HYFLEX PROJECT-BASED LEARNING AND STUDENTS' HIGH ORDER THINKING SKILLS: ITS IMPACT AND RELEVANCE

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ABSTRACT

Studies on project-based learning advocate the importance of cultivating high order thinking skills yet, little attention was paid to its implementation in the hybrid learning environment. This study aims to investigate the impact of blended project-based learning on critical thinking skills for students with different motivation level in the Academic writing course at IAIN Ponorogo. Using a Single Group of quasy-experimental design, this study investigated the impact of hyflex project-based learning in improving high order thinking skills within 30 students enrolled in an Academic Writing course. The study revealed considerable evidence that hyflex project-based learning is effective for improving students' HOTs. Educators are recommended to embrace this hyflex and project-based learning into their curricula to harness the benefits of this innovative learning model.

Keywords: *hyflex model; project-based learning, high-order thinking skills; academic writing.*

INTRODUCTION

Indonesia's Islamic Higher Institutions have felt the impact of the 21st-century learning movement, like other educational laws and regulations worldwide (Kennedy & Sundberg, 2020). In this case, education should allow learners to promote knowledge, skills transfer, and technology, significantly influencing education development.

The COVID-19 pandemic has compelled educators worldwide to rethink teaching methods, leading to school closures in 46 countries and lockdowns in 26 since March 2020(Patricia Aguilera-Hermida, 2020). This situation highlighted the need for a more sustainable educational model.

Hybrid learning has emerged as a vital model that integrates online and in-person instruction, offering flexibility and catering to diverse learning preferences. The Hyflex as the type of hybrid learning model further enhances this by allowing students to choose their mode of participation—either in-person or online. This versatility is particularly relevant in today's educational landscape, where diverse learning needs and the unpredictability of external circumstances require adaptable solutions. This shift not only ensures educational continuity but also redefines the role of teachers in the learning process.

Teachers' role is vital in the 21st-Century educational reforms (Darling-Hammond & Oakes, 2021; Granger et al., 2019). Teachers are required to cultivate students' high-order thinking skills as they are crucial for the effective application, connection, or manipulation of prior knowledge in order to solve new problems (Conklin, 2012). HOTs is an incision among the three top levels of ability in the cognitive dimension, which incorporate analyzing, evaluating, and creating, in the revised Bloom's taxonomy (Anderson & Krathwohl, 2001). It implied that HOTS is a way of thinking more than verbalizing memorization. It also involves translating the context by analyzing, synthesizing, associating, and concluding the new idea (Yulianto et al., 2019). HOTS in EFL classes can be acquired through virtual learning methods, encompassing a comprehensive concept of learning through problem-solving and collaborative and cybernetic learning.

A preliminary study conducted through interviews with educators and observations of students in the Essay Writing course at IAIN Ponorogo's English Department identified significant pedagogical issues. The findings revealed that students struggle to write clear and well-supported essays, indicating challenges in high-order thinking and information interpretation. To address the challenge of integrating high-order thinking skills into academic writing, lecturers employed hyflex project-based learning, which combines the advantages of both hybrid and project-based instruction.

Hyflex learning effectively merges traditional face-to-face instruction with online learning, improving interactions and facilitating remote education through technology(Broadbent, 2017; Singh et al., 2021). It streamlines online transactions and fosters flexibility, ultimately enhancing learning outcomes (Bozkurt, 2022; Gil et al., 2022; Rasheed et al., 2020). However, blended learning has not consistently equipped students with adequate information or linguistic

skills, making the integration of technology and active learning essential for developing high-order thinking skills through dynamic activities(Akyol & Garrison, 2011). Project-based learning encourages students to actively tackle real-world problems in small groups(Usher & Barak, 2020; Wu & Wu, 2020), leading to the preparation, investigation, and evaluation of projects with practical applications (Westwood, 2008). It is recognized in higher education as a dominant teaching strategy that fosters meaningful learning by connecting concepts to students' everyday lives.

