

THE IMPACT OF OPEN KNOWLEDGE MAPS ON UNDERGRADUATE STUDENTS' LITERATURE REVIEW WRITING IN LINGUISTICS

(Dampak Open Knowledge Maps terhadap Penulisan Tinjauan Pustaka Mahasiswa Sarjana dalam Bidang Linguistik)

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Abstract

This research aims to evaluate the impact of Open Knowledge Maps (OKM) on undergraduate students' literature review writing in linguistics. Literature review is one of the most important academic skills. However, many students face difficulties in finding relevant sources, structuring ideas, and integrating material. This study applies a quasi-experimental design involving undergraduate linguistics students. The participants were assigned to an experimental group using Open Knowledge Maps and a control group using conventional search methods. The data were collected using a pre-test and post-test of literature review writing and supported by an assessment rubric. The results show that students using Open Knowledge Maps achieved significant improvement compared to students in the control group. On statistical analysis there was significant difference between groups ($t(66) = 6.89, p < .001$), with a high effect size (Cohen's $d = 1.63$). The findings suggest that visual knowledge mapping may support deeper exploration of academic literature and supports the development of critical academic literacy skills. This research contributes an easily accessible digital tool aimed at helping students improve their research and writing skills, thereby contributing to pedagogical practices in linguistics.

Keywords: academic writing; digital research tools; literature review; linguistics

Abstrak

Penelitian ini bertujuan untuk mengevaluasi dampak Open Knowledge Maps (OKM) terhadap kemampuan penulisan tinjauan pustaka mahasiswa sarjana di bidang linguistik. Tinjauan pustaka merupakan salah satu keterampilan akademik yang paling penting. Namun, banyak mahasiswa mengalami kesulitan dalam menemukan sumber yang relevan, menyusun gagasan, dan mengintegrasikan berbagai materi. Penelitian ini menggunakan desain kuasi-eksperimental yang melibatkan mahasiswa sarjana linguistik. Para peserta dibagi ke dalam kelompok eksperimen yang menggunakan Open Knowledge Maps dan kelompok kontrol yang menggunakan metode pencarian konvensional. Data dikumpulkan melalui pre-test dan post-test penulisan tinjauan pustaka serta didukung oleh rubrik penilaian. Hasil penelitian menunjukkan bahwa mahasiswa yang menggunakan Open Knowledge Maps mengalami peningkatan yang signifikan dibandingkan dengan kelompok kontrol. Berdasarkan analisis statistik, terdapat perbedaan yang signifikan antara kedua kelompok ($t(66) = 6.89, p < .001$), dengan ukuran efek yang tinggi (Cohen's $d = 1.63$). Temuan penelitian ini menunjukkan bahwa pemetaan pengetahuan visual berpotensi mendukung eksplorasi literatur akademik yang lebih mendalam serta mengembangkan keterampilan literasi akademik kritis. Penelitian ini memberikan kontribusi berupa alat digital yang mudah diakses untuk membantu mahasiswa meningkatkan keterampilan penelitian dan penulisan mereka, sehingga turut berkontribusi terhadap praktik pedagogis di bidang linguistik.

Kata-kata kunci: penulisan akademik; alat penelitian digital; tinjauan pustaka; linguistik

INTRODUCTION

Literature review is a fundamental component of academic writing in linguistics, as it enables students to engage critically with existing research, identify gaps, and construct well-grounded arguments. It is a complex academic task that challenges students to synthesize, evaluate, and organize knowledge into coherent arguments rather than to simply summarize sources. However, many students struggle to develop good literature review writing. Literature review is one of the most challenging part in academic writing as students are expected to synthesize sources rather than merely summarize them (Santos & Silva, 2019). The problem happens due to the limited ability to find relevant sources, disorganization of ideas, and a tendency to summarize rather than synthesize previous studies. Therefore, organization of literature review and appropriate placement of citation remains a struggle for many graduate students (Chen & Kuo, 2012). Students often face difficulties to make the writing coherent, which is crucial for scholarly work. In other words, students need to learn how to manage sources and build evidence-based arguments to succeed (Hyland, 2019).

