Developing The Instrument of E-Learning Evaluation: Study at Vocational School

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Abstract:
This study aims to develop an instrument for the evaluation of e-learning with Learning Management System (LMS) in a vocation school majoring in office administration. The instrument development from CSE-UCLA evaluation model. The sample used was a cluster random sampling technique, taken at the small-scale trial stage were 85 respondents and at wide-scale trial stage with 235 respondents. The instrument was validated employing Aiken, construct validation used was EFA and CFA, Cronbach Alpha was employed the reliability. The result showed that there were five instrument constructs for implementing e-learning. The content validity using the Aiken index indicated a valid item. The validity of the instrument construct was conducted using EFA with a KMO value of 0.751 and each item had an anti-image coefficient >0.5 which means the factor analysis requirements for future met. The fit model based on the CFA result showed the value of Chi-square $(X^2) = 239.61$, df = 179, P-value = 0.416, RMSEA = 0.000. The loading factor value was 0.41-0.89 (>0.30) which meant that the item was valid. The reliability of the instrument showed a value of 0.791 that all instruments developed were reliable.

Keywords: Instrument, Developing, Evaluation, E-Learning

INTRODUCTION

E-learning is information and communication technology which is intended as a forum to encourage students to actively carry out learning activities wherever and whenever (Anshori, 2018). E-learning has begun to be implemented in the world of education since the 1970s (Hartanto, 2016). There are important requirements for organizing e-learning activities, namely carrying out them by utilizing a network, providing support for learning services, and providing tutor services if students have difficulty understanding the learning material. Many schools then utilize the Learning Management System (LMS) to support these activities.

Learning Management System (LMS) is an important tool in e-learning activities. LMS is a software application that is operated to facilitate administration, documentation, reporting, automation, and delivery of learning activities (Chahal & Patel, 2021; Furqon et al., 2023). This LMS focuses on automation and virtualization functions of learning so that it is carried out electronically (Kasim & Khalid, 2016). Usually, learning using an LMS is developed dynamically on a web basis.

The COVID-19 pandemic that hit the entire world in 2019 has had a broad impact on various sectors of life. In the education sector, the policy of closing schools and replacing them with online learning to be able to suppress the spread of the COVID-19 virus was carried out by the Indonesian government (Handarini & Wulandari, 2020). With online learning, social contact between students is expected to be reduced significantly so that the level of transmission between children and adults and students between schools is unlikely to increase. (Yuliana, 2022). Since the COVID-19 pandemic, e-learning has been widely used to keep the education system running despite the emergency of the spread of COVID-19 (Alturki & Aldraiweesh, 2021).

After the pandemic, many schools continued to use e-learning to support learning services (Rohana, 2020). Many schools still utilize the use of e-learning as a learning system service even though its implementation is not fully used. This is done because e-learning is able to overcome limitations between students and teachers in certain conditions or times that do not allow face-to-face classroom learning activities. Tena et al (2021) also explained that e-learning, which is a distance learning instrument, provides innovative alternative learning so that it can be carried out flexibly and is rich in opportunities so that it really suits the needs and demands of 21st century students.

The change in the learning system from face-to-face classes to distance learning has had a negative impact on the learning system and learning outcomes (Mar'ah et al., 2020).

These changes encourage transformation in the education sector. Three fundamental changes in global education (Purwanto et al., 2020), including: (1) changing the way millions of people get education, (2) innovation in the learning process, (3) the digital divide between students and educators. The digital divide will be visible in student learning outcomes. The challenge for teachers is innovation in delivering learning material by adapting to students' conditions (Tanuwijaya & Tambunan, 2021). Through the e-learning system, students can still access learning materials via the internet (Yanto & Retnawati, 2018). However, the e-learning system adopted is not easy, because it must be supported by appropriate class design and delivery methods.

