



Assessing Forum-Based Asynchronous Learning's Role in Student Engagement and Performance at BINUS University

(Jakarta, Bekasi, Alam Sutera)



Meet The Team

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Introduction

This study investigates the effectiveness of **asynchronous, forum-based discussions** in higher education, distinct from other online learning methods. Asynchronous learning is now a core part of university curricula, but its impact is debated; benefits include **flexibility and critical thinking**, while concerns involve **student motivation, passive participation, and delayed feedback**. The aim is to provide **empirical evidence** on forum-based discussions by analyzing student participation, perceptions, and academic results. Ultimately, the goal is to inform best practices for **digital pedagogy** and enhance student engagement and academic success in online courses.



Question Design

Main Variables and Mapping



Question Design

Measurements



Demographic Profiling

To understand the composition of the 252 respondents. Questions on cohort, faculty, and campus region created a clear participant profile, which was essential for identifying the sample's skew towards specific groups like the School of Computer Science and the Kemanggisan campus.

Enabling Advanced Analysis

Demographic data was crucial for comparative analysis between student subgroups, such as by faculty or campus. This data also provided the foundation for post-stratification weighting, a statistical method used to correct for sample imbalance and improve the generalizability of the findings.

Ensuring Data Validity

A screening question was used to filter participants, ensuring that only students with direct experience in asynchronous forums were included in the in-depth analysis. This methodological step was vital for maintaining the quality and relevance of the collected data by excluding respondents who could not provide informed answers.

Providing Deeper Context

Questions about learning preferences (e.g., quiet rooms, watching videos) were included to understand the broader learning environment. This contextual data helps explain why engagement in text-based forums might vary and provides a richer interpretation of the study's primary findings on student behavior.

Sample Design

⌘ Sampling Method: Two-Stage Cluster Sampling

- Stage 1 (Cluster): Selecting the 3 main campuses (Kemanggisan, Alam Sutera, Bekasi) as clusters.
- Stage 2 (Random): Drawing a random and proportional sample of students from within each cluster.

⌘ Sample Size

- Initial Calculation: 385 respondents (using Cochran's formula, 95% confidence, 5% margin of error).
- Design Adjustment: Adjusted with a Design Effect (DEFF) of 1.75.
- Ideal Sample Target: 674 students.
- Final Collected Sample: 224 valid responses (acknowledged as a study limitation).



Sample Design

Ξ Sampling Process

- Sampling Frame: Students at the 3 campuses with experience in asynchronous online learning.
- Distribution Method: Participation invitations were sent via online survey links distributed in large student group chats and academic communication channels.
- Random Element: Every student within those groups had an equal opportunity to respond.

Ξ Data Quality & Limitations

- Representation Error:
 - Coverage Error: The final sample (224) was far below the target (674).
 - Some campuses were underrepresented.
- Risk of Bias: Selection Bias & Non-response Bias due to voluntary participation (students who were more interested were more likely to respond).
- Quality Improvement Efforts:
 - Conducted a pre-test to improve the measurement instrument.
 - Examples of improvements: Removing redundant questions, clarifying ambiguous terminology, and correcting conceptual errors.



Data Collection

Data was collected via an online Google Forms survey over five weeks (May 5 - June 11, 2025). The survey was distributed in two waves, starting with broad distribution in student group chats. Due to a low initial response, a second wave was launched using direct, private messages to boost participation, ultimately yielding 252 responses from an estimated 1,271 invited individuals.

May						
Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

June						
Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

VALIDITY CALCULATION

⌘ Exploratory Factor Analysis (EFA).

Validity Calculation Process:

FactorAnalyzer package in Python

1. **Data Suitability Checks: Bartlett's Test of Sphericity** and the Kaiser-Meyer-Olkin (KMO)
2. **Factor Extraction:** identifies latent constructs (factors) that explain the shared variance among the items.
3. **Factor Retention:** The number of factors to retain was determined based on the **eigenvalue-greater-than-one** criterion and analyzed via a scree plot.
4. **Factor Rotation: Varimax rotation** was applied to simplify the factor structure, making it easier to interpret.

$$X = AF + \epsilon$$

Where:

- X = observed data.
- Λ = factor loading matrix.
- F = factor score vector.
- ϵ = unique variance or error.

RELIABILITY AND QUALITY CHECK

⌘ What is Reliability?

1. Refers to the consistency or repeatability of a measurement instrument (e.g., a questionnaire).
2. Its purpose is to ensure the measurement tool yields dependable results under consistent conditions.

⌘ Analysis Process Performed

1. Platform: Analysis was performed programmatically using the pingouin package in Python.
2. Data Preparation:
 - a. All Likert-scale responses were treated as ordinal numeric data (e.g., a 1-5 scale).
 - b. Reverse-coded items were re-aligned to ensure directional consistency.
3. Key Computations:
 - a. Overall Alpha: To determine the reliability of the entire set of items.
 - b. Alpha-if-Item-Deleted: To identify inconsistent items that could potentially reduce the scale's reliability.

