

A STUDY OF CHATGPT AS AN ASSISTANT FOR PRE-SERVICE TEACHERS' REFLECTIVE WRITING

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Abstract

This study addresses a critical challenge in teacher education: the tendency of pre-service teachers' reflective writing to remain largely descriptive, lacking the necessary intellectual depth, conceptual framing, and critical analysis. To investigate potential technological scaffolds, the purpose of this research was to examine the efficacy of ChatGPT as a conversational writing assistant designed to support and enhance the development of structured reflective thinking during initial professional preparation. Conducted among primary pre-service teachers at Iakob Gogebashvili Telavi State University, Georgia, in December 2024, the study employed a mixed-methods research approach. Data collection involved the systematic gathering and cross-validation of independent reflective essays, ChatGPT-assisted reflective essays, and comprehensive conversation logs captured directly from the AI interface. The empirical findings demonstrate that ChatGPT can significantly and positively impact the structural organization of reflective writing, expanding content parameters, and enhancing programmatic vocabulary use. However, the data concurrently reveals that AI integration can influence student writing in unintended ways, notably by diminishing the writer's authentic voice through standardized phrasing. Consequently, the research underscores the urgent need to explore specific genres of prompt engineering and structured AI scaffolding that can effectively foster deeper metacognitive reflection without compromising original authorship. These insights offer valuable guidance for educational leaders aiming to integrate artificial intelligence responsibly into contemporary teacher training curricula.

***Keywords:** reflective writing, ChatGPT, AI writing assistance, teacher's reflection, pre-service teachers.*

Introduction

Reflective writing is an essential component of the pre-service teacher preparation process as they transition into the teaching profession, and is encouraged throughout academic coursework and school-based practice. Reflective writing involves making reflective notes on university courses, classroom observations, self-development, and other related experiences. Through reflection pre-service teachers can identify their strengths, identify areas for improvement, and evolve professionally (Cohen-Sayag & Fischl, 2012; Dumlao & Pinatacan, 2019; Aleksanyan, 2020).

In reflective writing students describe an event or topic, express their feelings, and explore their personal connection to the experience or subject (Chong et al., 2020; Doucet & Wilson, 1997; Kim, 2018). According to Mezirow (1990) the most beneficial type of reflection reaches deeper levels of thinking and engages the highest forms of critical reflection, and plans future actions through reflection-based interpretations. Reflection

demonstrates students' cognitive skills, including critical thinking, analysis, evaluation, comparison, contrast, and problem-solving.

There are several ways to improve reflective writing. Various reflection models can support pre-service teachers in developing reflective thinking by focusing on their thoughts, experiences, emotions, people involved in the situation, outcomes, and future plans. Many Teacher training programs provide reflective writing through a step-by-step approach which is based on a certain reflection model. Mentors and supervisors' feedback can positively impact reflective writing process. Additionally, reflective thinking can be enhanced through peer or group collaboration, where participants brainstorm ideas and questions together.

Although several reflection models are available, reflective writing can still be challenging. Research has shown that reflective writing often becomes merely a descriptive account of events, lacking depth and critical judgment, remaining superficial (Chen et al., 2016). Students find it hard to express what they have learned, think critically, and opt out to evaluate their experiences—engaging instead in what Spalding and Wilson (2002) refer to as “personalistic reflections.” Moreover, if it is taught through theoretical exploration, the need to further develop reflective skills is actual (Evans & Maloney, 1998; Minott, 2008). Therefore, applying information technology in pre-service teachers' professional development might play an important role (Zhu, 2024).

Since the emergence of ChatGPT (Chat Generative Pre-Trained Transformer), it has been used to produce learning materials, assess, give feedback, provide personalized learning and act as a virtual conversation assistant in higher education (Dempere et al., 2023; Essel et al. 2022; Wang et al., 2017). ChatGPT can be used in writing to edit, proofread, summarize a text, brainstorm ideas for writing, create outlines, etc. (Fuchs, 2023; Rasul et al., 2023; Atlas, 2023).

