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The quality of hybrid learning in higher education using EduQual

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Abstract

The purpose of this study was to develop the dimensions of the EduQual instrument with hybrid learning characteristics and measure the quality of hybrid learning for undergraduate students at Yogyakarta State University. A survey method was used in this research. The subjects of this study were undergraduate program students at Yogyakarta State University in courses oriented toward theoretical studies. Based on the analysis of EFA and CFA, it can be concluded that the model developed by the researcher meets the criteria of construct validity and reliability. On the validity and reliability of the content involving experts, it was also concluded that the instrument was acceptable. The instrument can measure the quality of hybrid learning in tertiary institutions. Meanwhile, the results of a survey using the EduQual instrument developed regarding the quality of hybrid learning conducted for one semester after the pandemic were included in the moderate category. This shows the need to improve the quality of hybrid learning conducted by lecturers and universities. This increase is not only in the ability of lecturers to use the hybrid learning model, but physical facilities such as internet networks, software, and hardware need to be optimized.

Keywords: EduQual; education quality; high school; hybrid learning.

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1. INTRODUCTION

This research is motivated by regulations regarding hybrid lecture policies for students, which emphasize the implementation of lectures with a scheme of 50% of students learning offline on campus and 50% of students studying at home through conference applications such as Zoom and Google Meet. This policy requires each faculty to be able to provide facilities, infrastructure, and human resources to support hybrid learning. The hybrid learning policy should be able to open opportunities for tertiary institutions to maximize input factors such as facilities, infrastructure, and human resources for lecturers and education staff to support educational transformation in the digital 4.0 era. In addition, hybrid learning combines the best parts of face-to-face and online learning to create the ideal learning experience needed in society 5.0. However, the results of discussions with several lecturers and students conducted by researchers concluded that there were many mistakes in their thinking about hybrid learning. Many people think that hybrid learning is the same as blended learning. For example, they were using LMS in the learning process, face-to-face and through the Zoom application alternately every week, even asking all students to attend class or full meetings using Zoom. Confusion regarding these two terms needs to be straightened out and evaluated so that hybrid learning can be maximally fit for the purpose.

Concerning evaluation research, not everyone has the opportunity and training to make statistically feasible studies or comparisons or credentials that policymakers and the public must take seriously (Hudson et al., 2019). Academic researchers - professors and graduate students - may be able to undertake policy evaluation research if stakeholders require it or they obtain a research grant. Policy stakeholders are sometimes willing to volunteer their time and expertise because they agree with student researchers that policies need to be developed or changed (Srivastava et al., 2009). Many universities support research facilities on specific issues and are staffed by professional professors and researchers. If their interests match those of academics, perhaps policy research can be carried out as a form of collaboration between universities and professionals. The limitations of this research change the perspective of researchers to do things that might be done besides evaluating hybrid learning policies through policy research procedures.

One alternative that researchers can use to measure the success of a program is to look at program quality in terms of user satisfaction with program policies (Berry et al., 1988; Firmansyah et al., 2020). EduQual is a comprehensive research tool developed to measure consumer expectations and perceptions of services across five dimensions that are considered indicative of service quality. It is based on the expectation-disconfirmation model, which evaluates service quality by examining the degree to which consumers' initial expectations about service quality align or diverge from their actual experiences (De Oliveira & Ferreira, 2009; Yousapronpaiboon, 2014). Through dimensional adjustments to the hybrid learning pattern, it is hoped that it can measure the quality of ongoing hybrid learning in tertiary institutions in terms of user satisfaction. So that the results of the survey can be used as a college self-reflection on the hybrid learning policy that is being implemented. The main objectives of this research are; 1) to develop an EduQual instrument with a hybrid learning dimension; 2) to measure the quality of hybrid learning services in terms of policy user satisfaction, namely students while participating in lecture activities with the hybrid method. This research is limited to how the quality of hybrid learning is seen in terms of user satisfaction using the EduQual instrument at Yogyakarta State University, which applies the hybrid learning method.

1.1. Literature review

1.1.1. Hybrid Learning

The ongoing societal shift compels higher education and adult learning institutions to focus on fostering experiential and lifelong learning opportunities for individuals at all stages. Current higher education policies often emphasize the potential for multi-campus learning and inter-agency collaboration, facilitated by hybrid classrooms that combine small in-person groups with virtual engagement. As the demographic diversity of students in higher education and adult learning grows, there is an increasing demand to connect learners with differing circumstances, particularly those unable to participate in traditional classroom settings due to

commitments like family or work (Cain, 2015). Digital technologies have emerged as a solution, reshaping the educational landscape to make learning more flexible and accessible to a broader audience (Kee et al., 2024). With advancements in synchronous communication tools, the boundaries between traditional in-person education and online models, such as MOOCs, are increasingly blurred, paving the way for hybrid or synchronous blended learning approaches (Alexander et al., 2014; Roseth et al., 2013; Anthony Jnr, 2024).

Research highlights the diverse possibilities for implementing synchronous classes and hybrid learning models, which combine in-person and remote instruction. This approach involves educators teaching in-person and virtual students simultaneously through tools like video conferencing software. Hybrid classes may also include asynchronous components such as pre-recorded videos and online exercises, allowing a seamless integration of face-to-face and digital learning environments. Properly designed hybrid courses maximize the benefits of both formats, making education more accessible and flexible for a diverse range of learners.

Hybrid learning merges online environments and distance learning flexibility with the interactive experience of traditional classroom instruction (Marcellis et al., 2024). It offers opportunities for face-to-face interactions, fostering discussion, debate, and collaboration while also accommodating the convenience of online learning. Unlike fully online courses, hybrid learning provides physical experiences that enhance student engagement (Hentea et al., 2003; Fabian et al., 2024). Educators in this model serve as facilitators, supporting students as needed while supplementing lessons with complementary content.

