

# Prompting for Scaffolding: A Thematic Analysis of K-12 Students' Use of Educational Chatbots for Writing Support

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**Abstract:** With the emergence of generative artificial intelligence, dialogue systems like chatbots are redefining traditional concepts of authorship and impacting critical aspects of writing. In educational contexts, previous research has pointed out new opportunities associated with using chatbots for writing instruction and support. This study involved 108 students across 10 classes in Norwegian K-12 education, examining how they employed educational chatbots as a support tool in L1 writing assignments. Through an inductive, data-driven thematic analysis of 895 student prompts, five recurring patterns emerged: *information requests, structural guidance, example requests, content creation, feedback on text, and follow-up clarification*. Aggregated results show that information requests were the most common pattern, particularly among younger students, whereas content creation and feedback on text were more prevalent among secondary and upper secondary students. Illustrative examples from the conversations revealed that generative AI extensively produced content on student's behalf, even when students primarily sought scaffolding. The study proposes that effective scaffolding of writing through educational chatbots requires not only refining students' prompting strategies but also enhancing system designs that better support pedagogical use of generative AI.

Keywords: writing instruction, generative AI, educational technology, prompt engineering, ChatGPT



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## 1. Introduction

The public launch of ChatGPT in November 2022 sparked the beginning of a new era for artificial intelligence (AI), introducing conversational agents (hereafter referred to as chatbots) with advanced natural language processing capabilities to a broad audience of internet users (OpenAI, 2022). Enhanced by large language models and rigorous training, ChatGPT and similar chatbot technologies demonstrate emergent text generation abilities (Wei, Tay, et al., 2022), consequently challenging our perceptions of writing as a primarily human skill and activity (Mollick, 2024). For education, both challenges and opportunities with generative AI are observed and discussed (Adeshola & Adepoju, 2024; Farrokhnia et al., 2024; Hwang & Chang, 2023; Kasneci et al., 2023; Rahman & Watanobe, 2023). While some claim generative AI to be "revolutionizing education" (Adiguzel et al., 2023), others have raised critical concerns related to new forms of cheating (Cotton et al., 2024), 'hallucination' and misinformation (Bender et al., 2021; Monteith et al., 2024), anthropomorphizing (Salles et al., 2020; Salles & Paz, 2024), lack of environmental sustainability (Van Wynsberghe, 2021) and social harm to education (Selwyn, 2022, 2024). Despite these challenges, there is reason to believe that the use of generative AI will become increasingly widespread in educational and pedagogical settings, including writing instruction (Evmenova et al., 2024; Lambert & Stevens, 2024). Currently, there is a limited amount of research-based knowledge available in this domain. There are still relatively few published empirical studies on writing with generative AI and almost none on students' writing in school contexts (Albadarin et al., 2024). However, some early studies indicate positive outcomes in supporting students with initial idea generation and writing development (Ironsi & Ironsi, 2024; Jauhainen & Guerra, 2023; Levine et al., 2024; Wang et al., 2024), high reliability on formative feedback to writing (Jauhainen & Guerra, 2024; Steiss et al., 2024), support for language learning (Huang et al., 2022) and argumentative writing (Guo et al., 2022). These studies indicate that using generative AI tools, like educational chatbots, can provide students with organized guidance and support during the writing process. Such adaptive support to writing is previously conceptualized as 'scaffolding' (Langer & Applebee, 1987; Wood et al., 1976) and primarily investigated in teacher-student relations (Van de Pol et al., 2010). Utilizing generative AI as a 'more knowledgeable other' (Stojanov, 2023; Vygotsky, 1978) is a less explored area and especially so in K-12 education and writing studies. This research gap serves as the foundation for this study.

### 1.1 Purpose, scope and research questions

This study aims to investigate how learners in K-12 education utilizes generative AI as a writing aid. The study analyzes and discusses data from 108 digital conversations between Norwegian L1 students and educational chatbots. The dialogues were collected from various classrooms across grades 6 to 13, however all conversations were conducted under writing assignments, utilizing written text communication with the software while solving the task. The main question guiding this study is: *How do Norwegian L1 students of various ages seek writing support from educational chatbots, and how might these requests contribute to scaffolding in writing?*

The main question will be explored by three subordinate research questions:

RQ1. What kind of writing support was requested?

RQ2. How do requests for writing support differ across educational levels?

RQ3. What are some typical examples of prompts and responses?

The research questions will be addressed through the results of the data analysis and further explored in the discussion section of the article.