Most research on ChatGPT focuses on lesson planning, personalized learning, feedback, and content creation, but little is known about its role in reflective writing. It is not well-understood how interacting with ChatGPT affects pre-service teachers' reflective writing. Thus, the study explores this gap. ChatGPT can be integrated in the teacher reflection process to conduct guided reflection on teaching and help teachers improve their practice (Zhu, 2024). Combining the potential of ChatGPT to brainstorm ideas into reflective writing, can address the challenges in reflective thinking.

The aim of the study is to examine ChatGPT's support as a writing assistant for pre-service teachers reflective writing, namely, to contribute to the understanding of how ChatGPT can develop reflective practices in teacher education by describing ChatGPT's influence on the quality of pre-service teachers' reflective writing and their vocabulary use.

The research questions are as follows:

RQ1: How do students communicate with ChatGPT?

RQ2: How does this interaction influence the content and structure of their reflective writing?

To answer the research questions, a mixed-method study was conducted. In order to understand ChatGPT's impact on pre-service teachers' reflective writing, two types of reflective essays were collected and analyzed: first was written independently, and the second was written with ChatGPT's guiding questions on the same topic. Additionally, pre-service teachers' conversation logs with ChatGPT, were scrutinized.

ChatGPT has already several experimental applications in education. The findings could provide insight into the use of ChatGPT in the reflective writing process as a reflective partner. The research findings may be of interest for the practical application of artificial intelligence in writing reflective tasks. Educational program leaders may be interested in the possibilities of its use in teacher training programs to more effectively develop reflective thinking in future teachers. Also, the research findings may help researchers to investigate the issue in more depth or develop a theoretical framework, and artificial intelligence developers may develop a specific application that will serve to improve teachers' reflective skills.

Literature review

Reflection in Teacher education

Developing reflection skills in teacher education is essential. One effective approach is reflective writing, which has become a requirement in many teacher education programs. Reflective practice is encouraged throughout coursework and school-based training, involving activities such as making reflective notes on lectures, observing classes, and contemplating personal and professional development (Cohen-Sayag & Fischl, 2012). Reflective writing ranges from the open and free format to the structured one. Reflective writing is often fostered through reflective essays, which are typically integrated into course assignments. In reflective essays students describe an event or a topic, their feelings, and their relation to that experience or topic (Chong et al, 2020). They demonstrate critical thinking, analytical skills, such as evaluating, comparing, contrasting and searching for solutions (Dumlao & Pinatacan, 2019).

There are several ways to achieve a higher level of reflection. Various reflective models have been developed over the past 50 years. These models guide professionals through the reflective writing process by using structured questions that prompt deeper thinking. Gibbs', Schön's, and Kolb's reflective models are among the most prominent frameworks used to enhance reflective practice across different fields (Kolb, 1984; Gibbs, 1988, p. 49; Schön, 1991; Galli & New, 2022; Yaacob et al., 2023). Each model offers a distinct approach to reflection, helping individuals learn from experience and improve their professional practice.

Deep reflection can be achieved through dialogues based on questions. Ghaye (2010, p. 42) calls this type of dialogues "reflective conversations," which may lead to teachers to learn from their own educational experience and question existing educational values. This "conversations" can take the form of conversations with self, but later they have to be articulated in public. This process of going from "private" to "public" is difficult for pre-service teachers. The shift from private to public involves a transition from unconscious understanding to a more conscious and deliberate awareness (Polanyi, 1958, cited in Chaye 2010). In reflective conversations, the one who asks questions plays a crucial part. According to Pendlebury (1995) this person is 'dialogical other', and his or her role is to elicit the practical arguments and 'theories' that underpin the teacher's work (Cited in Ghaye, 2010). The 'dialogical other' is supportive and adds structure to the reflective conversation; he/she does not necessarily focus on weakness but ensure balance in judgement and strengthen the positive things. In Bain et al. (1999) study with dialogue reflections 66% of the subjects improved their reflections from reporting to reasoning.