This approach is characterized by a blend of learning modalities: collective and individual, synchronous and asynchronous, independent and group-based, as well as formal and non-formal. It incorporates lifelong learning principles and collaborative intelligence, leveraging methods and strategies that support diverse educational needs (Qi & Tian, 2011; Nguyen et al., 2013; Solovyeva et al., 2023). Hybrid learning employs flexible time management strategies, including synchronous sessions resembling traditional classes and asynchronous platforms ideal for independent study (Fong & Shan, 2009). Asynchronous tools enable deeper discussions, archived communication, and flexible participation for students with varying schedules (Branon & Essex, 2001; Johnson, 2006).

By combining the strengths of face-to-face and online education, hybrid learning creates a unified learning experience with minimal drawbacks. Benefits include flexible study schedules, synchronous communication for real-time collaboration, and opportunities for independent academic exploration. Students can tailor their learning experiences to their needs, revisiting materials and engaging in asynchronous discourse. Moreover, hybrid learning optimizes resource use by strategically allocating in-person and online activities, ensuring effective lesson delivery. The flexibility and safety offered by hybrid platforms, along with tools for recording and reviewing lectures, ensure that students can access quality education regardless of location or circumstance (Li et al., 2021; Nørgård, 2021).

Hybrid learning is a comprehensive approach. Some students are found face-to-face in a classroom (or conference room, training room, or office kitchen behind a barrier), while others attend sessions virtually. It is important to note that educators provide instruction to their virtual and face-to-face learners simultaneously, virtual learners are not watching the recording or participating in their own time. Instructors will use video conferencing tools to teach remotely and face-to-face simultaneously to assist virtual learners in ensuring everyone has an equal opportunity to get the most out of the course. Hybrid classes must be well thought out in advance, especially with a strong Wi-Fi connection and the right technology to support the sessions.

The online component of hybrid learning is designed to replace face-to-face class time without losing the appeal and effectiveness of face-to-face learning. Remote students must still have the opportunity to interact with the teacher and other students in the classroom, and synchronous, hybrid learning designs allow them to do just that. Students are rushing into full-time online learning in the places worst hit by the pandemic. But once we have a better understanding of how COVID works and spreads, many schools are shifting to a hybrid model, where classrooms see some children attending in person and others calling via video conferencing technology such as Zoom. Teachers deliver the exact instructions to all students, in person and remotely, at

the same time. In the hybrid learning model, face-to-face participants and distance learners all experience the same class simultaneously. Instructors teach them all at once, and video conferencing technology ensures remote learners receive the same experience as students in class.

On the other hand, blended learning finds all students present in person. Instructors design the online section to be extra, it's a way for students to learn independently, away from the classroom setting. Hybrid learning is designed to maintain a balance between online and offline learning, whereas blended learning provides students with online material to complement their classroom experience. Hybrid learning and blended learning share several similarities, particularly in their use of technology to enhance and support educational experiences. However, they differ significantly in their delivery methods. While hybrid learning provides students the flexibility to attend classes either in person or virtually, blended learning requires students to be physically present in the classroom to engage with the instructor (Istenič, 2024).

Table 1

Differences between Hybrid and Blended Learning

	Hybrid Learning	***Blended Learning***
Learn asynchronously	Yes	No
Classroom learning	Yes	Yes
Supports virtual learning platforms	Yes	Yes
Additional materials are available to students at any time	Yes	Yes

As illustrated in the table, the most notable similarity between hybrid learning and blended learning is their shared reliance on technology. Both methodologies utilize virtual learning platforms to support students' educational experiences. However, a significant difference lies in the absence of asynchronous learning in blended learning. In this approach, students are required to attend classes in person, as professors do not record lectures or provide online access for students who are unable to attend or prefer virtual study.

1.1.2. EduQual Dimensions

EduQUAL is a tool adapted from SERVQUAL, designed to assess the quality of education. SERVQUAL itself is a multi-dimensional research instrument used to capture consumer expectations and perceptions of services across five key dimensions that are considered to represent service quality (see Table 2). Built on the expectation-disconfirmation paradigm, SERVQUAL measures the gap between consumers' pre-consumption expectations and their actual perceptions of the service experience (Berry et al., 1988). The tool's value lies in its diagnostic capability, supported by a service quality model that forms the conceptual framework for its development. SERVQUAL has been widely applied across different contexts and cultural settings, gaining recognition as the dominant measurement scale in the field of service quality.

Despite its widespread use and various context-specific applications, SERVQUAL has faced some criticism from researchers. The questionnaire is composed of matched pairs of items, 22 expectation items, and 22 perception items organized into five dimensions believed to align with consumers' mental framework of service quality. These dimensions include tangibles (4 items), reliability (5 items), responsiveness (4 items), assurance (4 items), and empathy (5 items) (Berry et al., 1988). The questionnaire can be administered in various formats: paper, web, or face-to-face interviews. Studies have reported high validity and reliability scores, even with varying sample sizes. Additionally, it is common practice to add demographic information, prior experience with the brand or service, and behavioral intentions (intentions to repurchase, loyalty, and likelihood to recommend) to the questionnaire, expanding it to over 60 items, through the core 22 remain consistent. The face-to-face interview version of the questionnaire typically takes about one hour per respondent, while the paper and web survey versions are generally quicker to complete.

Table 2

Summary of SERVQUAL items

Dimension	**Number of Items**	**Definition**
Reliability	5	The ability to perform the promised service dependably and accurately

Assurance	4	The knowledge and courtesy of employees and their ability to convey trust and confidence
Tangibles	4	The appearance of physical facilities, equipment, personnel, and communication materials
Empathy	5	The provision of caring, individualized attention to customer
Responsiveness	4	The willingness to help customers and provide prompt service

The instrument, developed over five years, underwent extensive testing, pre-testing, and refinement before being finalized. According to its developers, Zeithaml et al. (1993), it is highly reliable and valid. SERVQUAL has been widely used and adapted in service quality research across numerous industries and geographic regions. In practice, researchers often make minor adjustments to the instrument to suit specific contexts, leading to the creation of revised versions with innovative names, such as LibQUAL+ (Cook & Heath, 2001) and EduQual (Mishra et al., 2013). SERVQUAL remains the most widely used tool for measuring service quality due to its simplicity, straightforward structure, and generalizability. However, because service quality is heavily influenced by human behavior, the dimensions of the tool may vary across different service environments. Consequently, SERVQUAL dimensions are often modified to fit the unique requirements of specific sectors. In some cases, the number of dimensions may change, or items within each dimension may be adjusted to better align with particular applications.

