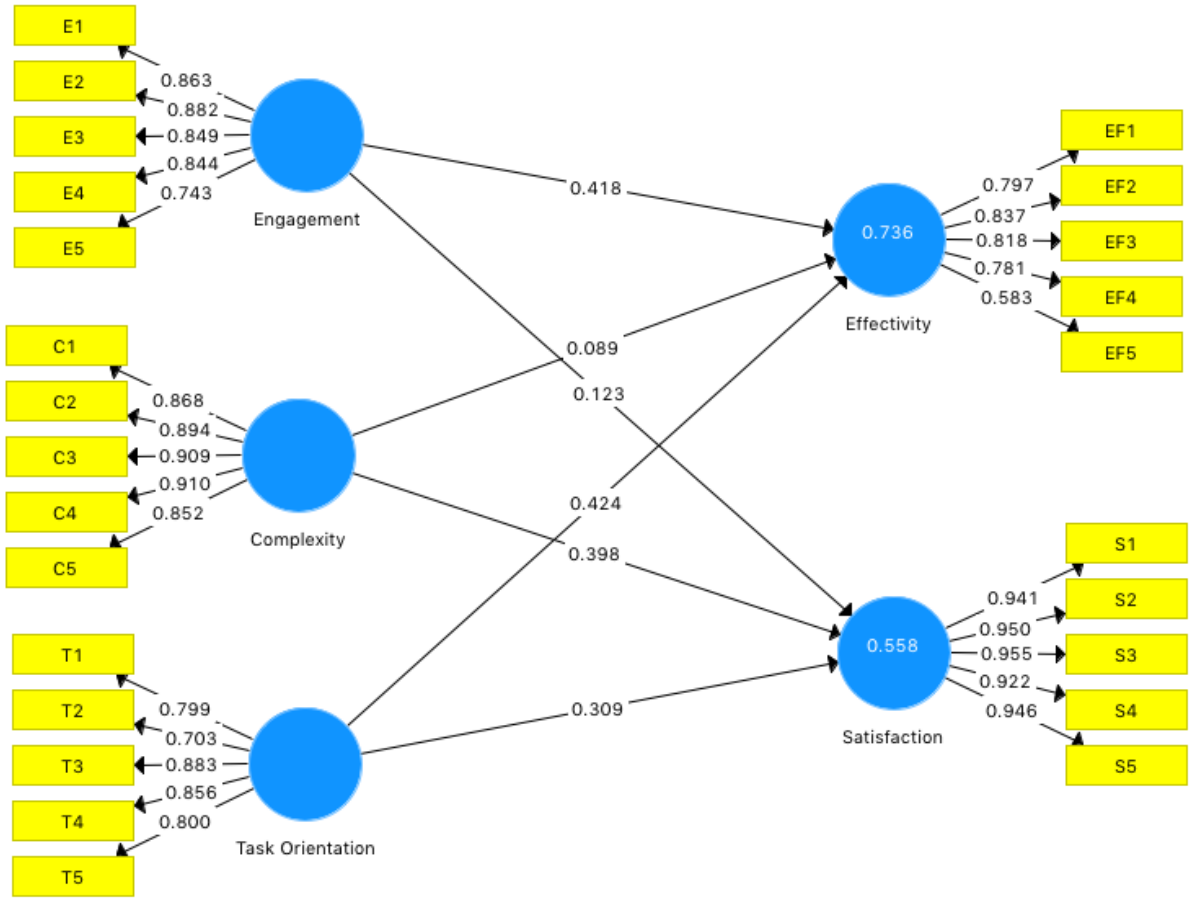

Figure 1. Structural equation model.

The diagram in figure 1 presented the results of data processing using SmartPLS [20]. It showed: 1) the 20 box shapes represented the observed variables or indicators that correspond to the instrument items, 2) the five-round shapes represented five construct variables (Engagement, Complexity, Task Orientation, Effectivity, and Satisfaction), 3) the numbers that accompany arrows directed to the observed variable showed factor loading of the observed variable in reflecting the construct variables, 4) numbers that accompany arrows in the relationships between construct variables showed the amount of the path coefficient and encloses the significance value (p-value) in parentheses. The next

discussions will evaluate the measurement model and the structural model. Evaluation of the measurement model will focus on evaluating the validity and reliability of the scores resulting from the instruments. In contrast, the structural model's evaluation will focus on evaluating the significance of the path coefficient between construct variables representing the hypotheses.

