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Assessment of Project-Based Learning: Evaluating Its Impact on Students' Writing Proficiency and Academic Outcomes

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Abstract. Project-based learning (PjBL) has been extensively studied, with numerous theoretical and empirical investigations concluding that it promotes significant growth in students. This study aimed to examine the influence of the PjBL approach and its assessment on students' writing skills in an Academic Writing (AW) course. A pre-experimental design was employed, involving 30 sixth-semester students from STAI Diponegoro Tulungagung, selected through purposive sampling. Pre- and post-tests were used to measure the students' writing skill outcomes. The findings suggest that PjBL can encourage educational practices such as project completion, data presentation, and self-reflection, as well as foster general educational attitudes like teamwork and problem-solving. However, the practical application of driving questions, student-set learning goals, and the use of projects to address essential subjects needs improvement. While scientific procedures were integral to the projects, the extent of student inquiry was unclear. The research indicated that various PjBL components attract the attention of both students and educators. These findings enhance our understanding of PjBL's potential and the challenges of implementing the proposed assessment in educational settings. The study's insights and the framework of key qualities derived from it can guide research-based implementation and the design of the PjBL approach and related educational areas.

Keywords: assessment, project-based learning, writing, academic outcomes

INTRODUCTION

Achieving outcomes in educational instruction and learning requires that both teachers and students are adequately prepared with the most relevant methods and strategies. It is widely acknowledged that the primary goal of educational institutions today is to provide students with opportunities to showcase their diverse capabilities and ideas (Allen & Heredia, 2021; Wrigley & Straker, 2017). To meet the challenges and complexities of effective classroom strategies, teachers and students need a diverse set of skills, including communication, critical thinking, and teamwork (Lee et al., 2014). Consequently, Project-Based Learning (PjBL) is recognized as an effective approach for equipping students with these essential skills. When integrated with other methods, PjBL enhances cooperative learning among students. PjBL has numerous positive effects on English teaching and learning, particularly in improving students' writing abilities (Condliffe et al., 2017). Additionally, it allows students to discuss and reflect on educational activities during group projects and receive immediate feedback from peers and teachers (Condliffe et al., 2017; Hidayati et al., 2023). In essence, PjBL is a powerful educational approach that can significantly enhance student motivation, foster skill development, and promote collaboration through teaching and group projects.

The PjBL movement is rapidly becoming more widespread among practitioners, for example, (Knoblauch, 2022) pointed out that a PjBL approach necessitates an immediate change not only in the curriculum, but also in the instruction and assessment for both the instructors and the students. This decision for actual change was made in reference to the fact that a PjBL approach necessitates an immediate change. In a PjBL environment, Frank et al. (2003) & Stefanou et al. (2013) identified a new function for the educator to undertake in the classroom enabling learners to develop their own knowledge, mentoring, giving resources, and replacing lectures to students who were not engaged with the material are the new methods of instruction. In this regard, participants are no longer merely recipients of information but rather active problem-solvers on the projects they are working on. Beckett (2002) and Petrosino (2004) believed the beneficial side effects of PjBL for students can be defined as the development of positive attitudes towards their learning process, work routines, problem-solving ability, and self-esteem. Coming to a similar conclusion, suggesting that participants in PjBL learn better and are more involved in their learning (Hanif et al., 2019; Hidayati et al., 2023). It is implied once students reach the conclusion of their projects, they engage in individualized contemplation and reflection on their experiences with the PjBL processes due to the fact its instruction focused on student inquiry that encourages students to actively construct their own knowledge via the completion of authentic projects (Brundiers & Wiek, 2013; Krajcik & Shin, 2014; Miller & Krajcik, 2019).