Another way to improve pre-service teachers' reflective writing is through clear explanations and feedback from mentors and experienced teachers on the reflective writing process. Supervisors' reaction to the written journal can affect pre-service teachers' levels of

reflection. Supervisors' positive encouragement, suggestions for problems and comments may stimulate higher levels of reflection during the pre-service teachers' training (Cohen-Sayag & Fischl, 2012). Teacher education programs support the development of reflective writing by offering a step-by-step approach with guiding questions. Reflective thinking can also be enhanced by working with a peer or in a group to brainstorm ideas and questions (Minott, 2008).

Even though in teacher education, there are several reflection models and set of questions available, reflective writing can be still difficult for students if they are not aware of essential types of questions of reflective writing (Cohen-Sayag & Fischl, 2012). In one study pre-service teachers did not improve their levels of reflection despite long and intensive processes of writing (Zuckerman & Rajuan, 2008). Very often reflective writing tends to be only descriptive protocol of events lacking the depth and judgement and assignments remain superficial (Zhang et al., 2023). There are studies that support the idea that pre-service teachers need support in reflective writing or they write "unproductive reflections", mainly descriptive, without much analysis (Davis, 2006). Besides, dependence on supervisor's positive encouragement can be a challenge for a student and organizing a brainstorming session before every reflective writing task can be time-consuming.

Therefore, with the emergence of different technology, there could be ways to harness the potential of AI to ask questions, act as a "dialogical other" and provide feedback in the writing process.

ChatGPT in collaborative reflective practice

Since the appearance of ChatGPT, it has transformed teaching and learning greatly. The strengths of using ChatGPT in education include instant feedback, personalized learning, improved access to education, and increased effectiveness (Loos et al., 2023). It has been used to produce learning materials, assess writing tasks, brainstorm ideas, and assist in writing. The latter function could be especially useful in teacher education, where AI tools hold great potential as writing assistants.

In Wulandari & Purnamaningwulan (2024) several AI tools, such as ChatGPT, Copilot, Twee, and Quizizz AI, were utilized to assist the EFL pre-service teachers in planning, creating teaching content, and assessing students. The study found three benefits that AI-assisted practicum can provide: new ideas, teaching preparation becomes more time-saving, and assistance in creating teaching materials. There were some challenges as well: overdependence, unethical behaviour, and fabricated and misleading information.

Buchholtz & Huget (2024) study examined how ChatGPT, might support pre-service teachers in lesson planning and improve university mathematics teacher education. In the study ChatGPT suggested standardized classroom procedures which indicated a strong dependence on the training data, but pre-service teachers were able to influence the quality of AI-generated content. The study found that ChatGPT could facilitate a reflective planning dialogue with structured prompts.

There are few studies which examine ChatGPT's use for reflection in education. Zhu (2024) examined the influence and the application of ChatGPT in the teaching reflection of international Chinese teachers. The study concluded that ChatGPT plays a certain role in the reflection about teachers, students, and teaching resources. Before utilizing AI in reflection, teachers should understand five steps: understanding AI, setting objectives, issuing instructions, analysing feedback, and adjusting strategies.

Arefian et al. (2024) study explored Iranian EFL teachers' ChatGPT-driven collaborative reflective practice, both independently and collaboratively and found that both types of reflection with ChatGPT contribute to teachers' professional development. Teachers could receive constant feedback to improve their teaching and shape their knowledge innovatively and creatively. However, the study stresses challenges such as teachers becoming lazy and over-relied if they permanently use ChatGPT.

In Wei et al. (2025) study AI tools (e.g., ChatGPT, Midjourney, Runway) were utilized in quasi-experimental design with eighty pre-service teachers to develop reflective thinking skills. The results revealed that the experimental group significantly improved reflective thinking skills in time, on objects and level of reflection compared to control group. AI tools have the potential to strengthen deep reflective practice in teacher education.