3.1. Measurement model evaluation

Evaluation of the measurement model aimed to check the validity and reliability of the scores generated from the instrument to measure the constructs used in this study, namely Engagement, Complexity, Task Orientation, Effectivity, and Satisfaction. A number in each arrow from the latent variable to the observation variable indicated the amount of outer loading that indicates how strongly an indicator reflects the latent variable. The requirements that need to be fulfilled by an indicator were to have an outer loading amount greater than 0.70 [21]. Figure 1 showed that the EF5 indicator had a value of 0.583, which was less than 0.70. Therefore, the model should remove the EF5 item, and the SmartPLS application will calculate the validity and reliability of the measurements without the EF5 item.

Evaluation of the validity of the measurement would use the Fornell-Larcker criteria [21]. Table 1 showed the results of SmartPLS calculations based on the Fornell-Larcker criteria [20].

Table 1. Measurement validity is based on the criteria of Fornell-Larcker.

	Complexity	Effectivity	Engagement	Satisfaction	Task Orientation
Complexity	0.887				
Effectivity	0.570	0.826			
Engagement	0.608	0.786	0.838		
Satisfaction	0.687	0.577	0.602	0.943	
Task Orientation	0.692	0.774	0.776	0.678	0.811

Table 2. Reliability of the measurements.

	Cronbach's Alpha
Complexity	0.932
Effectivity	0.846
Engagement	0.893
Satisfaction	0.969
Task Orientation	0.868

Table 1 showed that all values in pairs (rows and columns) of a construct by itself was higher than the values paired with other construct variables. For example, in the Complexity column, it appeared that the value in the complexity row had a value of 0.887, which was higher than the value in the other rows, which were 0.570, 0.608, 0.687, and 0.692, with the construct Effectiveness, Engagement, Satisfaction, and Task Orientation, respectively. Likewise, in the Effectivity column, the values in the Effectivity row have a value of 0.826, which is higher than the values in the other rows, namely 0.786, 0.577, and 0.774 for the Engagement, Satisfaction, and Task Orientation rows, respectively. The same calculation also applied to the Engagement, Satisfaction, and Task Orientation variables. It implied that the measurements used in this study had validity measurements that met the requirements based on the Fornell-Larcker criteria. Table 2 showed the reliability measures of the measurements used. Table 2 showed that the value of the Cronbach's alpha for measuring variable complexity, effectivity, engagement, and task orientation was 0.904, 0.876, 0836, and 0.898, respectively. The criteria for the reliability of the measurement were between 0.60 to 0.90 [21]. It could be concluded that the results of measurements of each construct variable had met the required reliability.

3.2. Structural model evaluation

The structural model in figure 2 was used to test the effect of Engagement, Complexity, and Task Orientation variables on Effectivity and Satisfaction. A diagram form in figure 2 presented the results of the SmartPLS calculations. In figure 2, the numbers in the arrows leading to the Effectivity variable indicated the path coefficients from independent variables to the Effectivity variable. The numbers in parentheses represented a p-value, which indicated the significance level of the path coefficient.

Before discussing figure 2 as a predictive model of the Engagement, Complexity, and Task Orientation variables for Effectivity and Satisfaction, we would first discuss the analysis requirements, namely collinearity, and coefficient of determination (R2). The indicator for collinearity would be used by VIF (Variance Inflation Factors). The magnitude of VIF showed collinearity or correlation between predictors that could disrupt the magnitude of the path coefficient and its significance. The VIF value must be greater than 0.20 [21]. Table 3 showed the VIF value of SmartPLS processing [20], which was greater than 0.20. The coefficient of determination in figure 2 was on the label in the Effectivity variable, equal to 0.685, and in the Satisfaction variable equal to 0.556. The magnitude of the coefficient of determination indicated the accuracy of the prediction. Hair, Hult, Ringle, & Sarstedt [21] classified the coefficient of determination of 0.75, 0.50, or 0.25 as substantial, moderate, and weak. Therefore, based on the requirements of the VIF value and the coefficient of determination, the prediction model of the Engagement, Complexity, and Task Orientation variables on the Effectivity and Satisfaction variables had fulfilled the requirements.

Table 3. Collinearity (VIF Statistics).

	Effectivity	Satisfaction
Complexity	1.969	1.069
Engagement	2.873	2.573
Task Orientation	3.111	3.111

Based on table 3, the VIF value for all independent variables in this study was higher than 0.20. Thus the predictions of the Complexity, Engagement, and Task Orientation variables on Effectivity and Satisfaction, as illustrated in figure 2, met the requirements.