PjBL has gained favour among educators and members of societies as an exciting method that stimulates students' desire to acquire knowledge (Guo et al., 2020a; Savery, 2006; Widodo et al., 2022). There is evidence that teachers are adopting PjBL, and studies have shown that the strategy is successful when administration provides strong backing for it. Students will be able to maintain themselves in issue situations, and their educational pursuits will be powered by construction, social contexts, creative problem solving, and connection to the community (Miller et al., 2021). PjBL is successful when teachers are given the autonomy, resources, and flexibility necessary to alter the level of instruction, construct learning scaffolds, and develop differentiation strategies (Guo et al., 2020). Teachers are need to rely on their own expertise in order to successfully scaffold relationships that are productive and equitable among students who come from a variety of demographic groups. To this aim, it is emphasized the significance of school administrations providing support for teachers in their roles as advisors who can foster individualized knowledge among students (Martinez, 2022; Petrosino, 2004). In the review that Chen & Yang (2019) conducted, a comparison was made between

the impacts of PjBL and those of instructors' direct instruction on the academic accomplishment of students in primary, secondary, and postsecondary education. In the context of this research, PjBL relates to a mode of instruction in which students are actively involved in the creation of outcomes while also working on real-world projects. The findings revealed that the use of PjBL had a significantly greater beneficial effect on the academic achievement of the students than did direct instruction. However, Lee et al. (2014) asserted that the study of PjBL in higher education has lagged significantly behind the growth of PjBL in K-12 education, which they contrasted with the rapid advancement of PjBL in K-12 education. As a result, the intention of this research is to provide a contribution to a more complete knowledge of PjBL as it is utilized in higher education (Guo et al., 2020).

The results of a number of studies conducted in ESL and EFL settings indicate that implementing a PjBL approach in the classroom can result in a wide variety of positive outcomes for students' language acquisition. What we believe about these perceived benefits mostly from previous reports, which indicates that PjBL, much like task-based language instruction, establishes relevant settings for real-world language usage (Beckett, 2002; Savery, 2006). PjBL is encouraging of areas such as enhancing student engagement (Ayaz & Söylemez, 2015; Beckett, 2002; Hidayati et al., 2023) and student autonomy for learning, in addition to its contribution to the acquisition of language through interactions that are valuable and authentic (Allen & Heredia, 2021). In spite of the benefits that have been established, additional case studies are required in order to investigate projects that can be carried out with students in academic EFL settings. In the growth of students' cognitive abilities during the process of PjBL, on the one hand, studies claim that PjBL can assist students in developing a meaningful comprehension of the basic ideas of their respective disciplines and improve their academic performance (Jaiswal et al., 2021; Kolmos et al., 2020; Rouvrais et al., 2006). PjBL can also promote the growth of competencies related to students' science learning. Some examples of these higher-order competencies include problem solving (Chua et al., 2014; Hong et al., 2012), problem attempting to raise (Sasson et al., 2018), logical arguments (Hsu et al., 2016), critical thinking (Holmes & Hwang, 2016). PjBL appears to be well adapted for developing legitimate approach in writing settings, which may otherwise provide a challenge for encouraging students to utilize PjBL productively. This conclusion was reached based on past research, which can be summarized it seems as though the PjBL approach is well suited to developing skills that are more general, such as the language learning, academic competences or even consequences of students' learning outcomes (Ghosheh et al., 2021; Lin, 2018).

Given the widely acknowledged positive impact of PjBL on learning outcomes, it is crucial to consider its assessment for effective implementation. While previous studies have explored various aspects of PjBL in language and disciplinary learning contexts, there remains a gap in evaluating proposed assessment approaches, particularly in writing classes. This study underscores the need for additional classroom-based research, particularly longitudinal studies with undergraduate learners utilizing PjBL in writing courses, to provide informed guidance to educators and researchers. The current study addresses these gaps by examining how undergraduate students enhance their writing skills through PjBL in AW course. Over the course of a semester, the study documented the implementation of PjBL and assessed its impact on students' processes and outcomes. The research design aimed to establish the validity of integrating PjBL with a proposed assessment framework to enhance students' writing abilities. This study emphasizes the potential benefits of PjBL in teaching writing within AW courses, drawing from practical examples of assessment approaches used in previous university studies. It also discusses the implementation of a PjBL project specifically tailored for AW contexts. By bridging these gaps, the study contributes to the broader understanding of PjBL's applicability and effectiveness in enhancing student learning experiences and outcomes in writing education.

