



# A quasi-experimental study on the impact of simulation-based learning on toefl performance in undergraduate nursing programs

Dhaniel Prasetyo Irianto<sup>1</sup>, Emi Nurniati<sup>2</sup>

<sup>1,2</sup> Analis Kesehatan, Universitas Noor Huda Mustofa, Jawa Timur, Indonesia

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## ABSTRACT

This study investigates the effectiveness of Simulation-Based Learning (SBL) in improving the TOEFL performance of undergraduate nursing students, a growing need in nursing education due to increasing global competency demands. The research aims to determine the impact of SBL on overall TOEFL scores and its sectional components listening, structure, and reading as well as to compare these outcomes with conventional TOEFL instruction. A quasi-experimental design with a non-equivalent control group was employed, involving 60 nursing students from the Faculty of Health at Noor Huda Mustofa University. The experimental group received four sessions of SBL-based instruction, while the control group followed traditional TOEFL preparation. TOEFL ITP-style tests were administered as pre- and post-tests to assess performance changes. The results showed significant score improvements in both groups; however, the experimental group achieved substantially higher gains across all components. Paired t-tests confirmed significant within-group improvements, and independent t-tests revealed significant post-test differences favoring the SBL group, with the largest effect size found in the structure component. The findings indicate that SBL creates an engaging, immersive, and cognitively demanding learning environment capable of enhancing academic English proficiency more effectively than conventional methods. This study concludes that SBL is a relevant and effective pedagogical strategy for strengthening TOEFL readiness and supporting global competency development in nursing education.

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## Corresponding Author:

Dhaniel Prasetyo Irianto

Analis Kesehatan

Universitas Noor Huda Mustofa

Jl RE. Martadinata No.45, Wr 06, Mlajah, Kec. Bangkalan, Jawa Timur 69116., Indonesia

Email: dhanielprasetyo92@gmail.com

## INTRODUCTION

Proficiency in English has become an essential competency for nursing students in the era of globalized healthcare. The ability to understand scientific literature, communicate effectively with international stakeholders, and access evidence-based resources requires a strong command of academic English (Azize, 2018; Gajewski, 2022). As universities place greater emphasis on global

readiness, standardized English language proficiency assessments such as the Test of English as a Foreign Language (TOEFL) serve as important benchmarks for academic advancement, professional certification, and international mobility in the nursing profession (Wilson, 2019). However, national and institutional evidence shows that achieving adequate TOEFL readiness remains a persistent challenge. ETS Indonesia reports that the average TOEFL ITP score of Indonesian test-takers has consistently ranged between 440–460, placing them in the intermediate-low category. Preliminary institutional data from several Indonesian nursing faculties including the Faculty of Health at Noor Huda Mustofa University also demonstrate that a large proportion of undergraduate nursing students score below the minimum TOEFL requirement of 450, particularly in the listening and structure components. These findings highlight a clear empirical gap between the expected competency levels and the actual language proficiency of nursing students. Such gaps are influenced not only by limited exposure to academic English but also by the mismatch between traditional English instruction and the cognitive complexity of the TOEFL exam (Alanazi, 2021).

Conventional TOEFL preparation programmes generally rely on lectures, grammar exercises, vocabulary memorization, and repeated practice questions (Cayarani, 2025). Although these approaches can provide foundational linguistic knowledge, they often fail to engage students in authentic, meaningful, and context-rich learning experiences. Nursing students, in particular, tend to perform better in experiential and applied learning environments due to the practice-oriented nature of their discipline (Ching, 2020). Consequently, decontextualized TOEFL training can hinder the development of higher-order language processing skills such as critical listening, analytical reading, contextual grammar application, and integrated reasoning that are essential for success in standardized English assessments (Alali, 2020). This instructional misalignment underscores the need for more innovative, immersive, and learner-centered approaches to TOEFL preparation in nursing education.

In recent years, Simulation-Based Learning (SBL) has become an increasingly prominent pedagogical strategy in nursing curricula due to its effectiveness in improving clinical decision-making, communication, and collaborative learning. Rooted in experiential learning theory and constructivist principles, SBL provides immersive scenario-based activities that allow learners to construct understanding through authentic tasks and reflective practice (Aebersold, 2018; Lee, 2021; Son, 2021; Yeo, 2023; Zhao, 2024). Although traditionally used to develop clinical competencies, SBL has strong theoretical potential to support language learning, particularly in English for Specific Purposes (ESP) contexts (Jitpaisarnwattana, 2025). The immersive nature of simulations creates communication demands, encourages active engagement, and activates deeper cognitive processing conditions that align with the skills required for TOEFL components such as listening comprehension, reading analysis, and structure and written expression. Despite this theoretical alignment, empirical evidence on the effectiveness of SBL in TOEFL preparation remains limited.

