Enhancing Research Skills and Reflective Learning Through Learning Logs

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ABSTRACT

Learning logs and reflective journals are infrequently utilized in schools. This study employed a learning log over two- terms period, with a grade 12 students enrolled in the AP Research course at an Applied Technology High School in the UAE. This study analyses the use of learning logs to teach research skills. It aimed to identify the benefits of using a learning log to promote learning in the research course. The learning logs themselves formed one source of data. Student reflections on the learning benefits of classroom activities were also assessed through classroom dialogue and semi-structured interviews. The learning log stimulated student reflection, and increased self-awareness about learning strategies, but did not significantly impact students' motivation. The research suggests incorporating learning logs into school curricula to promote reflective learning, provide continuous student feedback, and empower teachers to utilize logs effectively. By leveraging the potential of learning logs, educators can foster self-regulated learning and critical thinking skills in students while creating a more engaging learning environment.

Keywords: *AP Research, reflective learning, learning log, self-awareness, log utilization, critical skills*

Introduction

In the realm of education, the incorporation of innovative teaching methodologies holds the potential to improve the learning experience and foster the development of essential skills among students. One such approach that has garnered increasing attention is the utilization of learning logs, or reflective journals, as tools to promote reflective learning and skill enhancement. This paper delves into a specific application of this pedagogical strategy within the context of the Advanced Placement (AP) Research course, aimed at nurturing research skills and cultivating a culture of inquiry.

Despite the proven efficacy of learning logs in facilitating metacognition and self-regulated learning (Hatton & Smith, 1995; Kember et al., 2000; Renkl et al., 2020), the concept of learning logs has often been underutilized in traditional education. This study focuses on a comprehensive exploration of the implementation and impact of learning logs over a two-term period within the AP Research course, catering to grade 12 students at an Applied Technology High School in the United Arab Emirates (UAE).

Research Problem

The research problem addressed by this study is the underutilization of learning logs or reflective journals in the high school setting, particularly within the context of the AP Research course, despite their potential to enhance research skills, reflective learning, and overall engagement.

Research Questions:

1. How can learning logs be effectively integrated into the AP Research course to enhance research skills and promote reflective learning among grade 12 students?

2. To what extent do learning logs stimulate student reflection, elevate self-awareness regarding learning strategies, and cultivate time management skills in the AP Research course?

3. How can the experiences, perceptions, and outcomes of students engaged in the AP Research course inform pedagogical practices and inspire future educational advancements related to the use of learning logs?

These research questions guide the author's investigation into the potential benefits and challenges of incorporating learning logs into the high school curriculum, particularly in the context of research skill development and reflective learning.

In alignment with the overarching aim, the study endeavors to elucidate the multifaceted benefits of incorporating learning logs in the AP Research course. It seeks to unravel the extent to which learning logs stimulate student reflection, elevate self-awareness regarding learning strategies, and cultivate time management skills.

While the potency of learning logs in promoting reflective learning has been underscored by scholars (Schön, 1987; Moon, 1999), their application in the high school domain remains relatively uncharted territory. This research endeavors to bridge this gap in the literature by offering insights into the tangible outcomes and challenges associated with the integration of learning logs in this specific context.

As the educational landscape continues to evolve, educators and researchers are tasked with discerning strategies that enhance students' critical thinking abilities, self-directed learning, and overall academic performance. Through this study, the researcher attempts to embark on a journey to unravel the untapped potential of learning logs as transformative instruments for research skill development and reflective learning in the high school setting. By delving

into the experiences, perceptions, and outcomes of students engaged in the AP Research course, this study aims to contribute valuable knowledge that can inform pedagogical practices and inspire future educational advancements.

To improve learning and encourage independent learning, an effective method is to make learning more explicit and conscious (Watkins, 2001). This concept is rooted in metacognition, which encompasses the understanding of our own cognitive processes and the ability to regulate them. Metacognition refers to understanding our own thinking processes and being able to control them. It involves knowing our strengths, the task at hand, available strategies, and how these factors affect our ability to choose, do, monitor, and control our tasks (Flavell, 1987). Learning how to learn or having control over our learning requires reflecting on our learning experiences. In this study, the researcher investigates how keeping learning logs helps a group of Grade 12 students who are studying research skills and are required to write a 4000- to 5000-word research paper on a topic of their choice.