The progress of the e-learning model certainly needs to be evaluated to determine the level of success and effectiveness. Evaluation is a stage that must be carried out in program implementation to ensure that the program objectives are appropriate (Gronlund & Robert, 1991; Stufflebeam & Shinfield, 1985). Several educational policies resulting from evaluations were also implemented in 2020 to 2021, namely the elimination of the National Examination, the emergency curriculum, and the provision of study quotas. However, in reality, evaluation of e-learning has not been carried out comprehensively (Ariesta et al., 2021). Something similar to what was said by Giatman et al (2020) that student readiness in implementing e-learning shows that 40.5% of students are not ready. Not only students, educators who are not used to operating online learning platforms also need time to learn so that the implementation of learning is currently less than optimal (Gao et al., 2022; Krome, 2021).

Observations carried out at vocational schools throughout Yogyakarta also show that students and teachers are not yet accustomed to online learning, especially in office administration majors. There are still many obstacles so that e-learning cannot run effectively. In the implementation process, there are many teachers who experience difficulties in evaluating e-learning. Therefore, it is necessary to evaluate e-learning learning. The results of observations and interviews conducted with teachers and school principals also show that there has been no evaluation regarding e-learning due to difficulties in using the instruments. Having instruments related to e-learning evaluation that are valid and reliable is something that is really needed. This is because evaluation of e-learning learning needs to use clear instruments so that it can reflect the actual situation. The instruments developed were also adapted to the characteristics of vocational school.

In supporting the implementation of learning evaluation, it is necessary to design the development of evaluation instruments. The development of learning evaluation instruments is

very necessary to ensure good performance in e-learning (Gao et al., 2022). Long before the COVID-19 pandemic, e-learning was widely used, but many failed to realize the goals, motives and hopes behind its development due to the lack of guidelines for assessing the quality of e-learning (Sintawana et al., 2020; Sustiawati & Zakiyah, 2022). Therefore, developing e-learning evaluation instruments is a very important thing to do. Valid and reliable instruments are very important to obtain good information about evaluating the implementation of online learning in schools.

RESEARCH METHOD

The research aimed to develop an e-learning evaluation instrument in vocational schools majoring in office administration. The instrument developed comprised five components named system assessment, planning program, implementation program, improvement program, and certification program. The instrument developed from CSE-UCLA evaluation model and employed several modified steps from Mardapi (2008) wich can be seen in figure 1. The steps used in instrument development are objective specification and instrument study, then we describe and specify the theory of the objective, after that operationally define the theories that have been collected, then select a scale and develop instrument items, review instrument items, create a prototype which is ready to be tested, after the instrument is ready, a small-scale trial is carried out which is then explained and revised, after the instrument is revised, a large-scale trial is carried out which is then implemented and revised so as to produce an instrument that is suitable for absorbing e-learning.
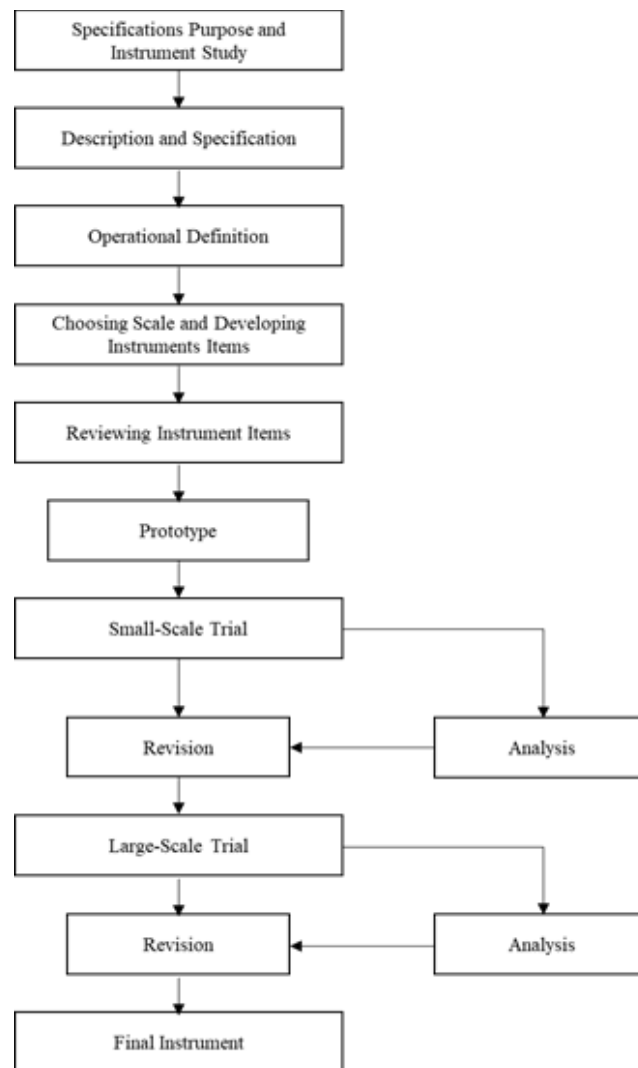
Figure 1.   The Stage of Developing the Instrument