⌘ Method Used: Cronbach's Alpha (α)

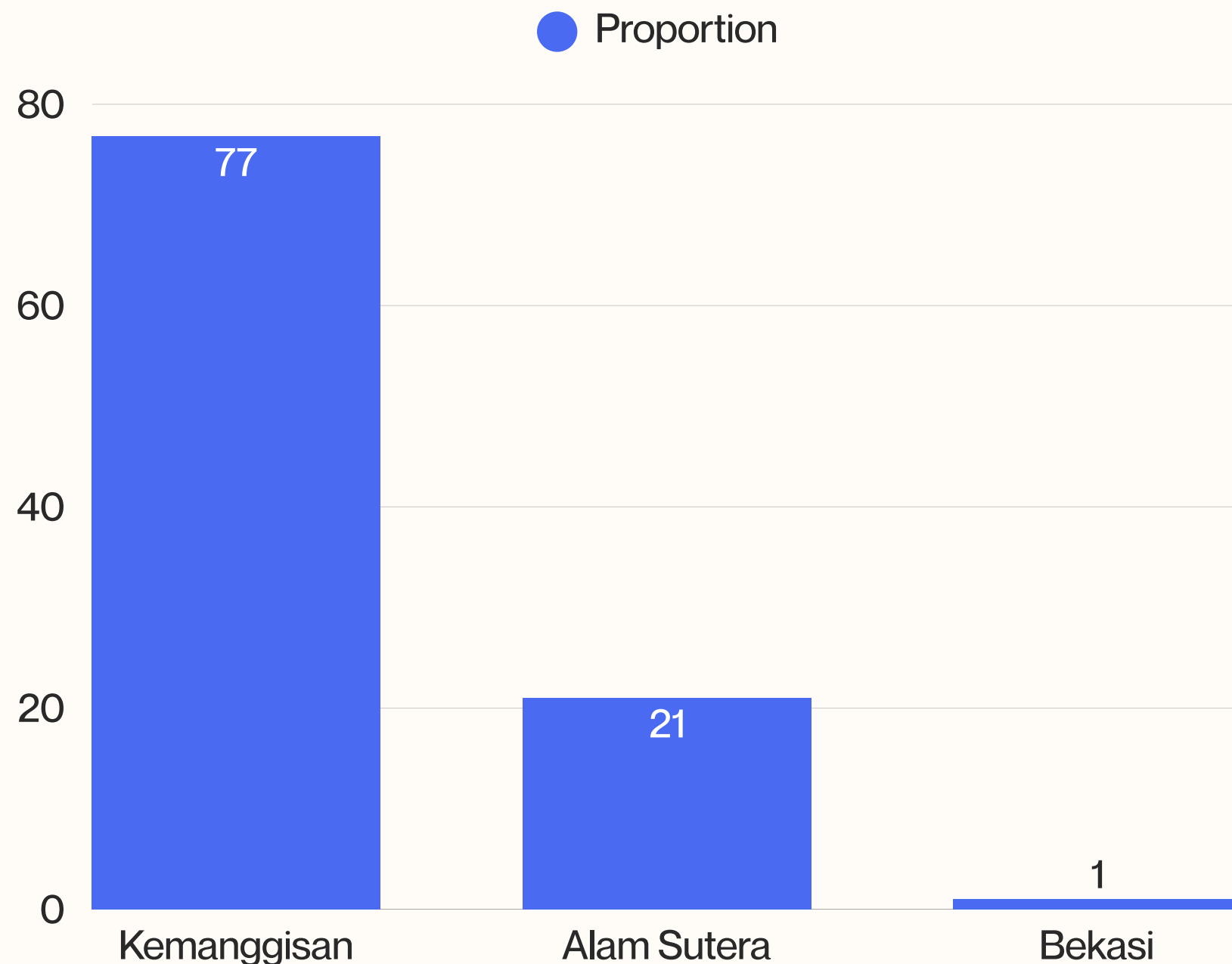
1. A standard approach for measuring the internal consistency reliability of Likert-scale items.
2. Cronbach's Alpha Formula:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum_{i=1}^k \sigma_i^2}{\sigma_T^2} \right)$$

⌘ Conclusion on Reliability

1. The survey's internal consistency was robustly evaluated using Cronbach's Alpha (α).
2. This result ensures that all survey items consistently measure the same construct.
3. Final Conclusion: The survey instrument is proven to be RELIABLE, and the resulting data is dependable for further analysis.

Data Analysis



⚠ Heavy Concentration of CS students

There was a heavy concentration of students from the Class of 2027, the School of Computer Science, and the Kemanggisan campus. This indicates that the sample is not fully representative of the broader student population.

⚠ Forum-Based Learning as a Widely Used Tool

The data confirmed that forum-based learning is a widely used tool within this sample, with 88.9% of respondents having participated in forum discussions.

Preprocessing

⌘ Post-Stratification Weighting

To address the significant demographic imbalances in the sample, a post-stratification weighting method was applied to the Likert-scale responses. This crucial step was taken to ensure the findings more accurately represented the true student population and to prevent the overrepresented groups from skewing the results.

⌘ Potential Volatility in Analysis

The process adjusted each respondent's influence based on their group's actual prevalence in the national **PDDikti** higher education database. While this weighting was necessary to correct for sampling bias, it resulted in some underrepresented subgroups receiving disproportionately high weights.



Conclusion



The study found that while asynchronous forums at BINUS University are **valued**, student engagement is often **superficial and compliance driven**. **Active instructors** are crucial for quality discussion, and the format raises **equity concerns** for less self-directed students.

Acknowledging **limitations** like a **low response rate** and **skewed sample**, future research will **improve robustness** by seeking a **more balanced sample**, **integrating qualitative data** (like interviews), and **refining its statistical methods**.





Thank You

So Much