## 2. Theoretical background

### 2.1 Scaffolding for writing

The concept scaffolding was originally coined by Wood, Burner and Ross (1976) in a paper on tutoring children for problem solving. The authors argued that not only modelling and imitation, but the intervention of a tutor should be taken into account for the social context of learning; "it involves a kind of 'scaffolding' process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts" (Wood et al., 1976, p. 90). The process was elaborated upon as six consecutive instructional steps including recruitment (getting attention), reduction in the learners' degrees of freedom, direction maintenance, marking critical features of the task being conducted, providing frustration control and offering demonstration (p. 98). The concept of scaffolding, as an empowering support to help learners achieve higher levels, aligns with key ideas in sociocultural and socio-cognitive theory, including learning beyond the zone of proximal development (ZPD) and tutoring assistance from a 'more knowledgeable other' (MKO) (Vygotsky, 1978). However, the metaphor originates from construction sites, where scaffolding provides a temporary structure for safe support during the building process (Van de Pol et al., 2010). This suggests that learning is envisioned as a cultural product within a collaborative construction process, involving participants from diverse disciplines, varying experience levels, and distinct roles. In this sense, learners and tutors become coworkers, however the tutors facilitate safety and support. The actual scaffolding needed to assist the construction is meant to be a temporary aid and will be removed once the learner becomes independent. This gradual release of responsibility is often emphasized in scaffolding definitions (Belland, 2013; Wilkinson & Gaffney, 2015).

In writing instruction, scaffolding is frequently interpreted as the use of specific activities, strategies and techniques designed to support and advance a writer's development (Coe, 2011; Graham & Harris, 2006; Harris & Graham, 2009). According to Benko (2012), scaffolding was originally adopted to literacy contexts by Langer and Applebee (1986) in order to explain how teachers may structure tasks related to reading and writing so that students acquire skills and strategies applicable not only to the current task but also to future tasks they may encounter. Building on these concepts, Benko (2012, p. 298) argues that a teacher can enhance students' writing development through scaffolding by:

- Assigning appropriately challenging tasks.

- Ensuring student ownership to writing.
- Reducing degrees of freedom by simplifying complex activities.
- Directing students' attention to important areas.
- Individualizing instruction or holding group minilessons.
- Demonstrating with multiple examples of writing (modelling).
- Structuring lessons to integrate old and new learning.

Previous research on writing instruction has shown that strategies directing students' attention to important areas in the writing process such as planning, organizing and reviewing while writing is effective for students' writing development (Graham et al., 2013, p. 35). Researchers have also suggested that demonstrating through explicit modelling of genres may support students' understanding of the purpose, structure, and audience expectations of writing tasks, as well as support metacognition (Tardy et al., 2020). Such modelling has become integral to the genre-based pedagogical approach (Cope & Kalantzis, 1993; Rose & Martin, 2012). Hyland (2007) argues that learning to write necessitates genre-specific knowledge because language is inherently embedded within genres, as informed by the theories of systemic-functional linguistics (Halliday, 1994; Martin, 1992). In this approach, scaffolding involves guiding students to understand and effectively use the characteristics and conventions of various text genres through structured support and targeted activities such as analyzing exemplar texts to identify key features, engaging in collaborative writing exercises, and receiving incremental feedback to refine their understanding and execution of specific genre conventions (Cope & Kalantzis, 1993, p. 11).

A recent example of research in scaffolding writing in K-12 education can be found in the EU-funded AILIT project (Bakken et al., 2025; Norwegian Reading Centre, 2025). In this project, an appropriate user interface for computer-supported modeling, writing and sharing of texts was developed and used by K-12 students across different European language communities. By combining generative AI with rule-based recommendation systems, students from Norway, Portugal, and Catalonia received software support during the idea and revision phases of their texts. They were also able to translate and adapt texts to other languages and read texts written by other students. The students experienced increased motivation for writing, particularly benefiting from support in the early stages of the writing process, where generative AI was implemented. However, many teachers observed that the AI system performed a substantial part of the writing process, thereby limiting the students' own opportunities for writing (Bakken et al., 2025, p. 128). This concern is consistent with a recent MIT study on brain activity, suggesting that use of Chat-GPT for essay writing reduces students' cognitive engagement (Kosmyna et al., 2025).

## 2.2 Human-Computer Interaction (HCI) with Large Language Models (LLMs)

Human-Computer Interaction (HCI) is a multidisciplinary field for the design, implementation and evaluation of interactive computing systems (Mathew et al., 2011; Sinha et al., 2010). The field was established with the advent of personal computers in the early 1980's, primarily

focusing on text editing (MacKenzie, 2024, p. 15). Since then, research has expanded to examine various elements of interaction within graphical user interfaces. However, recently text editing has garnered renewed interest due to the emergence of large language models (LLMs) with extended opportunities for HCI through use of natural language (Dale & Viethen, 2021; Jurafsky & Martin, 2025, chapter 10). Due to the emergent abilities in generative AI not only for text prediction but also for text *generation*, LLM interfaces are commonly designed as *chatbots*; computer interfaces simulating human-like conversations (Bender et al., 2021; He et al., 2024). In writing instruction, new opportunities may have emerged for implementing computer-based scaffolding (Ironsi & Ironsi, 2024; Jauhainen & Guerra, 2023; Levine et al., 2024).