The instrument developed has 5 options with modifications of the Likert scale (Mardapi, 2008; Nurrahman et al., 2022). The score range was 5-4-3-2-1 with 5 (Very Good), 4 (Good), 3 (Enough), 2 (Not Good), and 1 (Not Very Good Good). Respondents were able to select according to the conditions situated in the school.

Sample and Sampling Technique

The samples used in this study were students and teachers of vocational high school (SMK) majoring in Office Administation from the Province of Special Region of Yogyakarta. Sampling techniques with random sampling clusters. The sampling process was done by taking several districts at random, then taking some schools as well as teachers in a vocational high school randomly. The samples taken at the small-scale trial stage were

85 respondents. While in the wide-scale trial stage, it counted for 235 respondents. The trial on the sample was conducted using the help of an e-form.

Instrument

The instruments developed in this study were questionnaires. The first step was a comprehensive library review. It aimed to define the characteristics of the e-learning evaluation component. Operational definitions are designed as the framing of thinking in developing instrument indicators fitted with the construct developed. The items were then reviewed and assessed by four experts by the Delphi method (Dalkey & Helmer, 1963) which was then calculated using the Aiken V (Aiken, 1985)

An initial online learning evaluation instrument was developed as many as 23 items. There are 4 items for the system assessment indicator, 6 items for program planning indicator, 4 items for program implementation indicator, 4 items for improvement program indicator, and 5 items for certification program indicator.

Developing instruments was a long and valuable process (Istiyono et al., 2014; Nurrahman et al., 2022), so it was necessary to do in detail and with care. Therefore, researchers conducted a survey and reliability test of instruments that had been made in two SMK majoring in office administration in Yogyakarta. Researchers analyzed documents and searched for information related to the implementation of e-learning in vocational high school.

Data Analyse Technique

The data gained from the trial result were then analyzed including item validation using the Explanatory Factor Analysis (EFA) technique with the help of the SPSS 22 program and Confirmatory Factor Analysis (CFA) with the help of LISREL 8.80 (Jöreskog & Sörbom, 1993). This leads to getting the number of items that are constructed validly. Then, to measure the level of the instrument developed, it employed the Alpha Cronbach reliability coefficient using SPSS 22.

RESULTS AND DISCUSSION

Results

The results of this study are instruments used to evaluate the implementation of e-learning in Vocational High School (SMK). The result with *the Aiken* formula showed that items number 14 and 20 were rejected because the value of V only 0.75 and 0.69 respectively, so there are still 21 valid items. Also, there is input from experts so that the instruments developed

need to be revised. The revision aims to obtain valid items and scales to produce consistent and stable value for the long term.

After revising the instrument, the researchers then conducted a small-scale trial with 83 respondents. The analysis was conducted in a construct with the EFA. The results of the analysis showed a Kaiser-Meyer-Olkin Sample Sufficiency of Sampling (KMO) price of 0.751. Each item has an anti-image coefficient greater than 0.5 which means it has met the requirements for factor analysis.