This research aims to assess the impact of hybrid project-based learning on enhancing higher-order thinking skills within academic writing. The study underscores the importance of these skills in higher education, advocating for their cultivation through the implementation hyflex project-based learning. By addressing these questions, this study delves into unexplored dimensions of pedagogy and aims to contribute valuable insights to the evolving landscape of writing education, meeting the diverse demands of the contemporary era.

METHODS

This study employed a Single Group of quasy-experimental design to assess the impact of Hybrid Project-Based Learning (HPBL) in high order thinking skills among students in an Academic Writing course. Through cluster random sampling, 30 students from a total of 85 population. Participants were fully informed about the research's goals and procedures, and they voluntarily agreed to take part. The procedure is in the following:

Table 1. Research Procedure

Meeting	Experimental Class
1	Introduction to the course and Administering pre-test
2-6	The materials for supporting Academic Writing a. Reading and Note Making b. Paraphrasing c. Writing Models d. Writing Stages e. Technology assistance -Referencing Style, Management of Reference, Plagiarism (Turn it in), Grammarly, Mendeley/Zotero
7	Identify a unique challenge or problem • Explaining the characteristics of academic writing • Explaining an essay project through hybrid project-based learning • Lead the students' awareness of issues related to ELT for writing essay ideas.
8-9	Design plan for the project • Deciding the topic "An appropriate teaching method in ELT." Explore the ideas and challenge them through collaborative activities (online interaction)

Meeting	Experimental Class
	• Asking the students to make a group of 4, plan their project, and make an outline Employ the application of scaffolding technologies (online interaction) • Collecting the data for the project by reading the provided references and free-accessed journals related to the topic • Asking the students to write an essay on their platform provided
10-11	Utilize the inquiry process to improve products (F2F and Online Interaction) • Asking students to give peer feedback and their work needs to be corrected based on the feedback. • Guiding by giving feedback related to the content development
12-13	Develop the final product that addresses the challenge or problem and publicly share it (online interaction) • Asking the students to write a final draft • Asking the students to present the result of their writing and giving feedback on their friends' presentation
14	Administering Post-Test

A set of questions for essay writing was employed in the pre-test and post-test to measure the students' high-order thinking skills in their academic writing. The following scoring rubrics for measuring students high order thinking skills in adapted by (Ellerton, 2010). The Rubric can be seen in the following:

Table 2 Adapted Rubric for High Order Thinking Skills Adapted from Ellerton (2010)

Cognitive Skills	Accomplished 4-5	Developing 2-3	Competent 0-1
Analysis Skills			
Examining ideas	Key concepts and structures are correctly identified and named	Key concepts and structures are partially identified and named	Key concepts and structures are inaccurately identified and named
Argument deconstruction	The supporting evidence is described in detail.	The supporting evidence is partially clarified.	The supporting evidence is ambiguous.
Evaluation Skills			
Assessing claims	Direct links between evidence and claims are made obvious	Some direct links between evidence and claims are apparent	Few direct links between evidence and claims are made fairly apparent.

Cognitive Skills	Accomplished 4-5	Developing 2-3	Competent 0-1
Assessing arguments	There is a clear articulation of premises, conclusions, and evidence-supported relationships between them.	There is a partially clear articulation of premises, conclusions, and the connections between them supported by pieces of evidence.	There is a slightly clear articulation of premises, conclusions, and the connections between them supported by pieces of evidence.
Creation Skills			
Justifying procedures	Effective use of examples and illustrations.	Modestly effective use of examples and illustrations.	Slightly effective use of examples and illustrations.
Presenting arguments	Argumentative essays give a clear meaning and clarify the relevant points.	Argumentative essays convey a partially clear meaning and incompletely clarify the relevant points	Argumentative essays convey an unclear meaning and ambiguously clarify the relevant points

The data analysis in Stage 1 of this study comprises several phases. The first phase deals with descriptive statistics, followed by the fulfilment of statistical assumptions by testing the normality of the data. Next, hypothesis testing uses a Paired Sample T-test as parametric testing when the statistical assumptions are fulfilled.