The research available to Belland (2013) suggested that such scaffolding was ineffective without the support of teachers, primarily because computer systems lacked the capability to perform dynamic assessments. A decade later, in the era of generative AI, the appropriate technology for dynamic collaboration may be available (Wei et al., 2024). A literature review on AI chatbots in education summarized several advantages from the students' perspective, such as receiving detailed feedback on questions, personalized support, explanations and clarifications on difficult issues, assistance in complex problem-solving and support for writing skills development from grammatical corrections and style suggestions (Labadze et al., 2023, p. 14). These advantages indicate a potential for dynamic collaboration. In a recent study of such collaboration, students viewed generative AI as a virtual tutor and a digital peer, which helped them with ideation, planning, drafting, and revising (Kim et al., 2025). Dhillon et al. (2024) specifically examined the use of generative AI for scaffolding with students, finding that sentence-level scaffolding did not enhance writing quality or productivity. However, paragraph-level scaffolding resulted in significant improvements, particularly benefiting those who write infrequently and users less familiar with technology.

### 2.3 AI literacies and prompt engineering

While writing support from generative AI may have a potential to foster new ways of computer-assisted scaffolding, it also poses several risks, for instance that writing, thinking and learning may be transferred from humans to machines (Baron, 2023). Even before the advent of LLMs, such transformed forms of authorship with digital media have resulted in what has been termed a "literacy crisis" (Johnson, 2023; Trimbur, 2015). Issues related to cheating, disinformation and 'hallucination' with generative AI are already mentioned. In the context of LLMs, Byrd (2023) connects the literacy crisis to an increased use of linguistically homogenous and stereotypical language, due to ideologies such as white supremacy embedded within the language model's training data and generative output. Other researchers highlight the risk of simplifying writing with AI to merely structural forms that represent pre-established knowledge, rather than writing for creative, human thought – underscoring the necessity to reconsider writing education in the age of generative AI (Wang & Tian, 2025, p. 1). In a blog post, writing researcher Steve Graham (2024) discusses the fundamental question of whether writing instruction remains necessary at all in the age of AI,

ultimately asserting that the true value of writing lies in its role as a tool for thinking, and such thinking through writing must be taught. Consequently, when utilizing generative AI for writing support the user must stay actively engaged 'in the loop' (Mollick, 2024), in order to ensure agency. It also requires the user to critically evaluate the generated content for stereotypes, biases, and coherence with their own objectives.

To handle the above-mentioned challenges within educational writing contexts, researchers point out that certain *AI literacies* are required (Cardon et al., 2023; Casal-Otero et al., 2023). AI literacies can be defined as "a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI" (Long & Magerko, 2020). In their exploration of concept definitions within AI research, Ng et al. (2021b) proposes that AI literacies includes knowledge and understanding, use, evaluation and ethical consideration of AI systems. In summary, AI literacies are typically developed across three main strands: (1) the technological understanding of AI fundamentals like deep learning, prediction systems and generative content creation (Zhong & Liu, 2025); (2) competencies for ethical considerations and critical thinking (Biagini, 2025; Ng et al., 2021a); and (3) practical and technical skills such as prompting strategies (Hwang et al., 2023; Walter, 2024). Furthermore, when interacting with conversational agents such as chatbots, collaborative and communicative skills are also essential (Kok et al., 2024; Mollick, 2024).

Communicative skills with text-based AI systems such as chatbots is closely tied to the practice of *prompt engineering*; that is "developing and optimizing prompts to effectively utilize large language models" (Giray, 2023). Prompt engineering can be seen as a form of script programming in natural language. As the use of chatbots powered by LLMs continues to grow, numerous prompting methods and strategies have been proposed for effective collaboration, including various prompt libraries made by teachers or students. Prompts providing the chatbot with examples (*few-shots prompting*) (Lee et al., 2024), thinking in series (*chain-of-thought prompting*) (Wei, Wang, et al., 2022) and assigning the AI with roles (*persona prompting*) (Mollick & Mollick, 2023; White et al., 2023) is considered effective. UNESCO advises that prompting in educational settings should be clear and unambiguous, include examples, provide ample context, undergo refinement and iteration, and be anchored in ethical principles (Holmes & Miao, 2023, p. 12).

Cultivating such AI literacies could equip students with the skills necessary to collaborate effectively with generative AI technologies. However, empirical studies on the utilization of prompts by students in educational settings remain limited. A recent study currently under development indicates that students predominantly use prompts to gather information or employ direct requests, often referred to as one-shot prompting (Reeping & Shah, 2024). An other study in higher education revealed that students commonly utilize generative AI to complete assignments, either by directly copy-pasting or by making minor modifications to tasks that have already been provided (Sawalha et al., 2024). Evaluated in the context of scaffolding theory, such strategies may not be very effective for learning.

## 2.4 Methods and materials

This study applies a convergent mixed-methods approach (Doyle, 2019), integrating collection and treatment of student-chatbot dialogues with thematic data analysis (Braun & Clarke, 2012) and descriptive statistics. The dialogues in the study represent data collected between November 17, 2023, and December 13, 2024, as part of a larger project focused on generative AI literacy in Norwegian K-12 classrooms. It should be noted that in most of these classes, students had limited or no experience with the designated educational chatbots.

## 2.5 Student participants

The participants in the study were recruited by teachers involved in a university-school collaboration on competence development for AI in education, in the eastern and southern regions of Norway. This initiative introduced the use of newly implemented educational chatbots within the respective schools. The participants came from elementary, secondary and upper secondary school classes (grade span from 6-13). Both boys and girls participated in the study. Informed consent for storage and treatment of personal data was obtained from parents or guardians for students under 16, while older students provided their own consent before anonymization. As Table 1 summarizes, a total of 108 students from 9 schools and 10 classes participated in the study.