METHOD

This research aimed to evaluate the proposed assessment of the effectiveness of PjBL in an AW course. The study utilized a pre-experimental design with a single group, conducted at STAI Diponegoro Tulungagung, a private university in East Java, Indonesia. The participants comprised 30 undergraduate English majors in their sixth semester. The implementation of PjBL in the AW course was based on process pedagogy, requiring each writing assignment to go through three drafts before receiving a final grade. All students enrolled in the course during the 2022/2023 academic year, which totalled 14 credit hours. The study's design featured one-group pre-test and post-test elements, with no control group for comparison. Participants were treated as a single condition for both the treatment and evaluation phases. Throughout the learning activities, the experimental group underwent both pre-tests and post-tests to assess their writing abilities in the AW course that integrated the PjBL approach. Data were collected using these tests, which were specifically designed to evaluate the students' writing skills as part of the PjBL-integrated curriculum. The pre-test and post-test scores served as the final grades for the participants. An independent t-test was used to analyze the test data, comparing the obtained t-value to the t-table to determine statistical significance. This analysis provided insights into the effectiveness of the PjBL approach in enhancing students' writing skills, highlighting its potential benefits and areas for improvement in educational practice. This study investigated two hypotheses, which were as follows: If t_{count} is obtained greater than t on the table, the hypothesis (Ha) is accepted, and if t value is obtained less than t on the table, the hypothesis (Ho) is accepted. Conversely, the details can be expressed as follows:

1. Ho: There is no significant difference in the assessment-proposed of PjBL approach in AW course on the students' learning outcomes.

2. Ha: There is a significant difference in the assessment-proposed of PjBL approach in AW course on the students' learning outcomes.

In addition to collecting data from both the pre-test and post-test phases, comprehensive descriptive and inferential data analysis was conducted using the SPSS Statistics 26 program. To ascertain the statistical significance of the treatment effect, a paired sample t-test, also referred to as a dependent t-test, was employed. This test compared two samples extracted from the data, marking a crucial starting point to ensure the normal distribution of the data, a prerequisite for subsequent analyses. Furthermore, the Kolmogorov-Smirnov statistic was utilized to assess whether the data adhered to a normal distribution. This comparison aided in determining if the experimental group's performance in enhancing students' writing in the AW course, with respect to PjBL's project, was statistically significant. If the significance level exceeded 0.05, it was inferred that the data exhibited a normal distribution. Subsequently, the comparison of students' pre-test scores with their post-test scores via a paired sample test was conducted to gauge the effectiveness of the experimental group in enhancing students' writing skills. This step was executed in anticipation of the expected outcomes of the normality test. The final step involved interpreting the results of the paired sample test, crucial for determining the acceptance or rejection of the null hypothesis (Ho) and the approval or disapproval of the alternative hypothesis (Ha). A significance value below 0.05 indicated statistical significance, leading to the acceptance of Ha, and vice versa. This comprehensive analysis framework facilitated a robust assessment of the impact of the PjBL approach on students' writing skills within the AW course. With regards to the stages of the assessment of PjBL in AW course, the workflow is presented on the following table.

Table 1. The workflow of assessment-proposed of PjBL approach in AW course

Stage	Description	Assessment
Conceptualization of idea	Introduction of the work plan and develop ideas	Assess this workflow; if needed, suggest changes
Research of existing works (literature review)	Literature review and evaluation of related previous studies used	Assess missing collectively published articles and find out the research gaps
The sequence and composing of ideas.	Developing ideas in introduction and literature review (if any)	Assess students' works on developing introduction and literature review in their progress
Methodology used	Elaborating and composing method applied	Assess students' works in method part and its elements
Research findings	Interpretating the findings and data displayed	Assess student's work in their elaborating findings
Discussion	Argumentation the results findings in discussion section	Assess discussion section
Conclusion	Sum up the general findings	Assess conclusion, implication and further suggestions in students' work

Table 1 presents the structured workflow of the assessment-proposed PjBL approach within the AW course. It delineates each stage as follows: conceptualization of ideas involves introducing work plans and idea development, with assessment aimed at evaluating the workflow and recommending refinements if necessary; research of existing works includes literature review and evaluation of prior studies, focusing on identifying gaps in collective published research; sequencing and composing ideas entails students' development of introductions and literature reviews, with assessment directed at monitoring progress in these critical areas; methodology details the elaboration and application of research methods, with assessment centered on the thoroughness and coherence of students' methodological approaches; research findings interpretation involves students' analysis and presentation of data, with assessment focusing on the clarity and depth of their findings; discussion requires students to argue and contextualize their results, with assessment addressing the cogency and relevance of their arguments; and conclusion summarizes the overall findings, implications, and recommendations for further research, with assessment aimed at evaluating the completeness and insightfulness of students' conclusions.