Thus, application of ChatGPT in teacher's reflection could make the process more effective and productive. AI can act as a writing assistant to provide information, and guidance in pre-service teachers' reflective writing, but it might cause some challenges as well.

This study is grounded in reflective practice theory. ChatGPT is viewed as a *dialogical other* (Pendlebury, 1995; Ghaye, 2010) that supports reflection through asking questions, providing feedback, and dialogue. ChatGPT serves as a scaffold that helps pre-service teachers express their thoughts, deepen metacognitive awareness, and move from private to public reflection, which aligns with guided reflective dialogue models.

Methodology

A mixed-methods approach was designed to answer the research questions (Cohen et al., 2018). The collected data included Reflective Essay 1 (RE1), Reflective Essay 2 (RE2) on the same topic but written with ChatGPT's guidance, and the conversation logs with AI. RE1, RE2, and conversation logs provided three data sources, allowing cross-validation of findings across datasets.

All data were in the Georgian language.

The quantitative study design focused on analyzing (See Figure 1, Study Matrix):

- **Word Count analysis of RE1 & RE2:** This comparison aimed to determine how many words participants wrote independently versus with the help of AI, assessing whether the word count increased when ChatGPT was involved.
- **Prompts Count:** Quantitative analysis of the prompts evaluated how frequently participants interacted with ChatGPT.
- **Count of the same lexical units in RE2 & logs; Overlap of lexical units between RE2 and ChatGPT conversation logs:** To measure the influence of AI on vocabulary and ideas, we examined repeated lexical units in RE2 that appeared in the ChatGPT logs, indicating the extent to which participants incorporated AI-generated language and concepts.

For the word count analysis, the total number of words in RE1 and RE2 was recorded and compared. SPSS 20 was used to calculate descriptive statistics (mean, median, standard deviation) and conduct inferential statistics (t-test and p-value). The prompts were analyzed quantitatively by counting the total number of prompts.

A qualitative study design was used to analyze (See Figure 1, Study Matrix):

- **Prompts Analysis:** Understanding how participants communicated with AI and how this interaction related to their writing was essential. This included examining whether participants addressed ChatGPT with requests or questions and whether they responded to AI’s questions within the conversation logs.

For the lexical unit analysis in RE2 and ChatGPT logs, Voyant Tools (Poldner et al., 2014) was used. Each RE2 and its corresponding log were uploaded to identify shared lexical units and word families. To reduce potential bias in coding and qualitative judgment, two researchers independently reviewed and coded the reflective essays and ChatGPT logs. Any differences were discussed and resolved through consensus, and all coding decisions were recorded to maintain transparency. The types of prompts (questions, requests, responses/dialogic exchanges), as well as participants’ introductions to AI, were also thematically analyzed.