In larger-scale trials with a sample count of 235. The analysis was conducted using CFA techniques to reform the results of the first trial analysis. This is following Cramer's (Cramer, 2003) opinion that the EFA was used to explore the theory and CFA for testing the theory. The results of the Confirmatory factor are shown in Figure 2. Coefficient reliability with Alpha Cronbach shows a value of 0.791 which means the instrument is categorized as reliable (Feldt & Brennan, 1989; Retnawati, 2016).
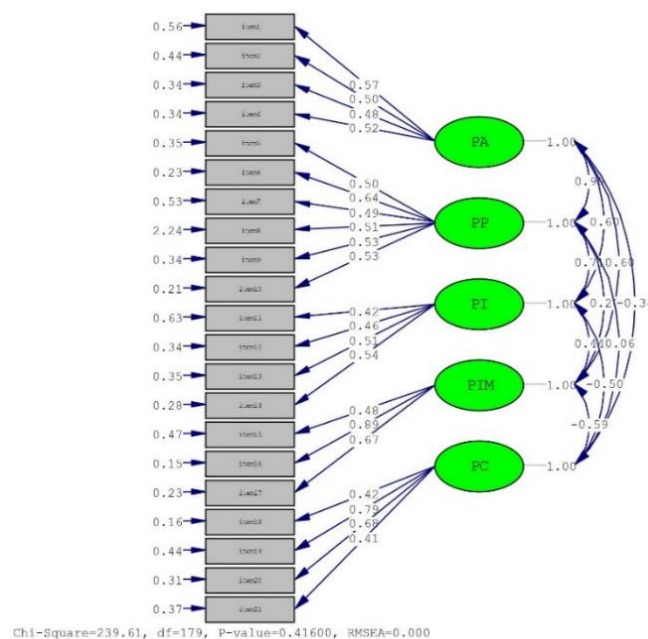

Figure 2. The CFA Analysis Result

Figure 2 shows the results of CFA analysis that Chi-square is smaller than 2 df (239.61 < 2 x 179, According to Jöreskog & Sörbom (1993), p-value = 0.416 (> 0.05, according to Pedhazur (1997), RSMEA = 0.000 (< 0.08, According to Ferdinand, 2002). The loading factor value of each item indicates a value > 0.3, which means all items are accepted (Hair et al., 2010). So, it can be concluded that the model developed is fit (Nunnally & B. I. H, 1994).

Discussion

The results analysis can be known that the instrument of evaluating the implementation of online learning has content validity, construct validity, and good reliability. The validity of the content aims to assess the instrument based on the readability of the item, the relevance of the item, the guidelines, and the revision of the item (Azwar, 2016; Mardapi, 2008).

As shown in figure 1, it can be known that the instrument that has been developed is fit. The fit model means the model that is tried can reveal a theoretical construct according to the data from the field. This is in line with Mardapi's opinion (Mardapi, 2008) that this constructed validity serves to show the extent to which the test instrument reveals measured theoretical construct or a trait developed in the preparation of instruments. The validity of this construct is important because with good construct validity it will indicate a high level of validity of the instrument used (Azwar, 2016; Setiawati et al., 2013).

The reliability coefficient of the instrument developed is also in the category of good means reliable. Reliable instruments are needed so that instruments can be used in the long term (Allen & Yen, 1979). It was also put forward by Nunnally & B. I. H (1994) and Iacobucci et al (1999) that reliability can demonstrate stability, consistency, and reliability to describe indicators as they are.

The final product of this study is an instrument used to evaluate the implementation of e-learning of vocational high schools can be seen in Table 1. The evaluation instrument is expected to be used to provide recommendations from the evaluation results related to the implementation of e-learning and as a decision-making consideration. This is under the statement by (Mardapi, 2017) that evaluation is an activity to collect, analyze, and present information about a particular object that is examined and the results can be used as a consideration material in decision making. Besides, (Divayana, 2017) also explained that evaluation activities are carried out to look for errors or weaknesses based on the results of the assessment of an object or program evaluated, but to know the effectiveness of an object can run properly and know the constraints which exist.