In higher education, writing a literature review is a part of developing an academic literacy. It includes the students' ability to search, evaluate, and integrate information from multiple sources. The students' critical reading and source-evaluation skills that are essential for an effective literature review (Boote & Beile, 2005). However, traditional method of literature search based on keyword search in academic databases often do not support students in understanding the broader structure of a research field. Without training, students commonly depend on descriptive summaries (Swales & Feak, 2012). It makes students struggle to identify thematic relationships among studies, which limits their capacity to construct a comprehensive and systematic review.

To answer these challenges, the use of digital tools for visual exploration of knowledge has gained increasing attention. Students need guided support when using AI or digital tools to produce literature review (Islam, et al, 2025). Digital mind mapping tools can improve students' critical thinking in ESL writing courses (Karim & Mustapha, 2020). Open Knowledge Maps (OKM) is an open-access tools that provides visual representations of research topics by clustering related publications. Unlike traditional search engines, OKM enables users to explore academic literature through thematic maps, making it easier to identify key areas, trends, and connections within a field. Visual mapping tools help learners in decreasing cognitive load while source searching and organization (Widiatmojo, 2020). OKM is a technique that help student comprehend and organize the information effectively.

This study offers several key contributions to the literature. First, although previous studies have examined digital tools in academic writing and the effects of the mapping method, there is limited empirical evidence on the pedagogical use of OKM that remains limited. This study addresses that gap by employing a quasi-experimental approach to measure the effectiveness of OKM in improving literature review writing. Second, this study focuses on linguistics, which helps to provide more specific insight into academic writing growth. Third, the study applies a comprehensive multi-criteria assessment rubric that includes important aspects of literature review writing such as source relevance, citation correctness and coherence. This study provides a comprehensive understanding of how visual knowledge mapping can extend students' literacy skills through an experimental design with well-defined evaluator framework.

Therefore, this study aims to explore the effectiveness of OKM on students literature review writing in linguistics based

on the identified research gap. To achieve this objective, the study is guided by the following research question: Does the use of Open Knowledge Maps significantly improve students' literature review writing compared to conventional search method.

This study is based on the intersection of constructivist theory and cognitive load theory. These theories emphasize that learners actively construct knowledge by organizing, interpreting, and integrating new information with prior understanding (Powell & Kalina, 2009). As students discover the kinds of studies on a particular topic through the literature review writing process, this makes the students create coherent academic arguments.

Cognitive load theory addresses how the design of instructional tools can facilitate or inhibit learning by reducing extraneous mental effort (Sweller, et.al, 2011). OKM visually clusters related research, which may reduce extraneous cognitive load allowing students to focus on higher-order academic tasks such as comparison and synthesis, or thematic organization of research. Collectively, these theories create a cohesive framework for understanding how OKM may support students' literature review writing development.

In the context of literature review writing, the process involves identifying relations between studies or groups of studies, and grouping them into meaningful themes, and synthesizing their findings. However, these processes are cognitive and challenging. These challenges indicate that literature review writing is not only a linguistic task but also a cognitive and epistemic process involving knowledge construction and organization (Schunk, 2020) argue that learning effectiveness is influenced by the amount of mental effort required to process information. Piaget, (1970) believes that learners build knowledge as they connect new information to the existing one.

Previous research has shown that students in EFL and linguistics contexts

struggle with identifying relevant sources, thematic structure, and integrating multiple studies (Chen & Kuo, 2012). Nurkamto & Drajiati (2022) explain that traditional search engines in academic often create results in linear and fragmented formats. It can overwhelm students and decrease student's ability to identify trends across studies. As the result, students tend to adopt descriptive summaries rather than carrying out higher-order processes.