Table 1. *Participants in the study*

|                       | Schools | Classes | Students |
|-----------------------|---------|---------|----------|
| Elementary level      | 3       | 3       | 20       |
| Secondary level       | 4       | 4       | 69       |
| Upper secondary level | 2       | 3       | 19       |
| Total                 | 9       | 10      | 108      |

## 2.6 Classroom writing assignments

Before data collection commenced, all participants were given a brief introduction to generative AI. They were also familiarized with the interface for the specific educational chatbot designated for use during the assignment, as well as the writing assignment itself. While the writing assignments exhibited some degree of variation, all were conducted in Norwegian within L1 classes and entailed the composition of a text utilizing generative AI as a support tool. All assignments were done individually. The genres and writing tasks are encapsulated in summary form together with count of students and prompts in Table 2 below.

The use of generative AI assistance was intended to scaffold students' idea generation, text creation, and revision processes. During the writing assignments, screen recordings, chatbot dialogues, and student texts were collected whenever possible. Due to variations in computer equipment among project participants across various classes, some provided recorded data while others submitted digital text files. The student-chatbot dialogues used in this study were captured either by harvesting text directly from the chatbot interface or by

transcribing content manually from screen recordings. After data collection, each prompt in the dialogue was annotated with relevant metadata and organized into a Microsoft Excel file for subsequent analysis.

Table 2. Data collection in the study

| Grade | Data collected | Class ID | Genre        | Writing assignment   | No. of students | No. of prompts |
|-------|----------------|----------|--------------|--|-----------------|----------------|
| 6-7   | 29 Jan 2024    | DA       | Factual text | Write a factual text on a topic of your choice.  | 9               | 121            |
| 7     | 8 Dec 2023     | BA       | Fiction      | Write a fantasy story.   | 7               | 38             |
| 7     | 23 Apr 2024    | GB       | Factual text | Write an academic text on the topic of "Internet Safety."  | 4               | 43             |
| 8     | 17 Nov 2023    | AA       | Fiction      | Write a short story in first or third person, using either present or past tense. Employ literary devices.   | 10              | 109            |
| 10    | 21 Nov 2023    | AB       | Factual text | Write an analysis of the film Divergent or The Hunger Games. Provide examples of dystopian genre features.   | 8               | 151            |
| 10    | 08 Nov 2024    | IA       | Factual text | Write an academic text about language. You can choose between 1) reflecting on what influences the language of young people and 2) convincing the reader of the importance of preserving dialects in Norway. | 21              | 200            |
| 10    | 13 Dec 2024    | KA       | Factual text | Write a text where you persuade the recipient about your viewpoint. Choose between writing 1) a speech or 2) an argumentative text.  | 30              | 212            |

|       |                |    |                 |   |     |      |
|-------|----------------|----|-----------------|---|-----|------|
| 12    | 26 Feb<br>2024 | EA | Factual<br>text | Write an essay about the Enlightenment. You can choose between the themes: 1) contradictions in the Baroque period and 2) science and literature. | 8   | 113  |
| 12    | 28 Feb<br>2024 | EB | Factual<br>text | Write an academic text about customer service, quality assurance, and documentation in a car repair workshop.                                     | 4   | 30   |
| 12    | 01 Mar<br>2024 | FA | Factual<br>text | Write an essay on the theme of honor based on a medieval story and a modern academic text   | 7   | 130  |
| Total |                |    |                 |   | 108 | 1148 |

## 2.7 Applied technologies

Participants in the study utilized either a PC, a Chromebook or Apple iPads for text composition and interaction with the educational chatbot. For this purpose, Microsoft Word, Google Docs and Book Creator were employed for drafting texts, and the web browser Chrome or Safari was used to access the generative AI application. The AI applications used by the students included educational chatbots developed and funded by Norwegian school proprietors. These tools were built on WordPress platforms, featuring secure login functionality and powered by APIs licensed through Microsoft Azure. In recent years, similar educational chatbots have been introduced to students across Norwegian and broader Scandinavian educational contexts. These solutions are designed in accordance with the EU's General Data Protection Regulation (GDPR), ensuring that user data remains within Europe and is not repurposed for model training or shared.

During the data collection period, these chatbots were powered by both GPT-3.5 and GPT-4 large language models. Due to licensing differences, students at various educational levels used two distinct setups. Elementary and lower secondary students interacted with the educational chatbot *AI Chatbot That Explains for Children*, while upper secondary students used the *Student Assistance* solution. Both systems share a similar technical framework and graphical user interface (see Figures 1 and 2), but they differ in their system prompts to better suit the target age groups (see Table 3 below).

## A chatbot for simple explanations

A chatbot instructed to explain everything in a simple way.