The effect of the independent variables on the Effectivity and Satisfaction would use the path coefficient and p-values to evaluate the significance of the prediction. Figure 2 showed the path coefficient of the Engagement variable on Effectivity and Satisfaction. The effect of the Engagement variable on the Effectivity variable was expressed by the path coefficient of 0.465 with a p-value equal to 0.000 so that it was significant at the alpha level = 0.05. The effect of the Engagement variable on satisfaction was expressed by the path coefficient of 0.118 with a p-value equal to 0.446, so it was not significant at the alpha level = 0.05. It implied that each average of one unit added to the Engagement variable score would increase the average Effectvity score by 0.465, but any score on the Engagement variable did not affect satisfaction. The engagement of learning participants was an essential component in the effectiveness of learning through webinars. Some previous studies were in line with the findings in this study. Collaço [10] concluded that effective teaching methods could stimulate participants engaged in learning, and learning engagement of participants was positively associated with learning outcomes. Baranova, Khalyapina, Kobicheva, & Tokareva [11] reported that the correlation analysis results showed that the engagement of learning participants had a significant influence on learning outcomes. Pérez, Collado, Salmones, Harrero, & Martin [9] in research on a flipped classroom revealed that participants learning engagement in learning activities were a key factor that influences perceptions of learning effectiveness.

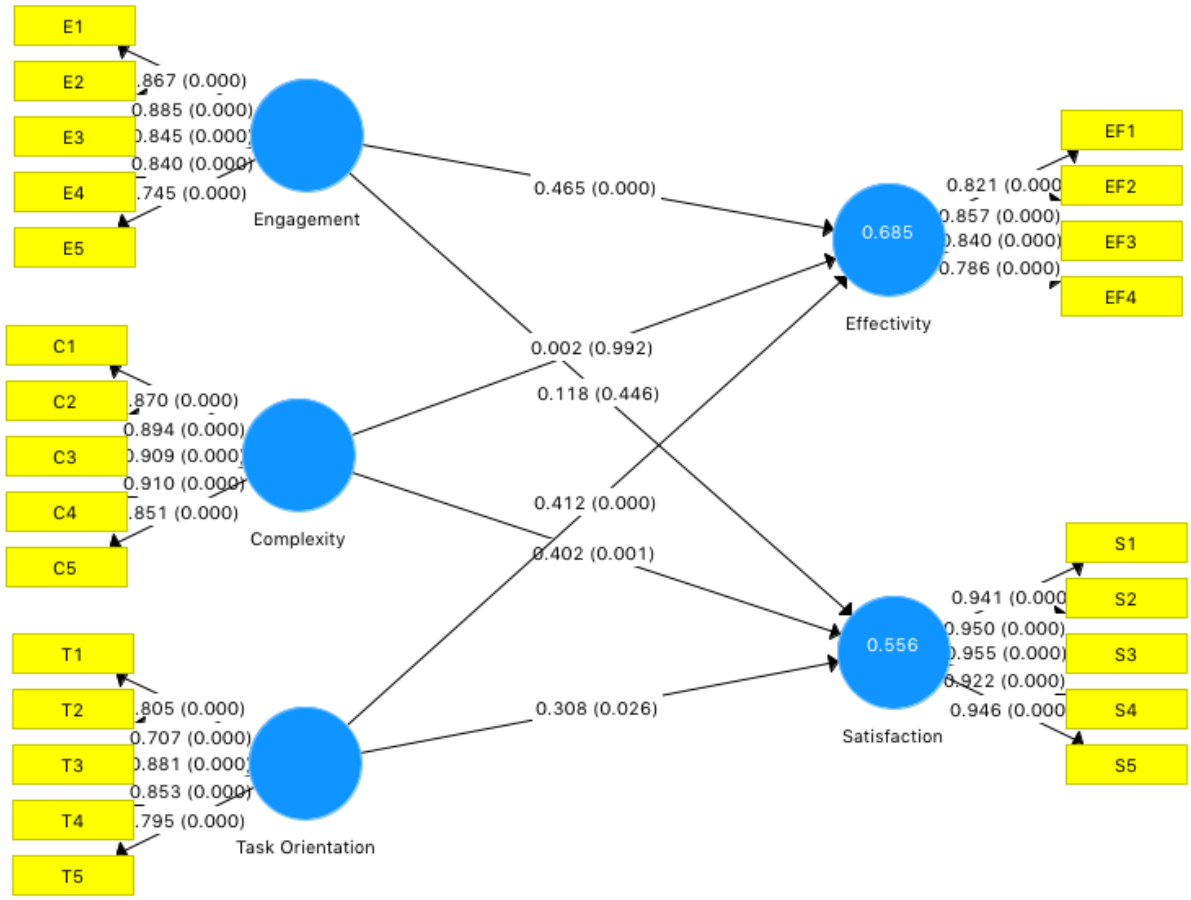

Figure 2. Structural model.