RESULTS

The aim of this study was to investigate the impact of the proposed assessment of the PjBL approach on the instruction of the AW course during the 2022/2023 academic year at STAI Diponegoro Tulungagung. Data collection included a pre-test administered before participants received the PjBL treatment and a post-test conducted after the treatment during the AW course using the PjBL approach. Both sets of data were gathered before and after the treatment sessions. The AW course involved weekly ninety-minute sessions (totaling 14 sessions), where the lecturer implemented the PjBL approach and its assessment proposal. The pedagogical approach encompassed lecture design, implementation, assignment, and evaluation of student writing projects throughout the course duration. Data were collected and analyzed using the SPSS Statistics 26 program, employing descriptive and inferential methods to draw conclusions from the findings. Descriptive analysis provided insights into mean scores, standard deviation, and the range of scores across the pre-test and post-test periods. Inferential statistical analysis was utilized to interpret the results of hypothesis

testing. Table 2 presents the outcomes of the descriptive statistical analysis conducted during the study, facilitating a comprehensive understanding of the effects of the PjBL approach on students' writing skills in the AW course.

Table 2. Pre-test and post-test descriptive analysis results

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test	64.85	30	7.442	1.325
	Post-test_PjBL	84.25	30	5.221	1.242

Table 2 indicates the differences results between pre- and post-tests in the implementation of PjBL in AW course as well as its assessment-proposed. The results show, in pre-test, the mean score is obtained 64.85 *(std. dev = 7.442; std. error = 1.325)* and the post-test mean's score is 84.25 *(std. dev = 5.221; std. error = 1.242)*. The data that the experimental model of PjBL in AW course has statistically enhanced student' writing learning outcomes. These results are indeed the average of all of the results. The inferential test, also known as the paired sample test, can be carried out if it has been determined, as was stated before, that the data follow a normal distribution. Due to the fact that there is just one group being represented in the sample, doing a homogeneity test on it is not necessary. After that, the Kolmogorov-Smirnov test was used to determine whether or not the data were normally distributed. The findings of the experimental correlation of the PjBL approach in the AW course with regard to the proposed model design of evaluation are presented in Table 3.

Table 3. The Kolmogorov-Smirnov test

		N	Correlation	Sig.
Pair 1	Pre-test & Post-test__PjBL	30	.762	.002

Table 3 reveals the value of the data findings in the implementation of PjBL in AW course regarding its assessment-proposed. The significance in paired samples correlation shows .002 *(correlation = .762)*. based on the result it is implied this model's usage to the treatment of PjBL-based lecture activities in the AW course has produced different results in terms of the assessment-proposed. Taking into account the importance of the paired samples correlation, it also reveals a correlation value of 0.02, which indicates that there was an influence both before and after the implementation of the model approach. This is because the paired samples correlation was significant. The results of the correlation can be used as the basis for a paired samples t test, which can then be used to make the determination that the data from both the pre-test and post-test periods are equally distributed and that the data fulfil the criteria for hypothesis testing. In light of the fact that the requirements for conducting hypothesis testing have been fulfilled, inferential analysis is carried out in this instance by making use of a paired sample test. In order to determine whether or not the experimental approach on PjBL in AW course about its assessment-proposed had a statistically significant impact on students' writing, the hypothesis testing strategy was utilized. The results of the study are presented in Table 4.

Table 4. Paired samples t-test

		Mean	Std. Dev	Std. Error Mean	95% Confidence Interval				Sig. (2tailed)
					Lower	Upper	t	df	
Pair 1	pretest - posttest	8.214	5.124	1.018	7.284	12.227	7.147	29	.000

The findings of paired samples t-test show a gained-mean is 8.214 *(std. dev = 5.124; std. error = 1.018).* With regard to the level of interval's confidence (0.5), it shows the lower value is 7.284 and the higher value is 12.227. A conclusion that can be drawn from the data presented in table 3 is that the significance level, also known as Sig. (2-tailed), is 0.000, which is a value lower than 0.05. Moreover, the result of hypotheses testing indicates Ha *"There is a significant difference in the assessment-proposed of PjBL approach in AW course on the students' learning outcomes"* is accepted. On the other hand, it is asserted that the PjBL application, in addition to its assessment-proposed in the AW course, has a significant influence on students' writing and is effective as a learning model. Both of these assertions have been established.