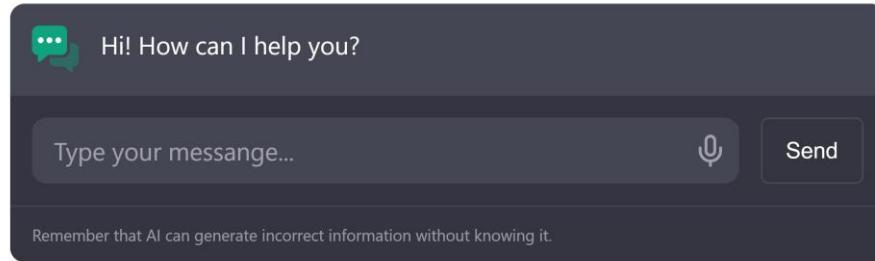


Figure 1. *Screenshot of the educational chatbot used by the student participants from primary and secondary school in the study*

## Student assistance

**STUDENT ASSISTANT:** Hi! I'm the student assistant. How can I help you?

Send

Figure 2. *Screenshot of the educational chatbot used by the student participants from upper secondary schools in the study*

Table 3. Educational chatbots in the study

| Grade | Educational chatbot                   | LLM                    | System prompt   |
|-------|---------------------------------------|------------------------|---|
| 6-10  | AI Chatbot that explains for children | GPT 3.5<br>GPT 4o-mini | You are ChatGPT, a large language model trained by OpenAI. As ChatGPT, provide age-appropriate, markdown-formatted answers for kids aged 6-9 years. Be both educational and entertaining. Follow the user's instructions carefully. Write in Norwegian. |
| 11-13 | Student assistance                    | GPT 3.5                | Write as if you are a student assistant for upper secondary school students. Be pedagogical and motivating.   |

## 2.8 Data selection and analysis

To address the research questions posed in this study, data was curated and processed in multiple iterations, following established principles of qualitative inductive analysis such as familiarization with the data, coding, labelling and theme development (Braun & Clarke, 2012; Naeem et al., 2023). A simplified overview of the analysis process is shown in Figure 3 below.

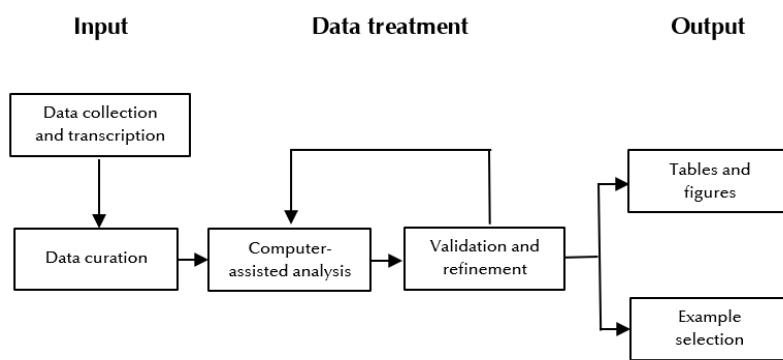


Figure 3. Process chart for data selection and analysis

After data collection and transcription, the dataset was refined to minimize potential bias and ensure alignment with the research questions. All prompts were machine translated to English to minimize risk of misinterpretation under computer assisted coding and for the purpose of international review and usage in this article. Student prompts that were clearly unrelated to the writing assignment were removed from the dataset (N=207). These included prompts containing common courtesy phrases, copy-pasted student texts without accompanying instructions, and entries that were nonsensical or frivolous. Occasionally, students were provided with an initial prompt to facilitate engagement with the educational chatbot. Given

that this study seeks to examine how students independently request writing support, these initial prompts and prompts where students copied in the writing assignments (N=46) were also excluded from the data analysis.

The remaining material (N=895) was analyzed to identify thematic categories based on common features in the students' prompts to the chatbot. Using an inductive approach, prompts with similar content were identified and grouped together, reflecting shared patterns in how students sought writing support from the educational chatbots. Thematic categories were established based on content within these groupings. The prompts were then labelled with the most likely thematic category. During the analysis, Microsoft 365 Copilot was utilized as a coding tool, performing an initial analysis with text vectorization, clustering and suggestion of possible categories. At the time of analysis, Copilot operated on Microsoft Prometheus, a language model built on OpenAI's ChatGPT-4 architecture (Wikipedia, 2025). Based on multiple iterations and my own evaluation as the researcher, a total of 6 thematic categories were eventually identified and selected (see Section 4.1).

After these categories were established, Copilot was instructed to perform an initial labelling of prompts, assigning the most appropriate category to each line in the spreadsheet, based on typical examples provided in an instructional prompt. The labelling instruction was formatted in JSON style (Bray, 2014) to ensure consistency. The assigned labels were stored to a spreadsheet and subsequently reviewed by me as the researcher. During the human review process, a total of 343 prompts were relabeled. The instruction for analysis and results after human validation is available for review in an open research depository (Open Science Foundation, 2025). With a larger dataset, the analysis protocol could have been revised to include more examples and more mutually exclusive category descriptions, thereby reducing the need for manual adjustments. In this study, however, the number of prompts was limited, making a manual review reasonable within the available time frame.

After labelling, Microsoft Excel was utilized to develop figures based on frequencies of the categorization to address research questions 1 and 2, and representative examples were selected for research question 3.