Literature review

The existing literature on the benefits of learning logs primarily focuses on college-level education, leaving a gap in understanding their implementation and outcomes within high school settings, specifically in relation to the AP Research course. This literature review aims to address this gap by exploring the specific use and outcomes of learning logs in the context school education. By examining the available research, this review provides valuable insights and guidance for educators and curriculum developers interested in integrating learning logs as an effective instructional tool for enhancing students' learning skills and promoting reflective learning. In the subsequent section, the author will expound upon the concept of a

learning log, drawing a clear distinction between a learning log and a reflective journal. Moreover, a comprehensive exploration of reflective learning will be undertaken, accompanied by an analysis of pertinent literature on this subject. Finally, the discourse will culminate in an examination of noteworthy research findings that underscore the advantages of integrating learning logs into educational practices.

Understanding the Learning Log

Learning logs, also known as learning journals or reflective journals, are written records or diaries where individuals document and reflect upon their learning experiences (Arthur, Costa, & Bena, 2008). These logs typically involve recording observations, thoughts, insights, questions, and reflections related to their learning process and progress.

They provide a structured framework for learners to track their learning activities, monitor their progress, and engage in self-reflection. In accordance with the perspective of self-regulation in the context of learning through writing, the utilization of learning journals/logs can be viewed as a writing activity that effectively promotes constructive cognitive and metacognitive learning approaches (Gino & Pisano, 2014).

A learning journal constitutes a writing task typically assigned as a supplementary post-course activity. After attending a lesson/lecture or completing a course, students are tasked with documenting their reflections on the materials covered. Research indicates that students who engage in learning journals exhibit notably greater acquisition of knowledge compared to those who do not partake in this practice (Connor-Greene, 2000; Wong, Kuperis, Jamieson, Keller, & Cull-Hewitt, 2002).

Additionally, learning journals have demonstrated their superiority over alternative writing assignments, such as

summarization (Cantrell, Fusaro, & Dougherty, 2000) or composing scientific reports (McCrindle & Christensen, 1995). When contrasted with other writing tasks like summaries and scientific reports, learning journals are explicitly designed to stimulate effective cognitive and metacognitive strategies aligned with self-regulated learning principles.

The existing literature lacks consistency in clearly distinguishing between reflective journals and learning logs. The two terms exhibit subtle variations, with one being perceived as less personal compared to the other. Reflective journals may emphasize subjective exploration of personal experiences, reactions, and contemplations while learning logs tend to serve as factual records of students' work processes, accomplishments, ideas, or inquiries (Equipped for the Future, 2004).

In both journals and learning logs, students can respond to various prompts related to course content, assignments, exams, their own ideas, or their reflections on specific class sessions. These entries are then submitted to the instructor for feedback. Renkl et al. (2020) demonstrated that a learning-journal example that modeled the application of the strategies primarily fostered the strategy used in the training session and learning in the transfer session. Additionally, Bangert-Drowns et al. (2004) concluded that the use of metacognitive prompts and increased treatment length enhanced the impact of the learning log on students while long writing assignments hindered students' engagement. Similar findings were echoed in Nückles et al. (2009); knowledge acquisition while writing learning journals was highest when students received cognitive and metacognitive prompts for their writing.

To conclude, as Renkl et al. (2020) pointed out, to enable learners to optimally exploit this learning opportunity, the journal writing needs to be instructionally supported.

Students can choose to use either paper-based or online formats for their journals or logs and may turn them in either before or after each class period or at any other specified time.

Reflective Learning

Reflection is a dynamic process through which students describe their learning experiences, how those experiences have evolved, and their potential implications for future learning encounters (Arthur, Costa, & Bena, 2008). Despite its historical roots in the educational philosophy of John Dewey, reflection often remains underestimated and underutilized within content-rich classroom environments. However, cultivating the practice of reflection is vital for students to comprehend and gain value from their studies. This practice is substantiated by extensive research, such as studies by Francesca Gino and Gary Pisano (2014) and Bisman (2011).

Reflection can occur before or after engaging in an action, task, or learning activity, whether in a classroom or beyond it. It entails self-examination and evaluation of past or ongoing experiences, thoughts, and actions. This introspective process is essential for gaining insights into current situations or challenges and for facilitating learning and personal growth. Engaging students in reflective learning empowers them to delve deeper into the subject matter and acquire profound insights into their own learning processes (Dianovsky & Wink, 2012).

Numerous studies have demonstrated that the practice of reflection can significantly enhance students' critical thinking abilities (Homik & Melis, 2007; RMIT, 2006; Roelle et al., 2012). Moreover, it equips students with the ability to think about their own thinking, a concept known as metacognition. This metacognitive dimension of reflection is invaluable for students in preparing for assignments and examinations (Costa & Kallick, 2008). Reflective learning serves as an

effective tool for self-assessment of one's learning journey and can lead to more positive attitudes toward learning (Wäschle, Lehmann, Brauch, & Nückles, 2015).