Visual learning and knowledge mapping can be used to address this challenge. Visual aids, such as the concept maps and knowledge maps utilized in this study and it enable learners to discover relationships between concepts and organize information in more coherent manner (Kress & Leeuwen, 2006). Researchers have demonstrated that mind mapping strategies can improve students' writing by organizing their idea (Tarin & Yawilong, 2022). However, the majority of existing tools mainly assist students in brainstorming individual ideas rather than exploring scholarly literature systematically.

The increasing integration of digital technologies in education has also influenced how students conduct literature reviews (Suryantara, 2019). Recent studies highlight that digital tools can enhance students' ability to retrieve and manage information, as well as support higher-order thinking skills such as critical analysis and synthesis (Zhipeng, 2022). Additionally, AI-assisted tools have been reported to improve efficiency in literature review writing, although their contribution to deep critical engagement remains limited (Ahmad et al., 2022). These findings suggest that despite their advantage, many digital tools remain designed to provide information rather than offer to enhance knowledge structuring. This research attempts to gain a deeper insight into how visual knowledge mapping can help students in both cognitive processing and academic literacy development, by drawing on relevant theoretical perspectives

provided by constructivism, cognitive load theory and visual learning.

METHOD

This study employed a quasi-experimental design using a pre-test and post-test non-equivalent control group model to examine the effect of integrating Open Knowledge Maps (OKM) on students' literature review writing in linguistics. The participants were 68 undergraduate students from a linguistics course at Universitas Warmadewa. The students were in the same academic year and had experience in writing short literature review assignments. These criteria were used to make sure that the participants had similar base knowledge and writing experience. The participants were from two different classes and divided into an experimental group and a control group.

The treatment was implemented over four weeks within regular class sessions. It consists of eight meetings with two sessions a week and each lasting 90 minutes. The experimental group was instructed using Open Knowledge Maps (OKM) as the literature search engine. Students were guided to search research topics through thematic clusters and identify relevant studies. The instruction emphasized visual exploration, thematic organization, and critical source synthesis. The control group was given conventional instruction using lecturer explanations, textbooks, and

standard academic databases (e.g., keyword-based searches). Students identified sources through linear search results and structured their literature reviews without the support of visual mapping tools. The method that was taught included conventional strategies such as note-taking, summarizing, and organizing references.

Data were collected by using a pre-test and post-test of literature review. The result was evaluated using an analytic rubric on the following 5 criteria: source relevance, thematic organization, synthesis of sources, citation accuracy, and coherence, each scored on a scale of 1 to 5. In the synthesis criterion, a score of 5 indicates the ability to critically integrate multiple sources while a score of 1 reflects simple summary without integration. The collected data were analyzed using descriptive statistics to determine mean scores and standard deviations.

To ensure validity, the rubric was reviewed and refined by two experts in applied linguistics and academic writing. Reliability was established by involving two different raters who assessed the same samples of students work. The level of agreement was calculated using Cohen's Kappa and resulted in a coefficient of 0.82, which indicates strong agreement. Internal consistency of the rubric was also assessed with high reliability as indicated by Cronbach's alpha of 0.87.

Table 1. Literature Review Writing Assessment Rubric

Score	Source Relevance	Thematic Organization	Synthesis of Sources	Citation Accuracy	Coherence
5 (Excellent)	Sources are highly relevant and support the topic	Clear and logical thematic structure	Critically integrates multiple sources, compares, and identifies relationships	Accurate and consistent citation style	Writing has strong logical flow and clear connections
4 (Good)	Mostly relevant and appropriate scholarly sources	Generally well-organized themes with minor inconsistencies	Synthesizes sources with some comparison, though not fully developed	Minor citation errors but generally consistent	Mostly coherent with slight lapses in flow
3 (Moderate)	Some relevant sources, but includes less appropriate or outdated ones	Basic thematic grouping but lacks clarity or depth	Limited synthesis; some comparison but mostly descriptive	Several citation errors and inconsistencies	Somewhat organized but ideas may be loosely connected
2 (Poor)	Limited relevance; sources do not fully support the topic	Weak or unclear organization; themes are poorly defined	Mostly summary with little or no synthesis	Frequent citation errors	Lack of coherence; ideas are disjointed
1 (Very Poor)	Sources are irrelevant or inappropriate	No clear organization or thematic structure	No synthesis; only listing or unrelated summaries	Incorrect or missing citations	No logical flow; very difficult to follow

DISCUSSION

This study examined the effectiveness of integrating Open Knowledge Maps (OKM) in improving students' literature review writing in linguistics. The results reveal that students in the experimental group scored higher than those in the control group. These results indicate that OKM offers pedagogical support for students in navigating and structuring academic literature.