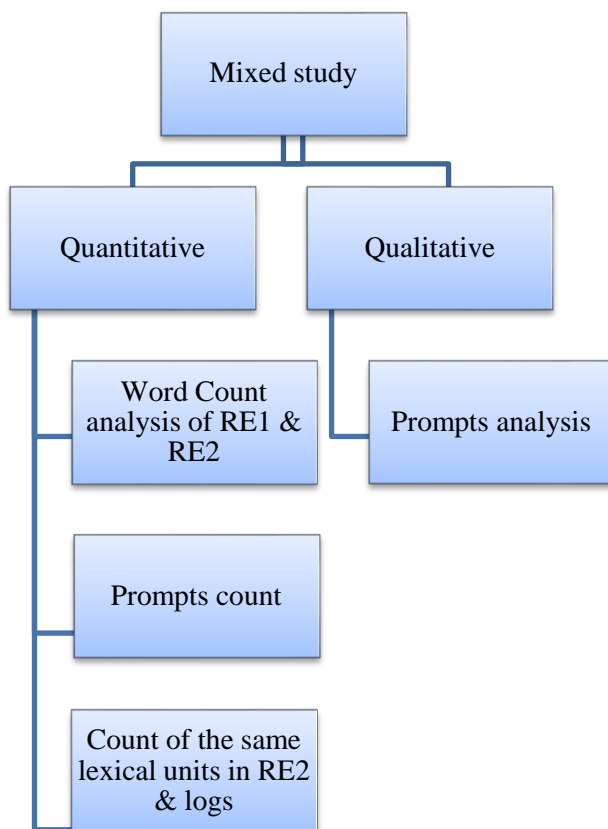


Figure 1
Study matrix

Participants

The participants in the study were pre-service teachers enrolled in the BA–MA integrated Primary Teacher Education Program at Iakob Gogebashvili Telavi State University, Georgia. Fifteen fifth-year pre-service teachers (equivalent to a Master's level) participated in the study. These students had previously completed school practice twice in earlier semesters and had kept reflective journals for that purpose. Prior to the data collection, all participants were informed about the purpose of the study and the consent was obtained.

The participation in the study was voluntary and anonymity and confidentiality were ensured throughout the research process.

Data Collection

In the first meeting participants were asked to write a reflective essay on the topic “*Reflection and I*” (Reflective Essay 1 – RE1) by hand. A week later, ChatGPT was introduced to the group. Only three participants had prior knowledge of AI and had used the mobile app; the rest created accounts on OpenAI. Participants were not aware that they were going to write the same essay and were instructed to ask ChatGPT for assistance in writing an essay on the same topic, resulting in Reflective Essay 2 (RE2). The second essays were typed on a computer. The participants saved their conversation logs with ChatGPT and submitted them along with their RE2 essays to the researcher.

Each writing task was completed within one hour. Although 15 students completed both assignments, three were unable to provide their ChatGPT conversation logs, and their data were excluded from the analysis. Additionally, one participant directly copied ChatGPT’s response into RE2 without modification; this data was also excluded. Consequently, the essays and logs of eleven participants were included in the final analysis.

Results

Word count analyses of RE1 and RE2

To evaluate ChatGPT’s impact on participants' reflection we examined the word numbers in both essays. The words were counted in RE1 and RE2 and then statistically analysed (See Table 1 and Table 2). On average, ChatGPT-assisted reflections are significantly longer than independently written reflective essays (See Table 2).

- ChatGPT-assisted reflections are, on average, 115.9 words longer than independent ones.
- The p-value shows a highly significant difference ($p < 0.001$)
- Standard deviation is higher in ChatGPT-assisted reflections, showing more variation in length.
- A paired-sample t-test revealed that ChatGPT-assisted reflections ($M = 251.00, SD = 69.86$) were significantly longer than independently written reflections ($M = 135.09, SD = 46.70$),
 $t(10) = 10.28, p < 0.001$ (See Table 2)

Table 1
Word count in RE1 and RE2

N	Reflective essay 1 (Word count)	Reflective essay 2 (Assisted by ChatGPT) (Word count)
01	109	204
02	186	356
03	129	251
04	60	180
05	227	338
06	187	363
07	108	262
08	114	202

09	118	217
10	123	183
11	125	205

Table 2

Statistical analysis of word count in RE1 and RE2

	Independent Reflections	ChatGPT-Assisted Reflections
Mean (Average)	135.09	251.00
Median	123	217
Standard Deviation	46.70	69.86
Statistical Comparison (t-test)	10.28	-
P-value	0.000000123	-

Prompts analysis

To understand the impact of ChatGPT on participants' reflective writing, the prompts were analyzed. The initial stage or introduction between participants and ChatGPT or the first prompt was a key aspect of the conversations; it defined the context for ChatGPT's questions. The participants had to introduce themselves to ChatGPT, then explain the task, and ask for guidance. Three participants introduced themselves as pre-service teachers, mentioning their specialty and the task, and received relevant questions from the AI. However, some participants skipped the introduction, and as a result, received highly diverse questions. For instance, Participant #7 did not mention the teaching profession at all, so ChatGPT generated very general questions about reflection that could apply to any profession. Participant #3 made a mistake in the introduction and presented herself as a "primary level student" instead of a "primary teacher education student," which led ChatGPT to produce simplified questions suitable for a primary school student's reflection, such as 'What did you do? When and how? What was the atmosphere like?' Other participants presented themselves as future teachers or even in-service teachers, thereby giving the AI a false impression (See Table 3). Each type of introduction influenced the set of questions that ChatGPT produced. Then, the participants selected some questions and responded to them in their reflective essays.