In the education sector, the intangibility of services and the lack of physical evidence create additional challenges in evaluating service quality. The perceptions of service quality in education are complex and vary across diverse stakeholders with different backgrounds and behaviors. To address this complexity and provide a comprehensive measurement tool suitable for the education sector, a new instrument, EduQUAL, was developed specifically for assessing the quality of education in technical institutions (see Table 3).

Table 3

Summary of EdQual items

Dimension	Number of Items	Definition
Learning outcomes	6	ability to provide the promised service dependably and accurately
Physical facilities	7	physical facilities, equipment, personnel, and communication material
Personality development	5	overall development of student's personality, enhancement of knowledge
Academics	5	expert faculties, and individualized attention to the customer.
Responsiveness	5	the willingness to help customers and provide prompt service

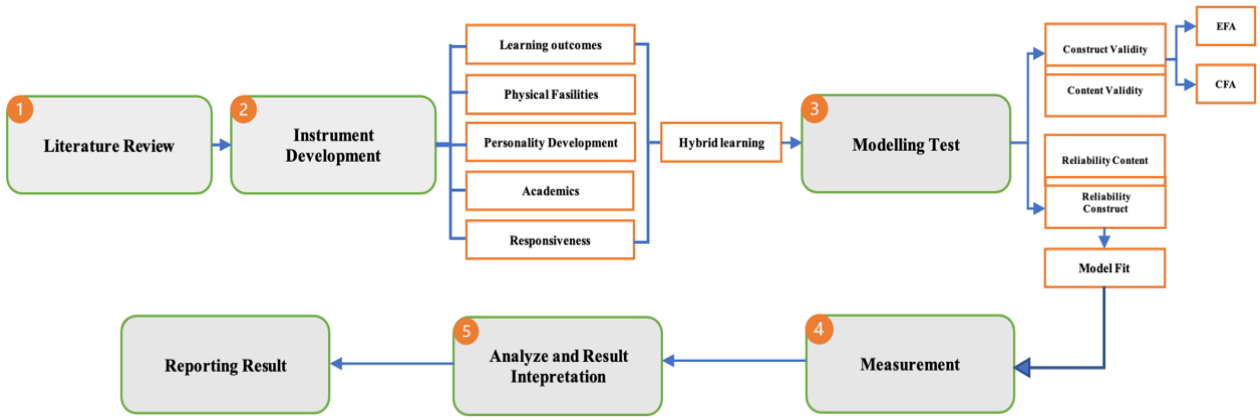
2. METHOD AND MATERIALS

The simple descriptive design was chosen because the data was collected only once.

2.1. Procedure

Figure 1

Research procedure



2.2. Data collection instrument

The research method used in this study is a survey method. In survey research, researchers can choose between simple descriptive, cross-sectional, and longitudinal approaches (Mertens, 2010). At the literature review stage, researchers reviewed theories regarding the dimensions of EduQual and hybrid learning which were developed to measure the quality of education.

2.3. Analysis

EFA and CFA are used to test the validity and reliability of the resulting constructs. At the same time, content validity was carried out by involving ten expert teams regarding hybrid learning and measurement. The resulting model can be seen in A2.

2.4. Participants

After obtaining a fit model, measurements were carried out involving 1040 students in the Faculty of Education. Of the 1040 students who were given a questionnaire, the researchers re-selected students in semesters 3 and 5 who took part in hybrid learning in theoretical courses so that the data to be analyzed involved a total of 457 students. Descriptively, the characteristics of the respondents' answers that were analyzed can be seen in Table 4.

Table 4

Descriptive of Respondent

Gender		Male	Female
Faculty		152	305
Faculty of Education	157		
Faculty of Math and Science	50		
Faculty of Social	62	457	
Faculty of Engineering	73		
Faculty of Language and Art	67		
Faculty of Sport Science	48		
Semester		Third	Fifth
		216	241

3. RESULT

A total of 32 questions related to hybrid learning satisfaction were made for further analysis of the validity and reliability of content and constructs. In the dimensions of learning outcomes, physical facilities, personality development, and academics, they are adjusted to the digital education standards of the FIBAA international accreditation agency. Content validity and reliability were measured using six measurement experts and 4 learning strategy experts. Aiken's V content validity coefficient is used to measure content validity. The results show that the mean value of Aiken's V validity for each item is above 0.850, which means that each item has adequate content validity**.** Meanwhile, content reliability values were analyzed using the multi-rater reliability method (Kappa-Statistics) and showed results exceeding 0.78. So it is concluded that the instrument can be used to test the fit model.

Table 5

Factor Loadings

	Dimensions	Std Loading	Composite Reliability
Learning Outcomes			0,90
LO1	Learning outcomes are conveyed at the beginning of learning according to the study program and courses taken	0,87	
LO2	Learning is tailored to the needs of workers in the field	0,86	
LO3	Learning according to student expectations	0,84	
LO4	All students have the opportunity to play an active role in academic activities	0,82	