### 3. Results

#### 3.1 RQ1: What kind of writing support was requested?

Based on the inductive categorization outlined in Section 3.4, six thematic categories emerged from the material: *information requests, structural guidance, example requests, content creation, feedback on text, and follow-up clarification*. These categories reveal the different ways students used the educational chatbot for writing support, often reflecting various stages and needs in their writing process. Themes, description and example prompts are summarized in Table 4 below.

Table 4. *Themes, descriptions and examples*

| Theme                    | Description  | Example prompts   |
|--------------------------|--|---|
| Information requests     | Initial prompts requesting information, ideas or explanations of concepts to be used in the writing assignment.                                  | What is dystopia? (AB-J1-011)<br>Information about the Baroque and the Renaissance (EA-J1-001)  |
| Structural guidance      | Requests for help with organizing a text, applying genre-specific conventions, or writing specific sections such as introductions or main parts. | Can you make a short outline for how I can write a text about youth language? (IA-P1015-001)<br>What should I write in the main part? (DA-J6-025) |
| Example requests         | Prompts asking for concrete examples or sample texts that illustrate specific genres, styles, or language use.                                   | Can you provide a sample text? (AB-J2-049)<br>Give me some concrete examples of words and expressions young people use today. (IA-P1005-009)      |
| Content creation         | Requests to generate new written content or to rewrite, extend, or transform existing text for use in an assignment.                             | Create a fantasy story for me. (BA-G4-003)<br>Can you create a second paragraph on this topic? (EA-G4-017)  |
| Feedback on text         | Prompts in which students pasted text segments and asked for specific feedback, or suggestions for improvement.                                  | Can you proofread this assignment for me? (EA-G1-021)<br>What else should I include in this text? (KA-P17-003)                                    |
| Follow-up clarifications | Follow-up prompts asking the chatbot to elaborate, simplify, or adjust previous responses for greater clarity or relevance.                      | Can you elaborate on your answer?<br>Preferably with more details. (KA-P23-015)<br>Explain it more briefly. (AA-G1-003)                           |

While these categories are presented separately, the boundaries between them were not always clear. Some prompts could easily fit into more than one category, reflecting the flexible and intertwined nature of students' writing. Idea generation, planning, drafting, and revising often happened side by side rather than in a fixed order. The prompts show that students' needs ranged from gathering background information and organizing their thoughts to finding

concrete examples, creating text, getting feedback, and asking for clarification to improve their understanding.

As described above, all 895 prompts were assigned to one of the six themes. Based on this categorization, the percentage distribution of prompts across themes was calculated, as shown in Figure 4 below.

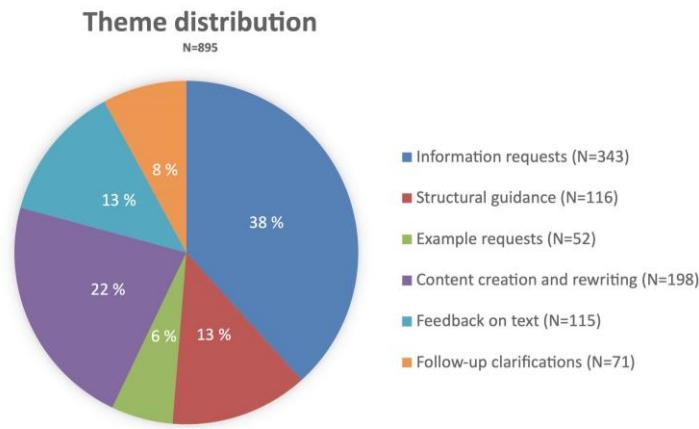


Figure 4. Percentage distribution of themes for writing support

The distribution of themes in the data materials reveals that students predominantly made *information requests*, counting 38% of the total prompts. This finding suggests that students frequently used the educational chatbot as a knowledge resource, to gather initial information before or while proceeding with their writing tasks. *Content creation and rewriting* represent the second-largest category (22%), pointing to an instrumental use of the chatbot for producing text to be used in the assignment. Next, the equal share of structural guidance and feedback requests (both 13%) suggests that a considerable subset of students utilized the chatbot for typical scaffolding activities such as demonstrating text organization and improving drafts. Follow-up clarifications (8%) demonstrate some iterative, dialogic engagement, pointing to students' needs to refine understanding. Similarly, example requests (6%) were rare, possibly reflecting either a lower perceived need for genre modeling or a lack of awareness of the chatbot's potential in this area.

### 3.2 RQ2: How do requests for writing support differ across educational levels?

Grouping students' prompts by education level makes it possible to visualize how requests for writing support vary across age groups. This can indicate whether age influences the way students interact with educational chatbots under writing assignments. Table 5 and Figure 5 below shows how the different types of requested support are distributed across the various school levels.