In terms of constructivist theory, the findings can be explained by the role of active knowledge construction in learning (Hardika & Andriyanto, 2025). The OKM platform allows students to explore studies through thematic clustering rather than as isolated articles. Conventional search engine presents fragmented information, requiring substantial mental effort to organize and interpret results (Win, 2024). In contrast, OKM visually structures information in the form of cluster reducing extraneous cognitive load and allowing students to allocate more cognitive to higher-order processes like comparison and synthesis.

The results are supported by the theory of visual learning, which states that visual representations enhance comprehension by making relationships between concepts more explicit (Chen et al., 2020). The visual mapping functions of OKM enable students to track their thematic connections, which create more coherent and logically structured literature reviews. This is in line with previous studies indicating that visual mapping tools help to improve writing quality and organize thoughts (Karim & Mustapha, 2020).

It is also important to consider OKM supports the organization and exploration of literature with various sources. Without appropriate pedagogical guidance, students may still engage in surface-level processing of information. Therefore, OKM should be used as conditional upon pedagogical

assistance and not seen as definitive solution to improve literature review writing.

The findings of this study are aligned with previous research that highlighting the benefits of digital tools in improving academic writing and critical thinking. This study extends previous research by showing that visual knowledge mapping tools such as OKM improve the efficiency of literature search but also play a crucial role in enhancing the potential quality of organizing knowledge especially in a linguistics context.

In this case, the most notable finding is the very large effect size (Cohen's $d = 1.63$) achieved by the experimental group compare to controls. It shows a great impact of treatment. This large effect explained by a number of mutually associated mechanisms. First, OKM reduces search disorientation by structurally presenting literature within organized and thematic structure. Second, by using visual cluster, it allows students to develop schema where they are able to internalize relationship between studies more efficiently. Third, the tool has assisting student in exploratory learning. These combinations foster both cognitive efficiency and pedagogic richness resulting in more rapid development of literature review writing skills.

Meanwhile, the control group, which used conventional methods, showed only moderate improvement. Although traditional instruction supports basic academic writing development, it often fails to provide scaffolding the processes of knowledge organization and synthesis, the literature reviews. This result strengthens the case for instructional innovation, spesifically through the visual digital tools to solve the problems in academic writing.

Table 2. Comparison of Literature Review Performance Between OKM and Conventional

Aspect Assessed	Experimental Group (OKM)	Control Group (Conventional)	Key Finding / Interpretation
Pre-test Mean Score	12.41	12.18	Both groups showed equivalent baseline ability
Post-test Mean Score	18.76	15.28	OKM group achieved substantially higher performance
Mean Gain (Improvement)	+6.35	+3.10	OKM nearly doubled students' improvement
Statistical Significance (Within Group)	$t = 12.87, p < .001$	$t = 6.21, p < .001$	Both groups improved, but OKM had a stronger effect
Between-Group Difference	$t = 6.89, p < .001$	—	Significant advantage of OKM over conventional methods
Effect Size (Cohen's d)	1.63 (very large)	—	OKM shows a substantially stronger impact
Source Relevance	High improvement	Moderate improvement	OKM helps students identify more relevant literature
Thematic Organization	Strong improvement	Limited improvement	Visual clustering supports structured writing
Synthesis of Sources	Strong improvement	Moderate improvement	OKM facilitates comparison and integration of studies
Coherence of Writing	Improved significantly	Slight improvement	Better logical flow due to clearer structure
Learning Process	Visual, exploratory, guided	Linear, keyword-based	OKM promotes deeper engagement with research topics
Cognitive Impact	Reduced cognitive load	Higher cognitive effort	Visualization simplifies information processing

After the treatment, the post-test results revealed a noticeable improvement in both groups; however, the increase was more significant in the experimental group. Students using Open Knowledge Maps achieved higher scores in all assessment criteria with better thematic organization and synthesis. The OKM's visual clustering feature helped students to organize literature review. In contrast, the control group showed more limited improvement and still experience challenges in organizing and connecting sources.