Table 1. Online Learning Evaluation Instruments

No	Indicator	Item (Evaluated Aspect)	Loading Factor
1	*System Assessment*	Background of online learning implementation	0,57
		The base of the legality of e-learning	0,50
		Mechanisms of online-based learning models	0,48
		The mechanism for determining human resources	0,52
2	*Program Planning*	The readiness of teachers' knowledge of online learning	0,50
		The readiness of students' knowledge of online learning	0,64
		Management knowledge readiness	0,49

		The readiness of facilities and infrastructure	0,51
		Online-based learning model planning	0,53
		Online learning budget readiness	0,53
3	Program Implementation	Socialization of the orientation of online learning for the school community	0,42
		Socialization of online learning operation to teachers and students	0,46
		Socialization of the use of key devices and supporting online learning to the managers	0,51
		Online learning operation	0,54
4	Program Improvement	Online learning budget management	0,48
		Online learning hardware installation	0,89
		Installation of online learning software	0,67
5	Program Certification	The attainment of online learning programs	0,42
		Reliability of online learning systems	0,79
		Quality of learning process	0,68
		The attainment of assessment and evaluation of learning	0,41

Table 1 shows that instruments developed and used to evaluate online consist of five factors and have 21 items. Item-item tersebut dikembangkan dari teori-teori para ahli berdasarkan dari deskripsi operasionalnya. Each item formed from five factors also meets the minimum requirements for a loading factor value, namely > 0.3, namely in the range $0.41 – 0.89$. The highest mean loading factor value was for the program improvement factor (0.68), while the lowest was for the program implementation factor (0.48). The instrument developed has the validity of the contents and the validity of the high construct. In addition, the coefficient level of instrument reliability in the category is good (Salkind, 2007). That good reliability is very important because if reliability is bad then it will affect the validity measuring instrument. Valid and reliable instruments can provide accurate information about a component. This is in line with the opinion of (Andrian et al., 2018) that valid and reliable instruments can provide information about education programs holistically.

CONCLUSION

The results analysis can be known that the instrument of evaluating the implementation of online learning has content validity, construct validity, and good reliability. The instrument includes five components, namely System Assessment, Program Planning, Program Implementation, Program Improvement, and Program Certification. The total instrument items created were 21 items. The instrument was validated employing Aiken, construct validation used was EFA and CFA, Cronbach Alpha was employed the reliability. The instrument of evaluating that has been developed is expected to be used by stakeholders to evaluate the implementation of e-learning and as a consideration for future decision.

DAFTAR PUSTAKA

Aiken. (1985). Three Coefficients for Analyzing the Reliability and Validity of Ratings. *Educational and Psychological Measurement*, *45*(1), 131–142. https://doi.org/https://doi.org/10.1177/001316448545101

Allen, M. J., & Yen, W. M. (1979). Introduction to measurement theory, Monterey, CA: Brooks/Cole, 1979. *Google Scholar*.

Alturki, U., & Aldraiweesh, A. (2021). Application of learning management system (Lms) during the covid-19 pandemic: A sustainable acceptance model of the expansion technology approach. *Sustainability (Switzerland)*, *13*(19). https://doi.org/10.3390/su131910991

Andrian, D., Kartowagiran, B., & Hadi, S. (2018). The instrument development to evaluate local curriculum in Indonesia. *International Journal of Instruction*, *11*(4). https://doi.org/10.12973/iji.2018.11458a

Anshori, S. (2018). Pemanfaatan Teknologi Informasi Dan Komunikasi Sebagai Media Pembelajaran. *Civic-Culture: Jurnal Ilmu Pendidikan PKn Dan Sosial Budaya*, *9924*.

Ariesta, W., Aina, M., Uslan, Kumbarasari, S., Aminatun, D., & Mishbahuddin. (2021). Evaluation Of Online Learning In Higher Education During The COVID-19 Pandemic : A Review and Recommendations. *Novateur Publication, India*, *June*.