DISCUSSION

The PjBL strategy, as well as its evaluation in the context of the AW course as a project-based learning settings, was the focus of this study. In addition, the current study studied the relationship between the PjBL strategy and its assessment-proposed in terms of the students' overall academic accomplishment in their writing. In particular, we characterized students' writing skills based on their thoughts on creating goals, allocating responsibilities, implementing coordinating procedures, and developing their writing ideas. These were all taken from the students' writing processes. The first findings of the study indicate that the concept of conceptualization of writing ideas lacked essential components such as effectively allocating roles and setting goals. However, the PjBL strategy and its assessment that was provided in this recent study, furthermore, were successful in establishing the encouragement on student elaborating ideas' processes. These findings can be rationalized using the PjBL model, which asserts that the stronger a group's relationships and processes become, the longer its members work on a specific project and the more responsibility they are given for its completion (Condliffe et al., 2017; Skliarova, 2021). As a consequence, all of the students showed a high level of competency in writing as a final result for these particular cooperation abilities, as a result of the fact that they were engaged in a project for the entire semester (Lu, 2021).

Lesson characteristics should deeply involve lecturer-students in the PjBL approach to promote productive adaptation of resources and innovate their teaching and learning activities. This would be required for the design principle of the PjBL approach as well as its assessment, which is proposed in the AW course. Lesson elements of the AW course have the potential to allow constructive adaption of materials and innovation in teaching. There are a variety of motivating factors that encourage educators to modify lesson plans (Kim, 2021; Zaafour & Salaberri-ramiro, 2022). In the process of implementing the proposed design, we are required to take into account the various possible adaptations, as well as leverage and affect those potentials. In essence, its premise advocates for a move away from a high-fidelity approach to design and implementation and reflects the reality of adapting a curriculum to a variety of circumstances, namely that adaptation is unavoidable (and is even desirable for promoting changes in educators practice) (Ma, 2018; Umar & Ko, 2022). This means that the written project on PjBL features in the curriculum are opened up to adaptation by the teacher, while at the same time being adapted with integrity to PBL practices and is developed to accommodate lecturers in making use of this concepts. This pertains to the AW course-PBL curriculum that was designed (Lee et al., 2019; Markula & Aksela, 2022; Song & Zhou, 2022).

The outcomes of this study reveal that sustaining and expanding the development of AW course can be taught and strengthened through the integration of PjBL curricula. These curricula support the development of students who are capable of posing and solving problems, as well as working collaboratively (Beckett, 2002; Hidayati et al., 2023; Guo et al., 2020). The novel uses of project-based curricula, as well as collaborative work, are contingent upon fundamental changes in the manner in which we prepare teachers for the classroom and continue to support them once they

are there. According to the findings of the research done so far, in order to bring about a change in teaching methods, teacher education and professional development need to be of a suitable quality and quantity (Chua et al., 2014; Miller & Krajcik, 2019). In addition, educators require time to reflect on, talk about, and put into practice new strategies before they can accept them (Lin, 2018; Zaafour & Salaberri-ramiro, 2022).

The findings of this study indicate that the integration of PjBL in the AW course had a positive impact on students' writing skills. The initial findings revealed that students' conceptualization of writing ideas lacked essential components such as effectively allocating roles and setting goals. However, the PjBL strategy and its assessment, as implemented in this study, successfully encouraged students to elaborate on their ideas. These findings align with the PjBL model, which suggests that stronger group relationships and processes lead to increased project engagement and responsibility. As a result of their active involvement in a semester-long project, all students demonstrated a high level of competency in writing. (Condliffe et al., 2017; Skliarova, 2021; Lu, 2021).

The characteristics of the AW course played a significant role in facilitating the effective implementation of the PjBL approach. The course elements provided opportunities for deep engagement and innovation in teaching and learning. Educators were motivated to modify their lesson plans to accommodate the principles and assessments proposed in the PjBL approach. The flexibility of the curriculum allowed for adaptations that respected the integrity of PBL practices while catering to the diverse needs of lecturers. This highlights the importance of providing suitable support and professional development to teachers to foster the successful implementation of innovative strategies in the classroom. (Kim, 2021; Zaafour & Salaberri-ramiro, 2022; Ma, 2018; Umar & Ko, 2022).