FINDINGS AND DISCUSSION

The Implementation of Hyflex Project-based Learning in Academic Writing Course

Referring to the result of observation, the implementation of hyflex project-based learning is integrated with the process writing approach in teaching academic writing courses. The steps can be summed up in the following:

1) Pre-Activities

To demonstrate the hyflex project-based learning, the teacher conducted preparatory readings to students, which cantered on proficient note-taking techniques and study abilities to prime them for studying at home. In-person classes facilitated discussions on these themes, with students comparing which strategies elicit personal relevance across various learning mediums. A webinar addressing fundamental academic writing principles offered remote participants an asynchronous opportunity to reinforce their core knowledge and consolidate

their competencies. Webinar segments explored the complexities of employing various citing styles and incorporated management reference materials to assist with citation organization. Furthermore, the academic writing webinar elaborated on using software tools and online collaboration platforms to enhance scholarly writing relevant to final portfolio projects. Through this multi-channel exposure, the students were provided with essential writing abilities and self-regulated learning foundations, which were critical for their success in the hybrid setting.

2) Whilst-Activities

Several steps for activities for hyflex project-based learning are:

a. Identify the challenge or problem

During the first significant phase, students research a valid, student-relevant subject they intend to examine in their writing projects. After this procedure has yielded significant themes, instructors give students scaffolding to express pivotal leading inquiries that will steer their research. This pre-writing foundation assists aspiring authors in establishing a clear and comprehensive route for their composing attempts. Students engage in collaborative discussions to analyze the challenges and prospects in their local surroundings. In this scholarly writing course, pupils explored matters pertinent to fulfilling the capstone thesis prerequisite for the teacher candidate program.

b. Design plan for the project

After selecting topics, students are assisted in formulating precise and unambiguous objectives and deadlines for the culmination of their argumentative writing assignments. During these early stages of organization, students engage in the process of creating precise outlines to structure their subsequent essays strategically. Moreover, to persuade readers of their perspectives, they proactively generate pertinent instances, facts, and proof to incorporate into compiling necessary materials about their subjects. In collaboration with the instructor, students develop timetables that specify significant events for every component of their ongoing essays, ranging from developing compelling thesis statements to refining concluding recommendations.

c. Explore the ideas through collaborative activities.

After conducting preliminary independent brainstorming, students engage in group activities to delve deeper into their emerging ideas and outlines. Small group conversations promote the interchange of input regarding formulating strategies for composing argumentative essays. Peer evaluations facilitate constructive criticism, allowing students to enhance their outlines through the many comments provided by their classmates. To promote both

communal inquiry and individual responsibility for the final independent projects, students collaborate with the same consistent peer partners to disseminate their detailed outlines. By engaging in this continuous and iterative process of refining their critical guides, students obtain feedback that motivates them to elaborate on particulars, counterarguments, and evidence their peers believe would enhance their credibility and persuasiveness. Furthermore, these collaborative sessions facilitate the co-creation of further illustrative instances and efficacious explanations among mutually helpful cohorts. Independent progress is enhanced during the group phase by prioritizing idea exchange and peer evaluations of initial sketches.

d.   Employ the application of scaffolding technologies.

To substantiate their essay claims, students conscientiously consult the reference materials and any publicly available publications pertinent to their selected subjects. The objective is to support their argument viewpoint by integrating reliable sources. To enhance the structure of their continuous research, students can use resources such as Zotero to methodically record citations for subsequent accurate attribution while composing passages that incorporate the uncovered material. Diligently keeping track of citations enables the efficient compilation of bibliographies following the designated format style. For assistance with the writing step, students are advised to utilize automated proofreading capabilities offered by software such as Grammarly. By utilizing this tool during the drafting process, students can effectively assess their manuscripts for precision in punctuation, grammar, and spelling, in addition to honing word selection and aesthetic. These tools assist learners in focusing their efforts on generating material, verifying statements with external data, and refining linguistic accuracy as they advance through iterative writing cycles that align with the project's objectives.

e.   Utilize the inquiry process to improve products by Peer and Lecturer's Feedback.