	Dimensions	Std Loading	Composite Reliability
LO5	The teaching digitization strategy has been implemented in the classroom	0,86	
LO6	Higher education institutions/ agencies/ faculties inform the public about the concept of digital teaching	0,86	
Physical Facilities			0,94
PF1	Universities/Institutions/Faculties of Higher Education have technical infrastructure that enables the implementation of digital teaching	0,88	
PF2	Lecture halls and seminar rooms are equipped with functional and modern media technology.	0,90	
PF3	Lecturers are equipped with sufficient software and hardware to enable them to design digital teaching programs	0,87	
PF4	Availability of an excellent internet connection and fast Wi-Fi with adequate capacity	0,87	
PF5	Technicians are available to solve problems with facilities and infrastructure that are experiencing problems	0,88	
PF6	Availability of lecture e-modules according to the courses taken	0,92	
PF7	The learning media used supports hybrid learning	0,94	
Personality Development			0,88
PD1	Learning is done by emphasizing the character values needed by students	0,86	
PD2	Learning that is carried out on student skills according to job requirements in the field	0,84	
PD3	Learning orientation is not only on the element of knowledge	0,88	
PD4	Learning is done to increase my knowledge more broadly	0,88	
PD5	I learned a lot about what to do and what not to do according to my future profession	0,85	
Academics			0,96
A1	Universities/Institutions/Faculties of Higher Education use digital learning methods aligned with the didactic concept.	0,90	
A2	Students receive adequate academic support.	0,92	
A3	Adequate numbers of e-tutors/e-mentors are available for all students	0,90	
A4	Universities/advanced education Institutions/faculties provide various forms of communication to support students (e.g., digital, telephone, face-to-face)	0,88	
A5	Competency-oriented online exam formats (e.g., online presentations, learning portfolios, digital learning diaries)	0,90	
Responsiveness			0,87
R1	Lecturers quickly respond to student needs in learning	0,86	
R2	Lecturers are open to questions from students	0,84	
R3	Lecturers quickly assess all student work	0,84	
R4	The available technicians can solve problems with facilities and infrastructure that are experiencing problems	0,85	
R5	Academic services evaluate and follow up on input from users on the quality of learning regularly	0,90	
Hybrid Learning Satisfaction			0,92
HL1	The teaching platform is structured and designed to be easy to use	0,88	
HL2	Digital media is used in text, video, and audio formats.	0,88	
HL3	The materials are prepared in a user-friendly manner and encourage students to continue learning on their own.	0,87	
HL4	Interaction takes place both in class and online learning at home	0,89	

The *Covariance Analysis of Linear Structural Equations* (CALIS) procedure was used to assess the construct validity using the SmartPLS application. The results show that all items in the developed questionnaire are acceptable concerning Chornbach's alpha value > 0.70 (see Table. 5). It is the same as the composite reliability value on the *hybrid learning* dimension, which shows the number 0.92. It indicates that improvement on each item that is constructed is not needed.

Furthermore, empirically tested the instrument through convergent and discriminant validity. The t-test assesses convergent validity on the factor loadings formed. In this case, the loading factor is set as suggested by the application. The results show a significant t-test value with a p-value <0.000. This shows that all indicators in the variable provide a good measurement value for the construction being built. These results generally support the convergent validity of each indicator (Anderson & Gerbing, 1988). Convergent validity can also be seen from the average extracted variance value (AVE value). The AVE value is at least 0.500, or the square of the AVE value is at least 0.707. In this case, the square root value of AVE (shown in italics as the diagonal element of Table 6) varies from 0.800 to 0.964.

Meanwhile, in testing the value of discriminant validity, the researcher first considered the correlation between variables (see Table 6). The discriminant validity finding is further supported by the relatively small between-item correlations and the significant differences observed between each variable's square roots of the average extracted variance (AVE). We examined the extracted mean of variance (AVE) as a measure of discriminant validity. This method considers its constructs different if the AVE exceeds their common variance. The square root of the AVE for a given construct must be greater than the absolute standard correlation value of the given construct with the other constructs in the analysis (Anderson & Gerbing, 1988).

Table 6

AVE Values (Correlation Matrix)

	LO	PF	PD	A	R	HL
LO	**0,876**					
PF	0,850	**0,921**				
PD	0,827	0,905	**0,964**			
A	0,792	0,889	0,932	**0,889**		
R	0,740	0,856	0,917	0,840	**0,800**	
HL	0,689	0,820	0,884	0,811	0,782	**0,940**

p-value < 0,000

This study's structural model suitability criteria include; 1) path coefficient, 2) composite reliability, c) Cronbach's Alpha, and R^2 value. If the Cronbach's Alpha value is > 0.800, the composite reliability value is > 0.700, and the R^2 value is more than 0.67, then the model is acceptable. The composite reliability value in the model that the researcher proposes is between 0.87 and 0.96. The R^2 value for the quality of hybrid learning is 0.886. Our model is considered substantial based on Chin's (1998) three quality criteria. Figure in **A2.** Shows all significant path coefficient values with the criterion of p <0.05 (using a bootstrap routine with 457 samples).

Researchers use score categories to determine the quality of hybrid learning conducted in tertiary institutions. Like the range (R), the standard deviation (SD) can also be viewed as a distance measure. Therefore SD can be used as a tool for making classifications. For example, in a normal distribution, people assume that R (the distance from the lowest value to the highest value) = 6 SD, 3 SD below M, and 3 SD above M. Even though it is below M - 3 SD and above M + 3 SD, it is still a frequency or proportion, but because it is very small, people ignore its existence (Firmansyah et al., 2020). Each distribution can be divided into 3 or 5 classifications. The three classifications are, for example, high (T), medium (S), and low (R), so those included in the low classification (R) are values below M – 1 SD, which are classified as medium (S) are values that lie between M – 1 SD to M + 1 SD. Those included in the high classification (T) are values that are above M + 1 SD. If you make it into five categories, for example, very high (ST), high (T), moderate (S), low (R), and very low (SR), then the interval for each classification is 6 SD: 5 = 1.2 SD.