Existing research on SBL has predominantly focused on improving clinical skills, professional communication, and teamwork competencies. Only a small number of studies have attempted to integrate simulation approaches into language learning, and these are typically limited to general English instruction or medical English rather than standardized tests (Chan, 2021; Eost-Telling, 2021; Rattani, 2020). Meanwhile, research on TOEFL preparation remains dominated by conventional instructional approaches with minimal integration of contextual or experiential learning methods (Cheng, 2020; Johnson, 2020; Wahyuni, 2021). This highlights a significant gap in the literature: there is very limited empirical research especially using quasi-experimental methodologies that examines how simulation-based pedagogy can enhance TOEFL performance among nursing students. Moreover, existing literature does not provide clear evidence regarding which specific TOEFL components benefit most from simulation-based interventions. These gaps emphasize the urgency of examining SBL as an innovative, evidence-based strategy for improving standardized English language proficiency in nursing education.

Based on these issues, this study attempts to answer the following questions: (1) Does Simulation-Based Learning have a significant effect on the TOEFL performance of undergraduate nursing students? (2) Which TOEFL components listening, reading, or structure show the greatest improvement after the SBL-based intervention? (3) How does the improvement in TOEFL performance in the experimental group compare with that of students receiving conventional TOEFL instruction?

In line with these research questions, the objectives of this study are to: (1) analyze the effect of Simulation-Based Learning on the TOEFL performance of nursing students, (2) identify the TOEFL components that show the most substantial improvement after the intervention, and (3) compare the performance improvement between students who receive SBL-based instruction and those who follow traditional TOEFL preparation methods.

This study contributes to educational research in several meaningful ways. Theoretically, it extends the application of simulation pedagogy beyond clinical training by demonstrating its relevance in English for Academic Purposes (EAP) and standardized test preparation in health education (Shanavas, 2024). Practically, it offers an innovative instructional model that has the potential to enhance TOEFL preparation programmes for nursing students while addressing long-standing challenges in achieving academic language proficiency. Institutionally, the study provides evidence-based insights that can inform curriculum design and support nursing faculties in strengthening global competency standards through integrated and experiential English-language learning. Overall, this study aims to support the development of nursing graduates who possess the linguistic readiness required to meet global professional demands.

## RESEARCH METHODOLOGY

### 1. Research Design

This study employed a quasi-experimental method using a Non-Equivalent Control Group Design to examine the effectiveness of Simulation-Based Learning (SBL) on students' TOEFL performance. Two intact classes were assigned as the experimental and control groups due to institutional scheduling constraints. Pre-test and post-test TOEFL ITP administrations were conducted to measure learning gains and compare treatment effects.

To ensure internal validity, several bias-control strategies were implemented:

- (1) identical testing conditions for both groups,
- (2) equal duration and structure of instructional sessions, and
- (3) the same instructor delivering both interventions to minimize teacher effect.

### 2. Population and Sample

The population consisted of tenth-semester undergraduate nursing students at the Faculty of Health, Noor Huda Mustofa University. Purposive sampling was used based on inclusion criteria: (a) active enrollment, (b) completion of basic English courses, (c) no prior exposure to simulation-based language learning, and (d) willingness to complete all sessions.

A total of 60 students participated, divided equally into the experimental ( $n = 30$ ) and control ( $n = 30$ ) groups. Pre-test data confirmed that both groups were equivalent in age and initial TOEFL proficiency.

### 3. Research Variables

Independent Variable: Simulation-Based Learning (SBL) conducted through scenario-based tasks, role-play, interactive simulations, and structured reflection. Dependent Variable: TOEFL ITP performance (total score and sectional scores: listening, structure, reading). Controlled Variables: instructor, session duration, learning objectives, pre-test abilities.

### 4. Research Instruments

#### a. TOEFL ITP Test

TOEFL ITP was used as the primary assessment instrument, consisting of 140 standardized items (Listening 50; Structure 40; Reading 50). Prior studies report high reliability (Cronbach's  $\alpha > 0.85$ ). Two parallel forms were used for pre-test and post-test to prevent practice effects.