The pre-test results show that the experimental group ($M = 12.41$, $SD = 2.12$) and the control group ($M = 12.18$, $SD = 2.20$) had similar performance in literature review writing. The minimal mean difference ($\Delta M = 0.23$) refers to initial group equivalence, meaning that the differences can be more attributed to the effect of the intervention rather than differences in groups.

Following the instructional treatment, both groups improved after instruction. However, the great of change differed substantially. The experimental group reached a post-test mean of 18.76 ($SD = 2.03$) and the control group achieved 15.28 ($SD = 2.25$). This equated to a gain score of $\Delta M = 6.35$ for the experimental group and $\Delta M = 3.10$ for the control group, suggesting

an almost twice as great improvement compared to the conventional instruction.

These patterns are further bolstered by inferential analysis. A paired-sample t-test showed that there was a significant increase in the experimental group, $t(33) = 12.87, p < .001$, showing a strong within-group effect of Open Knowledge Maps. Although the control group also improved significantly, $t(33) = 6.21, p < .001$, there was less than half the size of change, reinforcing that traditional approaches small incremental gains but have limited reach in teaching value.

An independent sample of t-test of between-group comparison confirmed a statistically significant difference in post-test performance, $t(66) = 6.89, p < .001$. This result shows that the observed performance gap between the experimental and control groups is unlikely to due solely to random variation. Additionally, the lower standard deviation of the experimental group ($SD = 2.03$) compared to the control group ($SD = 2.25$) points not only higher achievement but also more consistent performance which implies that the intervention is helpful for a broader range of learners. These positive results also had several limitations. The study was conducted within a limited time frame and involved small number as sample, which

may affect the generalizability of the findings. In addition, the study focused primarily on short-term improvement and long-term academic writing development in students using OKM should be investigated further.

The results of this study were also consistent with several empirical studies on digital tools and academic writing. For example, Liu and Puteh (2025) conducted a study demonstrating that digital tools can improve critical thinking and information processing skills of students. Islam et al. (2025) reported that technology-assisted environments support more efficient literature review practices. Similarly, Zhu et al. (2026) have shown that students' ability to synthesize sources is closely associated with structured engagement in academic texts. Current study extends these results by providing evidence that visual knowledge mapping tools such as OKM not only facilitate efficiency but also lead to major improvement in the quality of organization and synthesis between different pieces of knowledge within a linguistics context.

This study suggests that integrating OKM into linguistics instruction is an effective strategy to help students to conduct more organized and systematic literature review, specifically in terms of organizing and synthesizing academic sources. This highlights the importance of incorporating innovative digital tools into academic writing pedagogy to support students in navigating complex research landscapes.

CONCLUSION

This study concludes that Open Knowledge Maps (OKM) had strong impact to improves students' literature review writing in linguistics. Students who utilized OKM achieved better achievement than those who carried out conventional search methods, especially in identifying relevant sources, organizing themes, synthesizing information, and producing coherent literature reviews. The OKM

visual clustering and mapping features provided a more systematic and efficient literature review process for students with limited experience in drawing connection among studies.

The statistical showed that the experimental group improved from pre-test to post-test significantly compared to the control group indicates positive effects of OKM on students' academic performance. Moreover, the use of OKM reduces student challenges. Pedagogically, the implications of these findings suggest that OKM can provide an impactful tool for supporting the development of academic literacy and research skills in higher education contexts. Consequently, it is argued that while lecturers incorporate OKM into their teaching of research writing and linguistics courses to encourage students to engage more critically and effectively with the information sources.

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