In summary, reflective learning is a process through which students assess and understand their learning experiences, contributing to improved critical thinking, metacognition, and overall growth. It plays a pivotal role in helping students make sense of their education and can greatly enhance their academic performance and learning satisfaction.

Benefits of learning logs

In examining the merits of integrating learning logs into educational practice, it becomes evident that these logs yield a diverse array of advantages. These advantages extend to their influence on various types of learners.

One notable advantage lies in the realm of metacognition and self-regulated learning. Learning logs serve as catalysts for the promotion of metacognitive skills and self-regulation (Wurdinger & Carlson, 2010). Encouraging learners to engage in reflective exercises, learning logs foster an acute awareness of individual learning strategies, strengths, and areas ripe for improvement. This heightened self-awareness actively involves learners in the process of their own education (Hatton & Smith, 1995).

Another significant benefit of learning logs is their capacity to facilitate the integration of new knowledge with prior understanding while nurturing critical thinking abilities (Moon, 1999). Moon's research (1999) underscored the enhancement of problem-solving skills and critical thinking that accompanies reflective learning.

Furthermore, learning logs play a pivotal role in cultivating a sense of ownership and responsibility for one's own education, thereby enhancing motivation and engagement (Kember et al., 2000). They guide students in reflecting on academic skills and techniques, emphasizing the learning process over personal opinions (Commander & Smith, 1996).

Moreover, reflective learning, through learning logs, has demonstrated a positive impact on students' communication and interpersonal competencies (Mann et al., 2009). This practice instills empathy and encourages an understanding of diverse perspectives. In professional contexts, as elucidated by Schön (1987), reflective learning enables individuals to adapt effectively to complex situations.

Learning logs also prove effective in promoting deep learning and bolstering conceptual understanding (Zimmerman & Campillo, 2003). In Zimmerman and Campillo's study (2003), students who maintained learning logs exhibited enhanced comprehension and retention compared to their peers who did not utilize such logs.

In addition, learning logs stimulate written communication and foster a sense of accountability for one's educational journey (Van Note Chism, 2006). By actively documenting progress and reflecting on achievements and challenges, learners cultivate a sense of responsibility and motivation.

It is important to note that student responses to learning logs vary considerably. For example, Thorpe's study (2004) categorized students into non-reflectors, reflectors, and critical reflectors based on their engagement with learning logs. This variability underscores the necessity for tailored instructional support to optimize the benefits of learning logs.

To this end, providing instructional support for journal writing has proven beneficial for students across a wide spectrum, encompassing both younger secondary school students (Roelle et al., 2012; Wäschle et

al., 2015) and older secondary or university students (Hübner et al., 2010; Nückles et al., 2009). The incorporation of prompts or worked examples has demonstrated effectiveness in enhancing the impact of journal writing on learning outcomes.

In summary, learning logs offer multifaceted benefits, encompassing metacognition, critical thinking, ownership of learning, enhanced communication skills, deep learning, and accountability. However, it is important to acknowledge the variability in student responses, underscoring the need for tailored instructional support to fully harness the potential advantages of learning logs within diverse educational settings.

Method

In this study, 21 grade 12 students enrolled in the AP Research course maintained learning and editing logs over two semesters and participated in a study. They were required to complete a learning log table after each lesson, covering new knowledge, actions taken, reflection, and next steps. While students had the freedom to determine log content, they were encouraged to upload logs for collaborative editing and comments. Data from these logs, along with group discussions and interviews, were analyzed to understand the role of learning logs in students' research journeys spanning over six months. Ethical considerations were followed, and participants' consent was obtained. To promote active student engagement, guided questions and sample learning logs were provided. Furthermore, this task was integrated into the formative assessment and assigned a weight of 20%. Table 1 reflects the instructions and the heading of the learning log.

Table (1): The instruction and the heading of the learning log

Instructions: Throughout conducting your research you will have to reflect on the process using this document; this task weigh 20% of your course mark. Your grade will be based on how thoroughly you complete the responses for each week in your reflection journal. The grade will be determined by the level of engagement, which is evident through detailed, thorough responses that provide evidence of a robust effort to complete the inquiry process. This document will be uploaded to your folder, and I will review and assess your work. The weekly reflection is due at the beginning of class on the first day of the new week.