To maintain validity and consistency, test administration followed ETS guidelines: identical room conditions and time allocation, standardized proctor instructions, no feedback or exposure to test materials between administrations, uniform seating and controlled noise levels.

#### b. Simulation-Based Learning Scenarios

SBL scenarios were adapted from authentic nursing tasks (e.g., clinical handovers, nursing chart interpretation, academic case analyses). Scenario content was validated by three experts in nursing and ESP, achieving a Content Validity Index (CVI) of  $>0.80$ .

#### c. Observation Sheet

An observation sheet was used to record engagement and participation during SBL sessions. It underwent expert review and inter-rater reliability testing (agreement coefficient = 0.86).

### 5. Treatment Procedures

The intervention lasted two weeks and consisted of four 90-minute sessions.

#### a. Pre-Test

Both groups completed the TOEFL ITP pre-test under standardized conditions to establish baseline equivalence.

#### b. Intervention

##### Experimental Group:

Participated in SBL activities, including role-play, scenario interpretation, and guided debriefing conducted entirely in English. Each session followed a structured pre-brief → simulation → debrief model.

##### Control Group:

Received conventional TOEFL preparation, including grammar practice, listening drills, vocabulary work, and reading exercises using the programme's standard module.

Bias mitigation included: identical session duration (4 × 90 minutes), controlled lesson objectives, same instructor and teaching aids.

#### c. Post-Test

Both groups completed a parallel TOEFL ITP post-test using equivalent forms and administration procedures identical to the pre-test.

#### d. Documentation

All test booklets, answer sheets, observation records, and attendance logs were collected and archived.

### 6. Flow of Research Procedure

1. Participant Identification
2. Pre-Test Administration
3. Group Assignment
4. Intervention (SBL vs. Conventional TOEFL Instruction)
5. Post-Test Administration
6. Data Entry and Cleaning
7. Statistical Analysis
8. Interpretation and Reporting

### 7. Data Analysis Techniques

Descriptive and inferential analyses were performed using SPSS. Normality was assessed using the Shapiro-Wilk test, and homogeneity using Levene's test. Within-group gains were analyzed using paired t-tests, while between-group differences were examined using independent t-tests. Effect size was calculated using Cohen's *d*. The significance level was set at  $\alpha = 0.05$ .

## RESULTS AND DISCUSSIONS

### Results

This section presents the results systematically, including descriptive statistics, assumption testing, inferential analysis, and key findings in accordance with scientific reporting standards.

#### 1. Descriptive Statistics

A descriptive analysis was conducted to provide an overview of TOEFL score changes in both groups. A total of 60 students participated (30 experimental, 30 control). Table 1 shows the mean and standard deviation of the pre-test and post-test TOEFL total scores.

**Table 1.** Descriptive Statistics of Total TOEFL Scores (Pretest-Posttest)

Group	Mean Pretest	SD Pretest	Mean Posttest	SD Posttest	Mean Gain
Eksperimen (n = 30)	428.50	25.66	470.96	30.05	42.46
Kontrol (n = 30)	433.84	20.26	453.28	20.14	19.45

The experimental group showed an almost two-fold increase in TOEFL scores compared to the control group. Descriptive analyses for the TOEFL components (listening, structure, reading) are shown in Table 2.

**Table 2.** Descriptive Statistics per TOEFL Component (Pretest-Posttest)

Components	Group	Mean Pretest	SD Pretest	Mean Posttest	SD Posttest	Mean Gain
Listening	Experiment	28.35	4.83	36.75	6.92	8.41
Listening	Control	30.67	4.45	33.15	5.86	2.48
Structure	Experiment	21.42	4.20	28.54	5.38	7.12
Structure	Control	20.96	3.42	22.26	4.86	1.29
Reading	Experiment	28.35	5.90	36.16	7.65	7.81
Reading	Control	27.70	5.41	32.00	6.47	4.30

The greatest improvements in the experimental group occurred in the listening and structure components.

#### 2. Assumption Tests (Normality and Homogeneity)

Before conducting inferential analyses, statistical assumption tests were performed to ensure the appropriateness of parametric testing.

##### a. Normality Test (Shapiro-Wilk)

The Shapiro-Wilk test was used to examine whether the pre-test and post-test TOEFL scores were normally distributed.

Experimental group:

Pre-test ( $p = 0.112$ ), Post-test ( $p = 0.154$ )

Control group:

Pre-test ( $p = 0.089$ ), Post-test ( $p = 0.167$ )

Since all  $p$ -values  $> 0.05$ , the data for both groups met the normality assumption.