Table 5. *Themes distributed across education levels*

| Theme                    | Elementary school | Secondary school | Upper secondary school |
|--------------------------|-------------------|------------------|------------------------|
| Information requests     | 73                | 214              | 56                     |
| Structural guidance      | 14                | 88               | 14                     |
| Example requests         | 2                 | 31               | 19                     |
| Content creation         | 16                | 101              | 81                     |
| Feedback on text         | 0                 | 64               | 51                     |
| Follow-up clarifications | 23                | 34               | 14                     |
| Total                    | 128               | 532              | 235                    |

When aggregated by school level, distinct patterns emerged in the types of writing support requested. In elementary school, nearly half of all prompts were information requests (49%), followed by follow-up clarifications (15%) and content creation (11%). Feedback on text was absent at this level, and requests for examples or structural guidance were relatively rare. In secondary school, information requests also dominated (48%), but there was a broader spread across other categories: structural guidance accounted for 20%, content creation for 23%, and feedback on text for 14%. Example requests (7%) and follow-up clarifications (8%) were also more common than in the youngest group. In upper secondary school, content creation was the most frequent category (33%), followed by information requests (23%) and feedback on text (21%). Example requests (8%) and structural guidance (6%) occurred at similar levels, while follow-up clarifications were least common (6%).

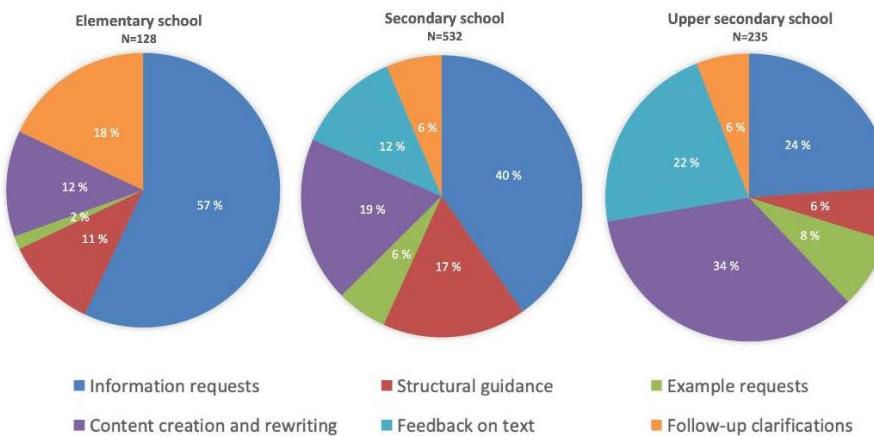


Figure 5. Percentage distribution of themes for writing support

When comparing across levels, it should be noted that most participants in the study came from secondary school classes, and the results representativeness especially for the elementary school levels is somewhat limited. However, the findings suggested that younger students relied heavily on information requests and clarifications, reflecting a stronger need for information seeking and conceptual understanding. As students progressed into secondary school, the range of request types broadened, with notable increases in structural guidance and feedback, indicating a growing focus on organizing and refining their writing. In both secondary and upper secondary school, more students requested content creation, while reliance on basic information gathering declined.

### 3.3 RQ3: What are some typical examples of prompts and responses?

While a detailed account of the interaction between each individual student and the chatbot lies beyond the scope of this article, it would be hypothetical to address the main question without also considering the chatbot's responses. To explore this query, I have selected a sample of prompts that seem representative of their respective categories. To keep the scope manageable, I have included one or two prompt-response pairs for each of the categories above – most responses are shortened due to length limitations.

#### *Example 1: Information requests (excerpt from AA-G3)*

The category of information requests is broad and multifaceted, encompassing students' inquiries for facts, conceptual explanations, and inspiration or brainstorming ideas for the texts they were tasked with writing. Many of the younger students requested and discussed initial ideas when starting their writing assignments. For example, in class 'AA', where students

were creating fictional texts, they often asked for suggestions of story ideas, characters and plots.

Student: Can you give me ideas for a story?  
 Chatbot: Of course! Here is an idea for a story:  
     Title: Shadowland  
     Main Character: Sarah Thompson.  
     Age: 12 years old  
     Description: Sarah is a curious and adventurous girl with long brown hair and brown eyes (...)  
     Main Idea: One day, Sarah discovers a mysterious old book in the attic. When she opens it, she is transported to a magical land known as Shadowland (...)  
 Student: Can you give me another suggestion, but don't write too much, just a little about the beginning of the story?  
 Chatbot: Of course! Here is another story idea with a short description of the beginning:  
     Title: The Magic Amulet  
     Main Character: Oliver Collins  
     Age: 10 years old  
     Description: Oliver is a curious and adventurous boy with short blond hair and blue eyes (...)  
     Beginning of the Story: Oliver spends a lot of time in his grandparents' attic. One day, he comes across an old chest filled with ancient artifacts (...)

In this excerpt, the student prompts for ideas, and the educational chatbot responds with a detailed message, suggesting a title, characters, character descriptions, and more. Earlier in the conversation, the student requested characters for the story, which likely explains the chatbot's extensive focus on character information. However, the response is too lengthy for the student to quickly read and assess at this stage of the writing process, leading the student to ask for a shorter reply. It is also noteworthy that the chatbot suggests stories including 10- to 12-year-old characters, despite the student not providing any information about his/her age. This likely reflects the system prompt that guides the chatbot to tailor responses for children (see Section 3.3 above). It should also be noted that, in addition to offering structured idea suggestions, the chatbot provides an actual beginning to the story. The generative AI system goes beyond simply suggesting ideas by generating content, even though the student only asked for "a little about the beginning". This tendency of extensive assistance appears frequently throughout the data.