The effect of the Complexity variable on effectivity associated with the path coefficient of 0.002 and a p-value equal to 0.992. While the effect of Complexity on Satisfaction is associated with the path coefficient of 0.402 with a p-value equal to 0.001, thus, it could be concluded that complexity (could also mean easiness) affected the satisfaction but not the effectivity. The magnitude of the path coefficient gave an interpretation that the average increase in the easiness of one score in using a webinar gives an increase of 0.402 to the satisfaction of participants learning in a webinar. This finding was in line with several research findings concerning the complexity or ease of learning, especially learning that uses information technology. Research by Pérez, Collado, Salmones, Harrero, & Martin [9] on 'flipped classroom' revealed that complexity in learning activities was a key factor influencing perceptions of satisfaction to learning participants. In line with this, Kyndt, Dochy, Struyven, & Cascallar [16] reported that perception of complexity was an inhibiting factor for learning participants to take a meaningful learning approach (deep learning), which in turn decreased satisfaction to the learning.

The effect of the Task Orientation variable on the Effectivity and Satisfaction variables was expressed by the path coefficient of 0.412, each with a p-value = 0.000 and 0.308 with a p-value of 0.026. Thus, Task Orientation affected Effectivity and Satisfaction. On average, an increase in one unit score on the Task Orientation variable increased 0.412 unit scores on the Effectiveness variable and 0.308 score units on the Satisfaction variable. This finding was different from the results of research conducted by King-Spezzo, Amanda, Hsiao, Wiley, & Wiley [19], which showed that there was no significant difference between the expectations of adult learning participants towards ideal learning based on task orientation. The difference in the findings of this study seemed to be the result of the presence or absence of the use of communication technology in learning. This research was a

study of the learning environment in a webinar that includes communication technology so that the complexity of its use affects the quality of learning.

4. Conclusions

The study concluded that engagement of learning participants affected the effectiveness of statistical tutoring through webinars. Some previous studies were in line with the findings of this study, that engagement was associated with the effectiveness of purchase [9][12][13]. This study also confirmed the effect of the Complexity or Easiness variable on effectiveness, but not on student satisfaction with statistical tutoring through webinars. This finding was in line with several research findings concerning the complexity or ease of learning, especially learning that used information technology [9][16]. This study concluded that the Task Orientation variable gave effect to the Effectiveness and Satisfaction of students on statistical tutoring through webinars. It had been stated previously that these findings differed from the results of research conducted by King-Spezzo, Amanda, Hsiao, Wiley, & Wiley [19], which showed that there was no significant difference between the expectations of adult learning participants towards ideal learning based on task orientation. The difference in the findings of this study seemed to be a result of the presence or absence of the use of communication technology in learning. This research was research in a learning environment that used webinars that included communication technology so that task orientation influenced the quality of learning and student satisfaction. In this case, learning through webinars that most of the time spent on learning activities would be perceived as successful by students compared to learning through webinars, which most of the time was spent dealing with technical matters relating to image or audio disturbances.

To increase the effectiveness of statistical tutoring through webinars, based on the findings of this study, the tutor and institutions of distance higher education should make some efforts for improving engagement and task orientation in a tutorial through a webinar. To increase engagement, Bender [14] recommended several learning strategies, among others are: 1) hold a meaningful conversation, 2) make learning a personal content, 3) use technology, 4) give students some choices, 5) create collaborative learning that fosters relationships, 6) create challenging activities, 7) use movements to make active learning, 8) make it a game, 9) focus on clearly stated goals, 10) use an activating task, 11) limit the lecture, 12) use graphics and illustrations, 13) focus on higher-order thinking, and 14) summarize the work at the end. To improve task orientation in a tutorial through a webinar, a tutor required more preparation than a face-to-face tutorial. Preparation mainly dealt with technical matters. Tutors needed to check the audio and visual quality so that the participants could easily see the displaying image during a webinar. All of that was to ensure that the tutorial through webinar of activities' time was maximally for student learning activities.

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