Table 7

Hybrid learning quality category score

No.	Formula	Range	Category Score
1.	x > M +1.8 SD	x > 5.80	Very Good
2.	M + 0.6 SD < x ≤ M + 1.8 SD	4.60 < x ≤ 5.80	Good
3.	M – 0.6 SD ≤ x ≤ M + 0.6 SD	3.40 < x ≤ 4.60	Moderate
4.	M – 1.8 SD ≤ x ≤ M – 0.6 SD	2.20 < x ≤ 3.40	Low
5.	x < M – 1.8 SD	x < 1.00	Very Low

Table 8

Crosstabs Average per Dimensions

Dimension	Gender		Semester		Faculty					
	F	M	Third	Fifth	1	2	3	4	5	6
Learning outcomes	4.01	3.99	4.03	3.98	3.97	4.21	3.97	3.97	4.02	3.94
Physical facilities	4.00	3.98	4.01	3.97	3.98	4.14	4.09	3.98	3.88	3.91
Personality development	3.98	4.04	4.04	3.96	4.06	4.00	4.17	3.91	4.01	3.69
Academics	3.97	3.94	3.98	3.94	3.95	4.12	3.84	4.04	3.92	3.90
Responsiveness	4.06	3.94	3.99	4.05	3.94	4.11	3.90	4.07	3.91	4.45
Hybrid Learning Satisfaction	4.05	3.92	3.96	4.05	3.92	4.10	4.00	3.97	4.17	4.09

1 = Faculty of Education
2 = Faculty of Math and Science
3 = Faculty of Social
4 = Faculty of Engineering
5 = Faculty of Language and Art
6 = Faculty of Sport Science

Based on the survey results in Table 8, the overall average of hybrid learning conducted in tertiary institutions is in the "moderate" category, both male and female students, those currently in their third and fifth semesters, and all faculties at Yogyakarta State University. This shows the need to improve the quality of hybrid learning carried out by lecturers and universities. The increase is not only in the ability of lecturers to use the hybrid learning model, but physical facilities such as internet networks, software, and hardware need to be optimized.

4. DISCUSSION

Content validity is assessed to ensure that the questionnaire's content is relevant and appropriate for the research objectives. It demonstrates that the content comprehensively represents all the attributes being studied. Typically, content validity is evaluated by seven or more experts (Devon et al., 2007). The estimation of content validity involves a thorough and systematic review of the test items to determine how well they align with the content domain and identify any items that do not fit (Kowsalya et al., 2012). Based on the content validity assessment, all items in the instrument were found to have adequate content validity. Meanwhile, content reliability measurements show that the average item is acceptable. Kappa statistics or interrater reliability is a measure used to test agreement between two people (evaluators/observers) on categorical variables. If there are more than two raters, the multi-rater Kappa technique can be used. The statistical measure of inter-rater reliability was Cohen's Kappa which generally ranged from 0 to 1.0 (although negative numbers are possible), where a large number indicates better reliability. A value closer to or less than zero indicates agreement by chance alone. In this study, content validity was above the average of 0.85. Meanwhile, the reliability value tested through the multi-rater showed an average of above 0.78. This indicates that, in the opinion of experts, the instrument developed is feasible for use at the following research stage.

In the process of construct validity and reliability, it was found that the instrument can be used to measure the quality of hybrid learning in terms of student perceptions in various tertiary institutions. This is shown in the fulfillment of construct validity and reliability criteria which researchers analyzed through exploratory (EFA) and confirmatory (CFA) factor analysis. Factor analysis is a method used to simplify complex interrelated actions in an orderly manner. Traditionally, it has been employed to explore the potential structures underlying a set of interrelated variables without imposing any predefined structures on the results (Child, 1990). Exploratory Factor Analysis (EFA) helps identify the number of constructs and the underlying factor structure. In contrast, Confirmatory Factor Analysis (CFA) is a statistical technique used to validate the factor structure of observed variables. CFA enables researchers to test the hypothesis that a relationship exists between observed variables and their underlying latent constructs. In this process, the researcher uses theoretical knowledge, empirical research, or both to hypothesize the pattern of relationships in advance and then tests this hypothesis statistically.

5. CONCLUSION

The survey results on the quality of hybrid learning using EduQual show that the overall average of hybrid learning conducted in tertiary institutions is in the "moderate" category for both male and female students in their third and fifth semesters. This shows the need to improve the quality of hybrid learning conducted by lecturers and universities. This increase is not only in the ability of lecturers to use the hybrid learning model, but physical facilities such as internet networks, software, and hardware need to be optimized. Suggestions for further research require adjustments to the dimensions of learning outcomes which are still general and refer to digital education standards from the international accreditation body FIBAA. It would be much better if learning outcomes were determined according to the majors taken by students. In addition, qualitative research is needed to get a more concrete picture to improve the quality of hybrid learning from the user's point of view. In addition, the instrument also needs to be developed so that it can involve all parties, both lecturers and teaching staff.

Based on the analysis of EFA and CFA, it can be concluded that the model developed by the researcher meets the criteria of construct validity and reliability. On the validity and reliability of the content involving experts, it was also concluded that the instrument was acceptable. The instrument can measure the quality of hybrid learning in tertiary institutions. Meanwhile, the results of a survey using the EduQual instrument developed regarding the quality of hybrid learning conducted for one semester after the pandemic were included in the moderate category. This shows the need to improve the quality of hybrid learning conducted by lecturers and universities. This increase is not only in the ability of lecturers to use the hybrid learning model, but physical facilities such as internet networks, software, and hardware need to be optimized.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: The study adheres to the ethical guidelines for conducting research.

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REFERENCES

Alexander, M. M., Lynch, J. E., Rabinovich, T., & Knutel, P. G. (2014). Snapshot of a hybrid learning environment. *Quarterly Review of Distance Education*, *15*(1).

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, *103*(3), 411. https://psycnet.apa.org/record/1989-14190-001

Anthony Jnr, B. (2024). Examining Blended Learning Adoption Towards Improving Learning Performance in Institutions of Higher Education. *Tech Know Learn 29*, 1401–1435 https://doi.org/10.1007/s10758-023-09712-3

Firmansyah, Munandi, S., Prasojo L.D. & Jaedun, A. (2025). The quality of hybrid learning in higher education using EduQual. *World Journal on Educational Technology: Current Issues*, *17*(1), 32-48. https://doi.org/10.18844/wjet.v17i1.8586

Bell, J., Sawaya, S., & Cain, W. (2014). Synchromodal classes: Designing for shared learning experiences between face-to-face and online students. *International Journal of Designs for Learning*, *5*(1). https://www.learntechlib.org/p/209656/

Berry, L. L., Parasuraman, A., & Zeithaml, V. A. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, *64*(1).