Table 3

Participants' Introduction to ChatGPT and Interaction type

N	How participants introduced themselves to ChatGPT	N of Prompts (Participants' turn taking including introduction)	Types of prompts/interaction with ChatGPT	RE2 Word count
01	Future teacher (The level and subject not specified)	8	Dialogue – responding to ChatGPT's questions and getting instant feedback	204

02	Pre-service primary education teacher of a Specified year	9	Asking Questions	356
03	Introduced as a primary level student	3	Requesting information	251
04	A teacher	4	Asking Questions	180
05	Pre-service primary education teacher	5	Requesting information	338
06	Primary education teacher	4	Requesting information	363
07	No introduction	9	Asking Questions	262
08	Future teacher (The level and subject not specified)	8	Dialogue - responding to ChatGPT's questions and getting instant feedback	202
09	Pre-service primary education teacher	5	Requesting information & Asking Questions	217
10	No introduction	4	Asking Questions	183
11	Future teacher (The level and subject not specified)	6	Requesting information & Asking Questions	205

Another significant aspect of ChatGPT's impact on reflection was the intensity of communication, which was reflected in the number of prompts. The lowest number of prompts, including the introduction, was 3, and the highest was 9, with a mean of 5.91 prompts. A typical prompt asked ChatGPT: "I am writing a reflective essay about my reflection experience. Write guiding questions for this." ChatGPT usually provided a minimum of five topics or questions, each with three or four sub-questions.

The number of questions was often overwhelming, leading participants to ask for a narrower focus or fewer questions. In most cases, more prompts did not lead to better results. Participants were inundated with an increasing number of guiding questions from ChatGPT (one log with 9 prompts contained nearly 2,800 words!). As a result, the ideas in the essays were often chaotic. Conversely, those who used only three prompts tended to be more structured, answering fewer questions more thoroughly. Only Participant #1 and Participant #8 responded to most questions, engaging in a dialogic interaction with the AI, while others selectively answered questions from the list provided by ChatGPT.

Regarding the types of prompts, most were in the form of requests such as "Guide me" or "Write questions..." (see Table 3). Some participants preferred to ask direct questions and receive answers, for example: "What is reflection?" or "Why is reflection important for students?" Others used a combination of both requests and questions. Two participants (#1

and #8) engaged in a conversational dialogue with ChatGPT, asking questions and writing full responses in the chat logs. As a result, their reflective essays were more organized, benefiting from ChatGPT's instant feedback and suggested improvements. ChatGPT even provided model sentences to support their reflections.

Lexical units and impact of ChatGPT

lexical units were analysed—words or word families, specifically content words such as nouns, verbs, adjectives, and adverbs—and their usage was examined in RE1, RE2, and participants' conversation logs with ChatGPT. Lexical units that appeared in both RE1 and RE2 were excluded from the analysis to isolate new lexis potentially influenced by ChatGPT. Next, lexical units in the conversation logs were compared with those in RE2. Shared word families (not word frequencies, which were higher) were identified and counted using Voyant Tools (<https://voyant-tools.org>) (See Table 4).

Almost all essays showed influence from ChatGPT's questions or model sentences. The ideas and lexical units in ChatGPT's prompts impacted the participants' writing. Generally, the more prompts participants used, the greater the overlap of lexical units shared with ChatGPT. For example, participant #2 used 86 words (24.16%) from the log—nearly a quarter of their essay! Similarly, participant #11 incorporated 16.59% of words from the log, and participant #4 used almost 21%. Additionally, one participant copied some content from lecture materials as another resource.