The process of critically evaluating essay drafts is crucial to refine and enhance the quality of arguments before the completion of projects. By adopting the views of analytical peer readers, one might identify areas that require additional clarification or evidence to support claims. Peers evaluate the regarding developing projects that utilize course principles in a disciplined manner. Following a preliminary revision guided by themes identified in peer evaluations, students incorporate lecturer criticism on conceptual accuracy and material deficiencies. The iterative process of inquiry, critique, and suggestion-making preceding the submission of final iterations to the centralized Google Drive promotes development. Participating in group critique exercises teaches students that to persuade readers; scholarly writing requires that claims be

justified. The revision phase refines students' reasoning and communication skills by collaborative drafting, reviewing, and revising projects.

f. Develop the final product and share it.

Equipped with peer and lecturer feedback, students advanced to crafting their final academic argumentative essays. In these culminating manuscripts, writers incorporated constructive criticism from group critique and advising sessions. Before submission, students rigorously self-reviewed any lingering writing issues - confirming proper grammar, punctuation, mechanics, and accurate referencing based on source logging practices. Satisfying rubric benchmarks signalled readiness for dissemination beyond the classroom. Students shared successful completions within learning communities, submitted works to scholarly writing competitions to potentially reach wider audiences, or pursued online publication venues to publicly add their academic voices to contemporary conversations. Students meaningfully developed myriad competencies throughout the multifaceted process from investigating issues to providing evidence-based perspectives. They are equipped to apply tailored writing, collaborative, and project design abilities within myriad future contexts. The student-directed and collaborative undertaking cemented hybrid learning's capacity to foster impactful educational outcomes.

g. Post-Activities

End-of-semester reflection exercises are of the utmost importance in facilitating teachers' ability to assist students in evaluating their accomplishments, identifying areas of concern that require improvement, and fostering a culture of ongoing growth moving forward.

The procedures for hyflex project-based learning in an Academic Writing course integrate the core principles of project-based learning (Krajcik & Shin, 2014) with hyflex learning, combining both online and face-to-face interactions This model serves as an effective method to introduce the process writing approach, which breaks down the writing process into key stages: planning, drafting, revising, editing, and publishing(Flower & Hayes, 1981).

The initial stage involves providing students with theoretical knowledge to help them connect new information with their prior understanding, aiding in the creation of academic drafts (Aghayani & Hajmohammadi, 2019). Planning occurs during the pre-writing phase, where students outline ideas, conduct research, and gather sources for their essays. Instructors guide students by offering learning materials that support their research and essay planning, establishing a clear timeline and scope.

During the drafting phase, students collaborate in groups, organizing their ideas into paragraphs and linking them coherently. Group discussions encourage peer interaction and the exchange of feedback to refine their initial drafts. Face-to-face interactions foster communication, creating a cooperative learning environment where students can learn from one another(Dumford & Miller, 2018).

Scaffolding technologies are crucial to the process. Google Classroom serves as the primary platform for uploading drafts, receiving feedback, and participating in discussions, while tools like Grammarly help students eliminate grammar and syntax issues, improving the overall quality of their writing(Martín et al., 2021).

The inquiry process follows, allowing students to refine their essays through feedback from peers and instructors. Peer feedback enhances audience awareness, interaction, and revision, ultimately improving the quality of the essays (Dizon, 2016). The final stage focuses on editing to ensure clarity, accuracy, and readability. Students finalize their drafts, share them via Google Drive for assessment, and are tasked with applying the same procedures independently when writing academic manuscripts.