Bower, M., Dalgarno, B., Kennedy, G. E., Lee, M. J., & Kenney, J. (2015). Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers & Education*, *86*, 1-17. https://www.sciencedirect.com/science/article/pii/S0360131515000755

Branon, R. F., & Essex, C. (2001). Synchronous and asynchronous communication tools in distance education. *TechTrends*, *45*(1), 36-36. https://search.proquest.com/openview/d88700f51bc3656624839ee85ce6a2ae/1?pq-origsite=gscholar&cbl=40581

Cain, W. (2015). Technology navigators: An innovative role in pedagogy, design, and instructional support. *Educational innovations and contemporary technologies: Enhancing teaching and learning*, 21-35. https://link.springer.com/chapter/10.1057/9781137468611_2

Child, D. (1990). *The Essentials of Factor Analysis (2nd ed.)*. Cassell Educational Ltd.

Cook, C., & Heath, F. M. (2001). Users' perceptions of library service quality: A LibQUAL+ qualitative study. *Library Trends*, *49*(4).

De Oliveira, O. J., & Ferreira, E. C. (2009). Adaptation and application of the SERVQUAL scale in higher education. In *Proceedings of POMS 20th Annual Conference Orlando, Florida USA,* 1-20. https://pomsmeetings.org/ConfProceedings/011/FullPapers/011-0072.pdf

DeVon, H. A., Block, M. E., Moyle-Wright, P., Ernst, D. M., Hayden, S. J., Lazzara, D. J., ... & Kostas-Polston, E. (2007). A psychometric toolbox for testing validity and reliability. *Journal of Nursing Scholarship*, *39*(2), 155-164. https://sigmapubs.onlinelibrary.wiley.com/doi/abs/10.1111/j.1547-5069.2007.00161.x

Fabian, K., Smith, S., & Taylor-Smith, E. (2024). Being in Two Places at the Same Time: a Future for Hybrid Learning Based on Student Preferences. *TechTrends*, 1-12. https://link.springer.com/article/10.1007/s11528-024-00974-x

Firmansyah, F., Rahayu, W., & Nurjannah, N. (2020). Evaluation of the entrepreneurship education program through extracurricular activities of the Student Company. *Jurnal Penelitian Dan Evaluasi Pendidikan*, *24*(1), 51-61. https://journal.uny.ac.id/index.php/jpep/article/view/19783

Fong, J., & Shan, W. J. (2009). Hybrid Learning and Education: Preface. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 5685 LNCS*.

Hentea, M., Shea, M. J., & Pennington, L. (2003). A perspective on fulfilling the expectations of distance education. In *Proceedings of the 4th conference on Information Technology Curriculum,* 160-167. https://dl.acm.org/doi/abs/10.1145/947121.947158

Hudson, B., Hunter, D., & Peckham, S. (2019). Policy failure and the policy-implementation gap: can policy support programs help? *Policy design and practice*, *2*(1), 1-14. https://www.tandfonline.com/doi/abs/10.1080/25741292.2018.1540378

Istenič, A. (2024). Blended learning in higher education: the integrated and distributed model and a thematic analysis. *Discover Education*, *3*(1), 165. https://link.springer.com/article/10.1007/s44217-024-00239-y

Johnson, G. (2006). Synchronous and asynchronous text-based CMC in educational contexts: A review of recent research. *TechTrends: Linking Research & Practice to Improve Learning*, *50*(4). http://jan.ucc.nau.edu/~ct68/ETC599DE/Johnson-2006,%20Synchronous%20and%20Asynchronous%20CMC.pdf

Firmansyah, Munandi, S., Prasojo L.D. & Jaedun, A. (2025). The quality of hybrid learning in higher education using EduQual. *World Journal on Educational Technology: Current Issues*, *17*(1), 32-48. https://doi.org/10.18844/wjet.v17i1.8586

Kee, T., Kuys, B., & King, R. (2024). Generative artificial intelligence to enhance architecture education to develop digital literacy and holistic competency. *Journal of Artificial Intelligence in Architecture*, *3*(1), 24-41. https://ojs.uajy.ac.id/index.php/JARINA/article/view/8347

Kowsalya, D. N., Venkat Lakshmi, H., & Suresh, K. P. (2012). Development and Validation of a Scale to Assess Self-Concept in Mild Intellectually Disabled Children. *International Journal of Social Sciences & Education*, *2*(4).

Li, Q., Li, Z., & Han, J. (2021). A hybrid learning pedagogy for surmounting the challenges of the COVID-19 pandemic in performing arts education. *Education and Information Technologies*, *26*(6), 7635-7655. https://link.springer.com/article/10.1007/s10639-021-10612-1

Marcellis, M., Frerejean, J., Bredeweg, B., Brand-Gruwel, S., & van Merrienboer, J. J. (2024). Motivating students in competency-based education programs: designing blended learning environments. *Learning Environments Research*, 1-16. https://link.springer.com/article/10.1007/s10984-024-09500-5

Mertens, D. M. (2010). Transformative mixed methods research. *Qualitative inquiry*, *16*(6), 469-474. https://journals.sagepub.com/doi/abs/10.1177/1077800410364612

Mishra, P., Satapathy, S., & Patel, S. K. (2013). A methodology for evaluation of e-electricity service quality using neural networks. *International Journal of Indian Culture and Business Management*, *7*(2), 152-170. https://www.inderscienceonline.com/doi/abs/10.1504/IJICBM.2013.055502

Nguyen, N. T., Kowalczyk, R., & Xhafa, F. (Eds.). (2013). *Transactions on Computational Collective Intelligence XI*. Springer Berlin Heidelberg. https://link.springer.com/content/pdf/10.1007/978-3-642-32066-8.pdf

Nørgård, R. T. (2021). Theorizing hybrid lifelong learning. *British Journal of Educational Technology*, *52*(4), 1709-1723. https://bera-journals.onlinelibrary.wiley.com/doi/abs/10.1111/bjet.13121