These four points describe **different types of impacts** that ChatGPT had on the participants' reflective writing, specifically on how they incorporated AI-generated content into their essays. There were four possible impacts:

1. A participant copied a sentence directly from the log.

Example:

ChatGPT wrote: "Reflection is one of the key elements of a teacher's professional development. It involves the individual's awareness, evaluation, and search for ways to improve their professional activities." Participant #2 copied the entire sentence.

2. Single words were taken from the log and used in the writing. There was multiple usage of the same words in the essays (See Table 4 for shared lexical units).

3. Participants paraphrased ChatGPT's ideas in their essays.

Example

ChatGPT wrote on the benefits of reflection for schoolchildren: "Reflection teaches children that mistakes are a part of growth. When a child evaluates why they made a mistake, they can improve their approach and avoid repeating the same mistakes."

Participant #9 paraphrased:

"Through reflection, they learn from their mistakes. When a student thinks about their actions, they also take responsibility for them."

Example 2:

ChatGPT wrote: "In the process of reflection, it is important to be tolerant toward yourself."

Participant #7 wrote: "When reflecting, it is important to note that we should be tolerant toward ourselves."

4. Participants used ChatGPT's ideas as a springboard for new ideas (whether valid or invalid for the topic).

Example 1:
ChatGPT provided topics to participant #2, including reflection as a tool for evaluation:

“Evaluation:

What did you learn from this process?

How did you engage the students and how effective was it?”

The participant developed the idea and concluded that reflection should be valid and reliable:

“It often happens that a student may express dissatisfaction with the assessment I give. Therefore, my reflection must be unquestionably reliable and valid—no one should have any doubts about its credibility.”

Example 2:

ChatGPT provided a model sentence on teaching styles:

“Reflection is a space for me where I evaluate my actions and their outcomes to better understand how my teaching style impacts students.”

Participant #11 developed the idea:

“As I mentioned, teaching requires continuous development rather than an authoritarian style of instruction that merely involves the dry transmission of knowledge.”

Table 4

Lexical analysis of RE2 and ChatGPT conversation logs

N	RE2	ChatGPT log Word count*	N of the same words** in RE2 and Conversation logs with ChatGPT	The percentages of shared words relative to RE2
01	204	551	12	5.88%
02	356	2816	86	24.16%
03	251	339	13	5.18%
04	180	1540	38	21.11%
05	338	840	32	9.47%
06	363	827	28	7.71%
07	262	2962	27	10.31%
08	202	731	15	7.43%
09	217	581	27	12.44%
10	183	651	16	8.74%
11	205	1610	34	16.59%

*- *Word Count Number excludes the words in the prompts and words such as ‘ChatGPT said’, ‘You said’*

** - *Word Families were counted and not the word frequencies.*

Discussion

The aim of the study was to explore ChatGPT’s impact on pre-service teachers’ reflective writing to understand how AI can be used to improve pre-service teachers’

reflective writing. ChatGPT might significantly influence writing as the word count comparison of independently written essays and ChatGPT-assisted suggested that the effect is not just statistically significant but also meaningful in practice; AI support may lead to substantially longer reflections.

The findings suggested that ChatGPT's questions impacted the participants' reflective essays in four ways:

- *Direct copying:* Participant copied exact sentences from ChatGPT, which led to potentially low originality, high reliance on AI text.
- *Word borrowing:* Single words or phrases from ChatGPT were reused, indicating vocabulary influence, possibly expanding lexical choices.
- *Paraphrasing:* Participants rephrased ChatGPT's ideas in their own words, which shows comprehension and ability to reinterpret AI input.
- *Idea development:* Using ChatGPT's ideas as a springboard to generate new thoughts, which could facilitate higher cognitive engagement, creative elaboration beyond AI input.