Azwar, S. (2016). Reliabilitas Dan Validitas Aitem. *Buletin Psikologi*, *3*(1).

Chahal, K., & Patel, M. (2021). Features of Learning Management Systems (LMS) for Improving Teaching and Learning. *Journal of Interdisiplinary Cycle Research* , *13*(11).

Cramer, D. (2003). *Advance Quantitative Data Analysis*. McGraw-Hill Education.

Dalkey, N., & Helmer, O. (1963). An Experimental Application of the DELPHI Method to the Use of Experts. *Management Science*, *9*(3). https://doi.org/10.1287/mnsc.9.3.458

Divayana, D. G. H. (2017). Evaluasi Pemanfaatan E-Learning Menggunakan Model CSE-UCLA. *Cakrawala Pendidikan*, *36*(2).

Feldt, L. S., & Brennan, R. L. (1989). Reliability. In R. L. Linn (Ed.). *Educational Measurement*, 105–146.

Ferdinand, A. (2002). *Structural Equation Modelling dalam Peneltian Manajemen*. Badan Penerbit Universitas Diponegoro.

Furqon, M., Sinaga, P., Liliasari, L., & Riza, L. S. (2023). The Impact of Learning Management System (LMS) Usage on Students. *TEM Journal*, *12*(2). https://doi.org/10.18421/TEM122-54

Gao, M., Cui, Y., Chen, H., Zeng, H., Zhu, Z., & Zu, X. (2022). The efficacy and acceptance of online learning vs. offline learning in medical student education: a systematic review and meta-analysis. *Journal of Xiangya Medicine*, *7*. https://doi.org/10.21037/jxym-22-3

Giatman, M., Siswati, S., & Basri, I. Y. (2020). Online Learning Quality Control in the Pandemic Covid-19 Era in Indonesia. *Journal of Nonformal Education*, *6*(2).

Gronlund, N. E., & Robert, L. L. (1991). *Educational Assessment and Reporting*. Harcout Brace Javanovich Publisher.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis. In *Vectors*. https://doi.org/10.1016/j.ijpharm.2011.02.019

Handarini, O. I., & Wulandari, S. S. (2020). Pembelajaran Daring Sebagai Upaya Study From Home (SFH) Selama Pandemi Covid 19. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, *8*(3). https://doi.org/10.26740/jpap.v8n3.p496-503

Hartanto, W. (2016). Penggunaan E-Learning sebagai Media Pembelajaran. *Jurnal Pendidikan Ekonomi*, *10*(1).

Iacobucci, D., Neelamegham, R., & Hopkins, N. (1999). Measurement quality issues in dyadic models of relationships. *Social Networks*, *21*(3). https://doi.org/10.1016/S0378-8733(99)00010-6

Istiyono, E., Mardapi, D., & Suparno, S. (2014). Pengembangan Tes Kemampuan Berpikir Tingkat Tinggi Fisika (PysTHOTS) Peserta Didik SMA. *Jurnal Penelitian Dan Evaluasi Pendidikan*, *18*(1). https://doi.org/10.21831/pep.v18i1.2120

Jöreskog, K. G., & Sörbom, D. (1993). LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language. Scientific Software International. In *Scientific Software*.

Kasim, N. N. M., & Khalid, F. (2016). Choosing the right learning management system (LMS) for the higher education institution context: A systematic review. *International Journal of Emerging Technologies in Learning*, *11*(6). https://doi.org/10.3991/ijet.v11i06.5644

Krome, L. (2021). A review of Zoom utilization in higher education during the COVID-19 pandemic. *Education Thinking*, *1*(8).

Mar'ah, N. K., Rusilowati, A., & Sumarni, W. (2020). Perubahan Proses Pembelajaran Daring Pada Siswa Sekolah Dasar di Tengah Pandemi Covid-19. *Prosiding Seminar Nasional Pascasarjana UNNES*.

Mardapi, D. (2008). *Teknik Penyusunan Instrumen Tes dan Nontes*. Mitra Cendekia Offset.