##### b. Homogeneity of Variance (Levene's Test)

Levene's Test was used to examine variance homogeneity between groups for the post-test scores: TOEFL Total ( $p = 0.284$ ), Listening ( $p = 0.317$ ), Structure ( $p = 0.221$ ), Reading ( $p = 0.338$ )

All  $p$ -values  $> 0.05$ , indicating homogeneous variances between groups. Thus, parametric tests (paired t-test and independent t-test) were appropriate.

#### 3. Inferential Analysis

##### a. Paired t-test Results

**Table 3.** Results of the Paired t-test for TOEFL Total Scores

Group	t	df	p	Cohen's d
Experiment	17.33	29	<0.001	3.16
Control	9.15	29	<0.001	1.67

Both groups experienced significant improvements ( $p < 0.001$ ), but the effect size in the experimental group ( $d = 3.16$ ) was considerably larger than in the control group ( $d = 1.67$ ), indicating a stronger intervention effect.

#### b. Independent t-test Results

**Table 4.** Independent t-test results for posttest scores

Size	t	df	p	Cohen's d
TOEFL Total	2.68	58	0.010	0.69
Listening (Post)	2.18	58	0.034	0.56
Structure (Post)	4.74	58	<0.001	1.23
Reading (Post)	2.27	58	0.027	0.59

The experimental group scored significantly higher across all TOEFL components. The largest difference was observed in the structure component ( $d = 1.23$ ), indicating that SBL was highly effective in improving grammar-related skills.

#### 4. Key Findings

1. The experimental group demonstrated substantially greater improvement in total TOEFL scores (gain = 42.46) compared to the control group (gain = 19.45).
2. Significant improvements were found across all TOEFL components in the experimental group, with the largest gains in listening (8.41) and structure (7.12).
3. Independent t-tests confirmed significant post-test differences between groups for all components, with the strongest effect on structure ( $d = 1.23$ ).
4. Simulation-Based Learning showed a stronger impact than conventional methods, as reflected in the large effect size observed in the experimental group ( $d = 3.16$ ).
5. Normality and homogeneity tests confirmed that all assumptions were met, supporting the validity of the inferential results.

#### Discussion

The results of this study show that Simulation-Based Learning (SBL) significantly improved nursing students' TOEFL performance, both in total scores and in the listening, structure, and reading components. This section discusses these findings in relation to theoretical foundations, previous studies, research limitations, and practical implications for nursing education.

##### 1. Interpretation of Findings

The substantial increase in TOEFL performance in the experimental group can be explained through three interrelated factors: engagement, immersion, and cognitive processing. First, SBL encourages active engagement through problem-based scenarios, role-playing, and interactive communication. Such activities align with Experiential Learning Theory, which states that learning becomes more effective through direct experience and reflection. The high level of engagement during SBL sessions enabled deeper processing of linguistic input than conventional instruction.

Second, SBL provides an immersive learning environment that simulates authentic academic and clinical contexts. This immersion supports contextual encoding, allowing students to internalize English language structures and vocabulary through meaningful interaction. Such contextual grounding is highly relevant to TOEFL tasks, particularly in listening and reading, which require processing academic information under time constraints.

Third, from a cognitive perspective, simulation tasks require learners to analyze instructions, interpret texts, and make rapid decisions during scenario execution. These higher-order

cognitive operations contribute to improved structure and reading outcomes, reinforcing the effectiveness of SBL in promoting deep information processing. Thus, the improved TOEFL performance in this study results from the integration of authentic experiences, contextual immersion, and active cognitive engagement.

## 2. Comparison with Previous Studies

The findings of this study align with existing research demonstrating the positive effects of SBL on cognitive, communication, and analytical skills among nursing students. Studies by Alanazi (2021), Huffman (2020), and İnan (2019) have shown that clinical simulations enhance learners' reasoning, comprehension, and interactional competence. In the domain of language learning, previous studies have also reported that simulation improves English use in professional settings.

However, this study differs from earlier research in one key aspect: whereas most previous SBL studies have focused on clinical skill development and professional communication (Clinard, 2019; Inayat, 2021; Mahmood, 2021), the present study extends the scope to academic language proficiency as measured by a standardized test. This novel application of SBL demonstrates that simulation-based instruction can provide benefits beyond clinical learning and can be strategically adapted to support the acquisition of academic English skills required for TOEFL performance.