Week Topic	New Learning /Points of Contact What have you learned this week? Who did you talk to/email/call? Which sources did you evaluate? (See list for suggested activities)	Actions Taken/ Data Gathered What specific actions did you take this week to move the project forward?	Reflection/ Analysis How has your thinking regarding the research inquiry changed this week?	Next Steps What specific steps do you need to take next week to move the project closer to completion?
Week1				
Week2				

The analysis of the learning logs' content identified six key benefits associated with using learning logs in the AP research course. Table 2 displays the number and percentage of occurrences of these benefits.

Table 2: Occurrence of Benefits of Learning Logs

Benefits	Number of Occurrences
Promoted reflection (Reflective Learning)	18/ 21 (85.7%)
Developed accountability and enhanced Planning	16 /21 (76.2.0%)
Built Monitoring Progress skills	17 /21 (80.9%)
Enhanced adaptability and perseverance	14/ 21 (66.6%)
Improved Time Management and Prioritization	15/ 21 (71.4%)
Promoted of Critical Thinking	16/ 21 (76.2%)

The data in Table 2 underscores the multifaceted benefits of learning logs, including promoting reflective learning, accountability, planning, progress monitoring, adaptability, time management, prioritization, and critical thinking. These findings emphasize the valuable role of learning logs in enhancing students' learning experiences and outcomes.

Specifically, learning logs enable students to effectively plan and organize their academic tasks, promoting time management skills and ensuring project and assignment deadlines are met. These findings align with previous research conducted by Mann et al. (2009), Babcock (2007), Mark (2010), Bisman (2011), and Francesca Gino and Gary Pisano (2014), highlighting the positive impact of learning logs on students' organization and time management skills

.**Relational Content Analysis**

The relational content analysis revealed that the use of learning logs in teaching and learning in the AP research course offered several advantages. It served as a valuable tool for students to document their progress, track their actions, and reflect on their learning journey. Selected quotes from the learning logs further highlight these benefits:

1. **Promoted reflection:** The learning log prompted students to reflect on their actions, thoughts, and progress weekly. This reflective practice is essential for developing self-awareness and evaluating study habits. For example, one student expressed a significant shift in their perception of the course, stating, "My thoughts about this course have dramatically changed." Others recognized the importance of specific lessons and the impact on their thinking, such as "My thinking has been affected positively during this lesson as I understood what should be included in the introduction."

2. **Developed accountability and enhanced planning:** The incorporation of the learning log fostered accountability and effective planning. Students set clear goals and outlined necessary steps for the upcoming week. This practice encouraged a structured and methodical approach to research tasks. Excerpts from the logs, such as

"By the next week, I should complete and submit the inquiry proposal form," illustrate the advantage of learning logs in fostering responsibility and strategic planning.

3. **Built monitoring progress skills:** Learning logs enabled students to track their progress over time, helping them identify strengths, areas for improvement, and stay on track with their study habits. Entries like "I achieved a lot this week in terms of the literature review and the annotated bibliography" demonstrate how the log facilitated active monitoring and documentation of progress.

4. **Enhanced adaptability and perseverance:** Analysis of the learning logs indicated students' ability to adapt and persevere, evident in adjustments made to research questions based on feedback. Participants acknowledged time management challenges and planned accordingly by allocating tasks for future weeks. For example, a student narrowed their research question based on feedback: "I got feedback from my partner, and this made me narrow my research question and specify

Abu Dhabi Emirate instead of the entire UAE."

5. **Improved time management and prioritization:** Learning logs emphasized time management and prioritization. Students allocated dedicated time for research tasks, ensuring they met important milestones. Entries like "In the winter break, I started my research design" reflect how the log helped students manage their time effectively.

6. **Promoted critical thinking:** Learning logs fostered critical thinking skills, as students engaged in self-reflection, analysis, and the derivation of meaningful conclusions. Excerpts such as "I should make my topic important and attract the readers with my topic" demonstrate how the log encouraged students to think critically about their research.

Group In-depth Interview

In-depth interviews were conducted with five randomly selected students to gain a deeper understanding of their experiences with learning logs. The questions explored their usage of the learning log, its perceived usefulness, and their intentions regarding its

future use in various settings. Subjects' responses were recorded and transcribed (Appendix B).

Question 1: How did you use the learning log in the class? Examining the subjects' responses to question 1 reveales several key findings. First, the learning log functions as a resource for notetaking and task organization, streamlining students' access to vital materials and aiding in building effective time management. Second, it fosters reflective learning, prompting students to engage in self-examining and self-assessment of their activities and their thoughts, leading to a deeper understanding of the research process. Third, the learning log facilitates

direct communication between students and their teacher, enabling timely inquiries, feedback, and guidance. Finally, while some students initially found the reflective aspect challenging, the exposure to peers' reflections fostered a supportive learning environment. Overall, these findings emphasize the learning log's role in enhancing organization, reflection, communication, and peer interaction, thereby contributing significantly to the students' success and learning experience in this research-intensive course.