ChatGPT's questions might inspire students to reflect by introducing new ideas that influence their writing and thinking. Students may adopt concepts, structures, and vocabulary from the AI, especially when model sentences are provided—borrowing both content and form. It was observed that pre-service teachers who asked questions or actively requested information from ChatGPT tended to incorporate more of its language into their essays. In contrast, those who simply responded and engaged in a more dialogic exchange used fewer words from the chat log, as their ideas emerged in real time without delay (Zhang et al., 2023). Therefore, asking students to respond directly within the ChatGPT log, rather than composing a separate essay afterward, may reduce the AI's influence on their reflective writing.

ChatGPT provides a set of questions personalized to pre-service teachers' needs. It offers instant feedback, encourages students through positive reinforcement, and supplies model sentences to support reflective thinking. In the study the second essays were longer and used more appropriate vocabulary—indicating that ChatGPT positively influences pre-service teachers' reflective writing.

Pre-service teachers should receive proper guidance when writing a reflective essay with AI. They need to understand that the scope of the AI's responses can be controlled through carefully structured prompts. A clear introduction to the task is crucial for ensuring effective guidance from ChatGPT. As the study showed, participants can request information, ask questions, or respond to ChatGPT. Even slight variations in how the task is introduced may result in very different sets of questions. If pre-service teachers are not satisfied with the output, they may repeat their prompts several times, but this often leads the AI to generate an excessive number of questions, decreasing the quality upon repetition. This might pose a challenge: too many prompts may overwhelm students or cause them to focus only on the simpler ones, avoiding those that require deeper thinking. Pre-service teachers, in particular, may find it difficult to review all the questions generated by ChatGPT and may need to select only the most relevant ones—an effort that can be both time-consuming and cognitively demanding. Moreover, since they do not feel obliged to respond to every question, the depth of their reflections may remain limited.

The standardized AI output of a set of questions heavily relies on its training data, as also noted by Buchholtz and Huget (2024). While ChatGPT acted as a “dialogic other”, asked

(ԱԲ) միջերեսից արտաձված երկխոսությունների համապարփակ մատյանների համա-կարգված հավաքագրումն ու խաչաձև ստուգումը:

Փորձառական արդյունքները փաստում են, որ ChatGPT-ն կարող է նշանակալի և դրական ազդեցություն ունենալ ռեֆլեքսիվ գրության կառուցվածքային կազմակերպման վրա՝ ընդլայնելով բովանդակային սահմաններն ու բարելավելով ծրագրային բառապա-շարի կիրառումը: Այնուամենայնիվ, տվյալները միաժամանակ հայտնաբերում են, որ ԱԲ ինտեգրումը կարող է ոչ միտումնավոր կերպով ազդել ուսանողների գրավոր աշխատանքի վրա, մասնավորապես՝ կաղապարված ձևակերպումների պատճառով նվազեցնելով հեղի-նակի ինքնատիպ ձայնը: Հետևաբար հետազոտությունն ընդգծում է հրահանգների ճար-տարագիտության (prompt engineering) հատուկ ժանրերի ու ԱԲ կառուցվածքային օժանդա-կության այնպիսի ձևերի հրատապ հետազոտման անհրաժեշտությունը, որոնք կարող են արդյունավետորեն խթանել ավելի խորը մետաճանաչողական անդրադարձ՝ առանց սկզբնական հեղինակությունը վտանգելու: Այս պատկերացումները արժեքավոր ուղեցույց են առաջարկում կրթության ոլորտի ղեկավարների համար, որոնք ձգտում են արհեստա-կան բանականությունը պատասխանատու կերպով ներդնել ժամանակակից մանկավարժ-ների պատրաստման ուսումնական ծրագրերում:

Հիմնաբառեր՝ ռեֆլեքսիվ գրություն, ChatGPT, արհեստական բանականության աջակ-ցություն գրավոր աշխատանքում, մանկավարժական ռեֆլեքսիա, ապագա մանկավարժ-ներ:

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