Qi, L. S., & Tian, A. K. (2011). Design and application of a hybrid learning platform based on Joomla. In *Advances in Computer Science and Education Applications: International Conference, CSE 2011, Qingdao, China, July 9-10, 2011. Proceedings, Part II* (pp. 549-556). Springer Berlin Heidelberg. https://link.springer.com/chapter/10.1007/978-3-642-22456-0_79

Roseth, C., Akcaoglu, M., & Zellner, A. (2013). Blending synchronous face-to-face and computer-supported cooperative learning in a hybrid doctoral seminar. https://link.springer.com/article/10.1007/s11528-013-0663-z

Solovyeva, N., Tapalova, O., & Smirnov, S. (2023). Specifics of the student's critical thinking formation within active learning space. In *Frontiers in Education, 8*, 1132525. https://www.frontiersin.org/articles/10.3389/feduc.2023.1132525/full

Srivastava, A., Thomson, S. B., Barnett-Page, E., Thomas, J., Carroll, C., Booth, A., Cooper, K., Dixon-Woods, M., Framework, S. B., Tyler, K. C., David, V., Smith, J., & Firth, J. (2009). Framework Analysis : A qualitative methodology for applied policy research. *BMC Medical Research Methodology*, *4*(2).

Yousapronpaiboon, K. (2014). SERVQUAL: Measuring higher education service quality in Thailand. *Procedia-Social and Behavioral Sciences*, *116*, 1088-1095. https://www.sciencedirect.com/science/article/pii/S187704281400367X

Zeithaml, V.A. Parasuraman, A. & Berry, L. L. (1993). Delivering quality service; Balancing customer perceptions and expectations. *British Journal of Marketing Studies*, *3*(3).

Appendix

A1. Instrument EduQual

Identity

Name : _____
Department : _____
Semester : _____
Gender : _____

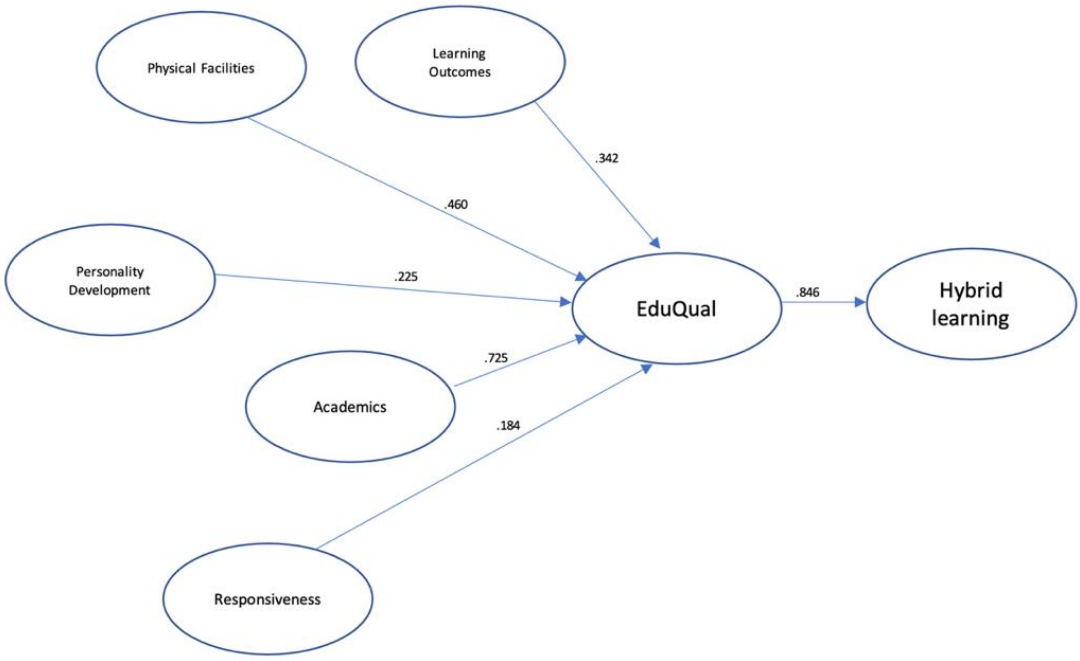
Scale:

1 = Strongly disagree
3 = Neutral
7 = Strongly agree

No.	Questions	Answer						
		1	2	3	4	5	6	7
1	Learning outcomes are conveyed at the beginning of learning according to the study program and courses taken.							
2	Learning is tailored to the needs of workers in the field.							
3	Learning according to student expectations							
4	All students have the opportunity to play an active role in academic activities.							
5	The teaching digitization strategy has been implemented in the classroom.							
6	Higher education institutions/ agencies/ faculties inform the public about the concept of digital teaching.							
7	Universities/Institutions/Faculties of Higher Education have technical infrastructure that enables the implementation of digital teaching.							
8	Lecture halls and seminar rooms are equipped with functional and modern media technology.							
9	Lecturers are equipped with sufficient software and hardware to enable them to design digital teaching programs.							
10	Availability of an excellent internet connection and fast Wi-Fi with adequate capacity							
11	Technicians are available to solve problems with facilities and infrastructure that are experiencing problems.							

No.	Questions	Answer						
		1	2	3	4	5	6	7
12	Availability of lecture e-modules according to the courses taken							
13	The learning media used supports hybrid learning.							
14	Learning is done by emphasizing the character values needed by students.							
15	Learning that is carried out on student skills according to job requirements in the field							
16	Learning orientation is not only on the element of knowledge.							
17	Learning is done to increase my knowledge more broadly.							
18	I learned a lot about what to do and what not to do according to my future profession.							
19	Universities/Institutions/Faculties of Higher Education use digital learning methods aligned with the didactic concept.							
20	Students receive adequate academic support.							
21	Adequate numbers of e-tutors/e-mentors are available for all students.							
22	Universities/advanced education Institutions/faculties provide various forms of communication to support students (e.g., digital, telephone, face-to-face)							
23	Competency-oriented online exam formats (e.g., online presentations, learning portfolios, digital learning diaries)							
24	Lecturers quickly respond to student needs in learning.							
25	Lecturers are open to questions from students.							
26	Lecturers quickly assess all student work.							
27	The available technicians can solve problems with facilities and infrastructure that are experiencing problems.							
28	Academic services evaluate and follow up on input from users on the quality of learning regularly.							
29	The teaching platform is structured and designed to be easy to use							
30	Digital media is used in text, video, and audio formats.							
31	The materials are prepared in a user-friendly manner and encourage students to continue learning on their own.							
32	Interaction takes place both in class and online learning at home.							