Question 2: What do you think of the learning log? Was it useful? How?

Based on the in depth five responses on question 2 regarding their experiences with the learning log in the AP Research course, several findings can be drawn. The learning log proved instrumental in developing and enhancing critical skills such as adaptability, perseverance, and enhanced writing abilities. Student 2's journey from initial reluctance to acknowledging the log's role in enhancing her communication skills exemplifies this point. It was evident that there was a gradual recognition of the log's value in improving their writing. All responses highlighted its impact on study skill development. The learning log consistently emerged as a valuable tool for tracking and managing various aspects of the course. All five students acknowledged its usefulness in facilitating task organization, progress monitoring, and resource management. The diverse perspectives and experiences presented by the students highlight the learning log's potential to play a pivotal role in enhancing the overall research journey and skill development of students in similar academic contexts.

Question 3: Will you use the learning log in the future in any setting like at university, job, project? The analysis of students' responses on question 3 offer a variety of perspectives on how the learning log might be used in the future. Some students are utterly enthusiastic about continuing it, whereas others show varied degrees of caution or concern. "Absolutely, I can fully see myself using the learning record in future circumstances," one student pointed out. "It basically manages resources and keeps track of my progress with such efficiency" (Student 1). As another student put it, "I'm definitely planning to continue using the learning log, especially in similar academic settings or research projects... it helps me stay focused" (Student 2), she hopes to continue in related academic contexts.

There are, however, contrasting views as well. "The learning log has changed the game for me, but I'm not sure I'd use it professionally,"

responded a student, acknowledging its importance for academic purposes. "Whether or not it actually increases my productivity would depend on the situation." (Student 3). Another student expresses a preference for conditional usage, saying she might use it provided certain conditions are met: "provided it's a required in a related academic subject, yes, I'll use it. But if I don't perceive a clear advantage, I might prefer traditional approaches for a task or project." (Student 4).

Lastly, a student adopts a pragmatic approach, highlighting some degree of uncertainty while considering the learning log's viability in both academic and professional settings: "In academic settings like university, I'd probably give it a shot if it's recommended, but I can't say I'm super enthusiastic about it... I'll definitely use it, although I'm not entirely convinced it's something I'd naturally adopt" (Student 5).

These various responses reflect the varied factors that students take into account when deciding how to use the learning log in the future, highlighting the importance of context, rewards, and individual preferences.

In summary, the results and discussion section highlighted the benefits of learning logs in promoting reflective learning, accountability, planning, progress monitoring, adaptability, time management, prioritization, and critical thinking. These findings suggest that learning logs play a valuable role in enhancing students' learning experiences and skills. Moreover, insights from in-depth interviews revealed students' evolving perspectives on the learning log, emphasizing its utility in academic settings and the potential for future use in similar contexts.

Conclusions and Recommendations

Together, the student responses to the three questions and the analysis of the log content yielded a wealth of information that may be

used to inform curriculum design and the teachers in the classroom. The learning log, which has advantages including better organization, reflective learning, and efficient communication with educators, emerges as a powerful instrument for improving students' learning experiences. The learning log's ability to improve learners' experiences and abilities was well received by the students, which highlights its capacity to foster critical thinking abilities. Additionally, it prepares students for difficulties they will face in the real world by facilitating adaptive planning and task prioritizing.

Given these findings, educators are recommended to incorporate the learning log into curriculum as a way to support the development of all skills. However, it is essential to address any potential resistance from students by clearly explaining the justification for its inclusion and emphasizing its long-term benefits. In the learning log, offering helpful critique and guidance can promote a friendly learning environment and support students as they work towards mastery.

The design of learning log activities should take students' developmental phases into consideration as it seeks to gradually increase students' organizational and reflective skills. Transferable skills that can be used in a variety of academic and professional settings can be developed by students by incorporating the learning log across disciplines. Additionally, educators are urged to evaluate the applicability and alignment of learning log methods within prospective career contexts, recognizing potential differences in their application based on professional expectations.

In conclusion, the students' perspectives on the learning log offer compelling insights for educators and curriculum developers alike. By harnessing the tool's potential to enhance research skills, foster reflective learning, and promote effective communication, educators can shape a more comprehensive and adaptable educational experience for students, equipping them for success in both academic and professional realms.

Note:

During the preparation of this work the author(s) used AI application CAHR GPT in order to improve the subjects responses and the language readability. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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