The Impact of Hyflex Project-based Learning on High-order Thinking Skills in Academic Writing Course

Then The following is presented as the result of the Pre-Post Test for Writing, in which

Table 3. The result of Pre and Post Writing (measuring HOTs)

Statistics		Pre-test HOTs	Post-HOTs
N	Valid	30	30
	Missing	0	0
Mean		31.0333	62.0000
Median		30.0000	62.5000
Std. Deviation		4.78852	10.57323
Variance		**22.930**	**111.793**

Table 3 shows the pre-test and post-test results for the argumentative essays. The average score on the pre-test is 31.0333, whereas the post-test average score is 62.0000. It indicates a substantial increase in average writing scores between the pre- and post-tests. Before starting with the hypothesis testing, it is necessary to determine the dataset's distribution properties. Many statistical tests assume normality, ensuring the conclusions' validity. It is presented in the following:

Table 4 The Result of the Normality Test

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Post_Test HOTs	.120	30	.200*	.966	29	.439
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

Table 4 shows result of the Normality test for HOTS encompassing analysis, evaluation, and creation skills. For the datasets for HOTs, the significance values are marked as 0.200; therefore, these data sets can be considered to follow a normal distribution. The results of the normality validate the choice of parametric tests, ensure the reliability and generalizability of the findings, and reinforce the conclusion that hyflex-PbL effectively enhances HOTS. The rigorous statistical analyses are presented to determine the extent to which hyflex-project-based learning impacts HOTS skills among students in the following:

Table 5. The Result of Hypothesis Test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Dev	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre_HOTS Post_HOTs	26.86667	8.97510	2.31736	-1.83691	21.89642	11.594	29	.000

Referring to the result of statistical calculation in table 5, a mean difference of 26.87 between pre-HOTS and post-HOTS scores, with a standard deviation of 8.98. This substantial increase demonstrates that Hyflex-PbL had a significant positive impact on students' ability to perform higher-order cognitive tasks, such as analyzing, evaluating, and creating. The p-value (.000) indicates that the observed improvement is statistically significant at the 95% confidence level. This result confirms that the increase in scores is unlikely to have occurred by chance. Furthermore, the 95% confidence interval for the mean difference, ranging from -1.83 to 21.90, provides additional evidence of a consistent improvement across the sample. The absence of zero within the interval further reinforces the reliability of the finding, supporting the conclusion that hyflex-PbL has a meaningful impact on HOTS.

Referring to the result above, the study emphasizes the importance of developing higher-order thinking skills in academic writing, addressing the

persistent challenges instructors face in integrating these cognitive skills into writing courses (Barak, 2020; Shanti et al., 2022; Wahono et al., 2020). By utilizing Hyflex Project-Based Learning the study merges face-to-face and virtual learning to adapt to the dynamic needs of writing instruction (Gil et al., 2022; Singh et al., 2021). Research has shown that hyflex project-based learning significantly improves students' critical thinking, problem-solving, analytical and evaluation abilities in writing (Carroll & Harris, 2021; Elfeky, 2019; Rochmahwati et al., 2024)

The findings align with the overarching goal of fostering HOTS in academic writing, demonstrating the cognitive benefits of hyflex project-based approaches. This model has been proven effective in developing creative and critical thinking skills, key components for writing compelling, well-researched essays (Kuo et al., 2019; Rochmahwati et al., 2024; Usher & Barak, 2020).

CONCLUSION

This study delves into the significant impact of Hyflex Project-Based Learning on high order thinking skills utilizing thorough statistical analyses Despite acknowledging limitations such as the small sample size and narrow focus, the research contributes valuable insights. Factors like individual learning styles, instructional methods, and assessment criteria are highlighted as influencing the variability in outcomes, warranting further exploration. While the study offers promising results, it emphasizes the need for future research to assess its long-term effects, its adaptability in different educational environments, and its effectiveness across diverse cultural contexts. Additionally, extending this approach to other areas of language learning could provide deeper insights into its broad applicability.

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