A2. Model Fit



A3. Crosstab Analysis

Descriptive Statistics

	LOR		PFR		PDR		AR		RR		HLR	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Valid	305	152	305	152	305	152	305	152	305	152	305	152
Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean	4.009	3.986	3.995	3.976	3.976	4.041	3.967	3.939	4.062	3.939	4.052	3.921
Std. Deviation	0.801	0.841	0.752	0.777	0.913	0.878	0.895	0.872	0.917	0.911	1.017	0.985
Minimum	1.830	2.000	2.000	1.860	1.600	1.200	1.400	1.800	1.600	2.000	1.750	1.750
Maximum	6.330	6.170	6.000	5.710	6.000	5.600	6.600	6.000	6.400	6.000	6.750	6.750

Descriptive Statistics

	LOR		PFR		PDR		AR		RR		HLR	
	Fifth	Third	Fifth	Third	Fifth	Third	Fifth	Third	Fifth	Third	Fifth	Third
Valid	241	216	241	216	241	216	241	216	241	216	241	216
Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean	3.975	4.031	3.973	4.006	3.963	4.036	3.938	3.981	4.054	3.985	4.050	3.963
Std. Deviation	0.790	0.841	0.740	0.783	0.905	0.898	0.890	0.884	0.923	0.909	1.029	0.983
Minimum	2.000	1.830	2.000	1.860	1.600	1.200	1.400	1.800	1.600	1.600	1.750	1.750
Maximum	6.330	6.170	6.000	5.710	6.000	5.800	6.600	6.400	6.400	6.200	6.750	6.750

Descriptive Statistics

	LOR					
	Faculty of Education	Faculty of Engineering	Faculty of Language and Art	Faculty of Math and Science	Faculty of Social	Faculty of Sport and Science
Valid	157	75	67	50	62	46
Missing	0	0	0	0	0	0
Mean	3.974	3.969	4.018	4.213	3.968	3.938

Descriptive Statistics

	LOR					
	Faculty of Education	**Faculty of Engineering**	**Faculty of Language and Art**	**Faculty of Math and Science**	**Faculty of Social**	**Faculty of Sport and Science**
Std. Deviation	0.839	0.794	0.848	0.864	0.765	0.716
Minimum	2.000	2.330	2.170	1.830	2.330	2.000
Maximum	6.170	6.000	6.330	5.670	5.330	5.500

Descriptive Statistics

	PFR					
	Faculty of Education	**Faculty of Engineering**	**Faculty of Language and Art**	**Faculty of Math and Science**	**Faculty of Social**	**Faculty of Sport and Science**
Valid	157	75	67	50	62	46
Missing	0	0	0	0	0	0
Mean	3.976	3.978	3.881	4.140	4.090	3.907
Std. Deviation	0.772	0.784	0.748	0.769	0.785	0.643
Minimum	1.860	2.140	2.000	2.430	2.000	2.290
Maximum	5.710	6.000	5.710	5.570	5.430	5.000

Descriptive Statistics

	PDR					
	Faculty of Education	**Faculty of Engineering**	**Faculty of Language and Art**	**Faculty of Math and Science**	**Faculty of Social**	**Faculty of Sport and Science**
Valid	157	75	67	50	62	46
Missing	0	0	0	0	0	0
Mean	4.056	3.909	4.012	4.004	4.168	3.687
Std. Deviation	0.887	0.877	0.897	0.965	0.819	0.986
Minimum	1.200	2.200	1.600	2.200	2.200	1.600
Maximum	5.600	5.800	6.000	5.800	6.000	5.800

Descriptive Statistics

	AR					
	Faculty of Education	**Faculty of Engineering**	**Faculty of Language and Art**	**Faculty of Math and Science**	**Faculty of Social**	**Faculty of Sport and Science**
Valid	157	75	67	50	62	46
Missing	0	0	0	0	0	0
Mean	3.948	4.043	3.919	4.116	3.842	3.896
Std. Deviation	0.870	0.884	0.836	0.962	0.821	1.020
Minimum	1.800	1.400	1.600	2.400	2.000	1.800
Maximum	6.000	5.800	5.400	6.400	6.200	6.600

Descriptive Statistics

	RR					
	Faculty of Education	**Faculty of Engineering**	**Faculty of Language and Art**	**Faculty of Math and Science**	**Faculty of Social**	**Faculty of Sport and Science**
Valid	157	75	67	50	62	46
Missing	0	0	0	0	0	0
Mean	3.938	4.069	3.913	4.112	3.900	4.452

Descriptive Statistics

	RR					
	Faculty of Education	**Faculty of Engineering**	**Faculty of Language and Art**	**Faculty of Math and Science**	**Faculty of Social**	**Faculty of Sport and Science**
Std. Deviation	0.914	0.762	0.934	0.896	0.915	1.049
Minimum	2.000	2.400	1.600	1.600	2.000	2.200
Maximum	6.000	5.600	6.200	6.000	6.200	6.400

Descriptive Statistics

	HLR					
	Faculty of Education	**Faculty of Engineering**	**Faculty of Language and Art**	**Faculty of Math and Science**	**Faculty of Social**	**Faculty of Sport and Science**
Valid	157	75	67	50	62	46
Missing	0	0	0	0	0	0
Mean	3.919	3.967	4.168	4.100	3.984	4.087
Std. Deviation	0.986	0.950	1.168	1.006	0.900	1.070
Minimum	1.750	1.750	2.000	2.000	2.500	2.000
Maximum	6.750	6.000	6.750	6.000	6.250	6.750