Mardapi, D. (2017). *Pengukuran, penilaian dan evaluasi pendidikan "Measurement, assessment and evaluation of education*. Penerbitan Parama.

Nunnally, J. C., & B. I. H. (1994). *Psychometric Theory (3rd ed.)*. . McGraw Hill.

Nurrahman, A., Sukirno, S., Pratiwi, D. S., Iskandar, J., Rahim, A., & Rahmaini, I. S. (2022). Developing Student Social Attitude Self-Assessment Instruments: A Study in Vocational High School. *Research and Evaluation in Education*, *8*(1). https://doi.org/10.21831/reid.v8i1.45100

Pedhazur, E. J. (1997). Multiple Regression in Behavioral Research; Explanation and Prediction. In *Journal of the American Statistical Association* (Vol. 70, Issue 352).

Purwanto, A., Asbari, M., Prameswari, M., & Ramdan, M. (2020). Gaya Kepemimpinan Di Madrasah Aliyah: Authentic, Tansformational, Authoritarian Atau Transactional? *Nidhomul Haq : Jurnal Manajemen Pendidikan Islam*, *5*(1). https://doi.org/10.31538/ndh.v5i1.544

Retnawati, H. (2016). *Analisis Kuantitatif Instrumen Penelitian (Panduan Peneliti, Mahasiswa dan Psikometri)*. www.nuhamedika.gu.ma

Rohana, S. (2020). Model Pembelajaran Daring Pasca Pandemi COVID-19. *At-Ta'dib: Jurnal Ilmiah Prodi Pendidikan Agama Islam*. https://doi.org/10.47498/tadib.v12i02.441

Salkind, N. J. (2007). *Encyclopedia of Measurement and Statistics*. SAGE.

Setiawati, F. A., Mardapi, D., & Azwar, S. (2013). Penskalaan Teori Klasik Instrumen Multiple Intelligences Tipe Thurstone Dan Likert. *Jurnal Penelitian Dan Evaluasi Pendidikan*, *17*(2). https://doi.org/10.21831/pep.v17i2.1699

Sintawana, N. (Nisya), Lazirkha, D. P. (Diana), & Sari, S. N. (Siti). (2020). Pengaruh Media Pembelajaran Online Berbasis E-learning pada Aplikasi Zenius terhadap Hasil Belajar Siswa SMA. *JI-Tech*.

Stufflebeam & Shinfield. (1985). *Systematic Evaluation*. Kluwer.

Sustiawati, M., & Zakiyah, Z. (2022). Pengaruh Pembelajaran Online Terhadap Hasil Belajar Siswa pada Pembelajaran Pendidikan Agama Islam. *Proceedings Series on Social Sciences & Humanities*, *4*. https://doi.org/10.30595/pssh.v4i.291

Tanuwijaya, N. S., & Tambunan, W. (2021). Alternatif Solusi Model Pembelajaran untuk Mengatasi Resiko Penurunan Capaian Belajar dalam Pembelajaram Tatap Muka Terbatas di Masa Pandemic Covid 19 (Studi Kasus Analisis Kebijakan Pendidikan). *Jurnal Manajemen Pendidikan*, *10*(02).

Tena, M. J. F., del Carmen Ortega Navas, M., & Fuster, M. C. S. (2021). New technologies as innovative teaching-learning strategies in the Digital Era. *Revista Electronica Interuniversitaria de Formacion Del Profesorado*, *24*(1). https://doi.org/10.6018/REIFOP.406051

Yanto, B., & Retnawati, H. (2018). Dapatkah Model Blended Learning Mempengaruhi Kemandirian Belajar Matematika Siswa? *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *7*(3). https://doi.org/10.24127/ajpm.v7i3.1559

Yuliana, D. P. (2022). Efektivitas Penggunaan Google Meet Sebagai Media Pembelajaran Daring Selama Pandemi COVID-19. *Jurnal Pendidikan Teknologi Informasi (JUKANTI)*, *5*(1). https://doi.org/10.37792/jukanti.v5i1.378