Furthermore, the findings reinforce pedagogical arguments that traditional grammar-oriented instruction is insufficient for developing comprehensive academic language proficiency (Davies, 2021; Hodges, 2019; Sarfati, 2019). Instead, contextual and experiential methodologies such as SBL can generate more meaningful, integrated, and transferable learning outcomes for nursing students.

## 3. Research Limitations

Despite its positive findings, this study has several limitations that should be acknowledged:

1. Short intervention duration  
The SBL intervention consisted of only four sessions over two weeks. While improvement was significant, a longer intervention period might yield deeper language gains and provide a stronger basis for skill retention.
2. Use of TOEFL ITP  
Although TOEFL ITP is a reliable and widely used assessment tool, it measures receptive skills (listening, structure, reading) and does not assess productive skills such as speaking and writing. Thus, the results cannot generalize to all dimensions of English proficiency.
3. Quasi-experimental design  
The absence of random assignment limits the ability to fully control individual differences across groups. Although pre-test equivalence was established, extraneous variables such as prior exposure to English or individual learning preferences may still have influenced outcomes.
4. Limited institutional scope  
The study was conducted within a single nursing program, which may limit generalizability. Replication across institutions is needed for broader applicability.

These limitations should be considered when interpreting the results and planning future research.

## 4. Practical Implications for Institutions

The findings offer several practical implications that can be directly applied by nursing education institutions:

1. Integration of SBL into English for Nursing and TOEFL preparation courses  
Academic simulation scenarios can be incorporated into language courses to create more engaging and context-rich learning environments. This integration may help institutions systematically raise their students' TOEFL readiness.
2. Curriculum development that links clinical reasoning with academic English  
By aligning simulation tasks with TOEFL skill domains, educators can support the

development of both clinical competencies and academic linguistic abilities simultaneously.

3. Enhancement of soft skills relevant to professional communication  
SBL not only improves TOEFL scores but also strengthens skills such as teamwork, verbal reasoning, and critical thinking, which are essential in clinical practice.
4. Supporting global competency standards  
Improved English proficiency aligns with international accreditation requirements and enhances graduates' mobility for internships, clinical placements, and further study abroad.

Institutions can therefore adopt SBL as a dual-purpose instructional strategy that addresses academic proficiency and professional readiness.

### 5. Overall Interpretation

Overall, the study demonstrates that Simulation-Based Learning is not solely a clinical pedagogy but also an effective strategy for improving standardized academic English performance among nursing students. By providing realistic, immersive, and cognitively demanding learning experiences, SBL supports language development in ways that traditional methods may not. These findings emphasize the need for pedagogical innovation in English language instruction within nursing programs to meet both local and international competency standards. learning in nursing programmes to meet local and international competency standards.

## CONCLUSION

This study concludes that Simulation-Based Learning (SBL) has a significant and positive effect on improving the TOEFL performance of nursing students. The experimental group achieved greater gains not only in total scores but also in all TOEFL components listening, structure, and reading compared with students who received conventional TOEFL instruction. These results indicate that SBL creates an immersive, engaging, and cognitively demanding learning environment that strengthens academic English proficiency more effectively than traditional approaches. The large effect sizes, particularly in the structure and listening components, further confirm the capacity of SBL to support functional, analytical, and reflective language use. Theoretically, this study contributes to the expansion of simulation pedagogy by demonstrating its relevance beyond clinical skill development and into the domain of English for Academic Purposes (EAP). It adds empirical evidence that experiential learning mechanisms such as contextual immersion and deep cognitive engagement can enhance performance in standardized English assessments. Practically, the findings provide nursing institutions with a viable instructional model for integrating simulation scenarios into TOEFL preparation and English for Nursing courses to enhance both academic proficiency and global readiness. In terms of future research development, several directions are recommended. First, studies with longer intervention periods are needed to evaluate long-term retention and sustained improvement in TOEFL performance. Second, future research could incorporate virtual or high-fidelity simulation technologies to explore their potential for deepening linguistic engagement. Third, expanding the assessment to include productive skills such as speaking and writing would provide a more comprehensive understanding of SBL's impact on overall language proficiency. Lastly, broader studies involving multiple institutions or larger sample sizes may improve generalizability and offer comparative insights across educational contexts. Overall, the findings highlight the potential of Simulation-Based Learning to enhance academic English performance and support the preparation of nursing students for global professional demands.

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