The outcomes of this study suggest that the integration of PjBL curricula in the AW course has the potential to enhance the development of students' problem-solving abilities and collaborative skills. By engaging in real-world projects, students develop positive attitudes toward their learning process, work routines, problem-solving abilities, and self-esteem. The PjBL approach encourages active participation, reflection, and knowledge construction, leading to improved motivation and skills among students. However, for the widespread adoption of PjBL in education, it is crucial to provide teachers with adequate support and training. High-quality teacher education and professional development programs are necessary to facilitate effective implementation of PjBL and to promote changes in teaching practices. (Beckett, 2002; Guo et al., 2020; Chua et al., 2014; Miller & Krajcik, 2019; Lin, 2018; Zaafour & Salaberri-ramiro, 2022).

Moreover, the findings of this study support the effectiveness of PjBL in improving students' writing skills in the AW course. The successful integration of the PjBL approach relied on the characteristics of the course and the ability of educators to adapt and innovate their teaching practices. The outcomes suggest that PjBL enhances students' problem-solving abilities, collaborative skills, and overall academic achievement. However, to maximize the benefits of PjBL, it is crucial to provide teachers with adequate support, professional development, and time for reflection. Further research is needed to explore the long-term effects and applicability of PjBL in different educational contexts. (Allen & Heredia, 2021; Wrigley & Straker, 2017; Lee et al., 2014; Knoblauch, 2022; Frank et al., 2003; Stefanou et al., 2013; Martinez, 2022; Petrosino, 2004; Chen & Yang, 2019; Savery, 2006; Ghosheh et al., 2021; Lin, 2018).

While the purpose of this study was to confirm the existing, though somewhat limited, body of literature on the connection between PjBL curricula and its assessment-proposed on skill development, it did so in a way that also raised a few questions that are related to the topic and should be investigated further. For instance, what is the best way for a group of lecturers to construct PjBL lessons through joint effort? In particular, what kinds of insights may be gained by observing lecturers

as they construct a unit, present it to the class (or classes), have students work on a project, and then present those projects to the class at the conclusion of the unit? Another question that has to be answered concerns the potential influence that the type of curriculum chosen can have on the success of PBL methods. Last but not least, there is a need for additional research to be conducted in order to develop frameworks for building teacher capacity in applying the principles of writing skills through an integrated, inquiry-based curriculum that is both relevant and rigorous enough to prepare students for life after high school.

CONCLUSION

This research study focused on assessing the effectiveness of the PjBL approach within an AW course. The findings illuminate various aspects of PjBL implementation and its impact on students' writing skills. The study revealed that the PjBL strategy, along with its assessment proposal, successfully enhanced students' ability to elaborate on their writing ideas and engage in cooperative processes. Integrating PjBL curricula in the AW course yielded promising results in terms of overall academic achievement and the development of problem-solving and collaborative skills. These findings have important implications for educational practice. Firstly, the study underscores the significance of deep engagement between lecturers and students in the PjBL approach to facilitate the productive adaptation of resources and foster innovation in teaching and learning activities. It highlights the need for educators to have the autonomy, resources, and support necessary to implement PjBL effectively. Furthermore, the research emphasizes the importance of teacher education and professional development to equip educators with the skills and strategies required for successful PjBL implementation in the classroom. However, it is crucial to acknowledge the limitations of this study. The research was conducted within a specific context, focusing on an AW course, which limits the generalizability of the findings to other disciplines or educational settings. Additionally, the study primarily relied on self-report measures and qualitative analysis of students' writing processes, which may introduce biases or subjective interpretations. To address these limitations and enhance PjBL implementation, several suggestions are proposed. Future research should aim to replicate the study in diverse educational contexts and disciplines to examine the generalizability of the findings. Incorporating objective measures of writing performance, such as standardized assessments or rubrics, can provide a more robust evaluation of students' writing abilities within the PjBL framework. Moreover, longitudinal studies that follow students' progress over an extended period can offer deeper insights into the long-term effects of PjBL on academic achievement and skill development.

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