*Example 2: Structural guidance (excerpt from KA-P10)*

The students who participated in this study wrote texts across a variety of genres. They often sought general writing support for structural guidance within specific genres, and sometimes for specific sections of their texts. In class 'KA', the students wrote argumentative essays. One

of them initially asked for ideas for an argumentative text about youth, climate, and politics – and then requested structural help to begin the essay:

Student: How do I start an argumentative text?

Chatbot: Starting an argumentative text can be a bit challenging, but here are some tips to get off to a good start:

1. Begin with an Engaging Sentence. Start with something that grabs the reader's attention. This could be an interesting fact, a quote, or a question. Example: "Did you know that over 8 million tons of plastic end up in the ocean every year?"
2. Introduce the Topic. Briefly explain what the topic is about so the reader understands the context. Example: "Plastic pollution is a global issue that affects both the environment and wildlife."
3. Present Your Main Argument. State what you are arguing for or against. This is your main argument or "thesis statement." Example: "Therefore, I believe we should ban single-use plastics to protect our planet."
4. Provide a Brief Overview. Give a short summary of the key points you will discuss in the text. Example: "This text will explore how a ban can reduce pollution, protect wildlife, and promote sustainable alternatives." Starting strong will help you structure the rest of your text.

Remember to be clear and direct and try to keep the reader engaged throughout your writing. Good luck! 😊

In this example, the student's prompt results in an AI-generated text that offers a step-by-step approach to writing within the requested genre and text segment. The chatbot's response is clear and instructional, organized into four chronological steps. Examples are provided throughout. It is noteworthy that the examples align with two of the topics the student previously indicated the text should address (climate and politics), but less so with the first-mentioned topic; youth. The chatbot's feedback combines imperative and encouraging language and concludes with an emoticon.

*Example 3: Example requests (excerpt from AB-J2)*

The category *example requests* was established based on several instances in the dataset where students asked for concrete examples. Such requests have the potential to enable modeling of genre-specific segments that can serve as inspiration or illustrative samples for students writing similar texts, as emphasized in the Australian genre pedagogy. The example below is taken from a secondary classroom, where most of these prompts were made. The excerpt is from class 'AB', where the students were writing a film analysis. In the first prompt, the student asks a question for structural guidance for writing the conclusion of the text and eventually requests an example of what a conclusion in a film analysis might look like:

Student: What is smart to include when writing a conclusion for my analysis?

Chatbot: When you are going to write a conclusion for your analysis, there are several elements you can include to round it off in an effective way:

1. Summarize main points: Go through the most important points you have discussed in your analysis. This gives the reader a clear understanding of your central arguments.
2. Repeat your conclusions/findings: What have you discovered through your analysis? What have you concluded? This is your last chance to highlight your findings and conclusions.
3. Include personal reflections or thoughts: (...)
6. End strongly: Your conclusion should leave an impression on the reader. End with a strong sentence that effectively summarizes your points and puts a definitive end to your analysis.

Student: Can you provide a sample text?

Chatbot: Of course, here is an example of a conclusion for your analysis of the film Divergent: Through the analysis of Divergent, it has become clear that the film reflects many of the challenges young people face in today's society – from the pressure to fit in, to the fear and uncertainty surrounding important life decisions. The film illustrates these conflicts insightfully by (...)

In the response to the second question, a typical sample text is not provided, but rather a possible conclusion to the text, implementing the structural guidance provided above. This example is representative of many similar cases in which students request generic writing support but instead receives a ready-for-use text.

*Example 4: Content generation (excerpt from EA-G4)*

As shown in Section 4.2, content generation requests were the most frequently employed approach among participants from upper secondary classrooms. These students produced relatively advanced texts that integrated subject-specific content within defined genres. In class 'EA,' for instance, students were assigned to write an essay examining the contrasts between the Baroque and the Enlightenment (see Section 3.2).

Student: Can you give an example of how I can write an introduction to an essay on this topic?

Chatbot: Yes, of course! Here is an example of how you can write an introduction to an essay on the contrasts between the Baroque and the Enlightenment in literature: During the 1600s and 1700s, Europe experienced two major periods in literary history: the Baroque and the Enlightenment. These two periods represent opposing values and ideas, and this is expressed in the literature of the time. The Baroque was characterized by an abundance of ornamentation and a tendency to exaggerate emotions and expression, while the Enlightenment was characterized by (...)

Student: Can you create a second paragraph on this topic?

Chatbot: Yes, of course! Here is another paragraph that shows the contrasts between the Baroque and the Enlightenment in literature through examples: Another difference between the Baroque and the Enlightenment is the view of art and literature. In the Baroque, art and literature were characterized by an abundance of ornaments and symbolic imagery, and there was a tendency to exaggerate emotions and expressions. This stood in contrast to the Enlightenment, where art and literature were seen as (...).

In this excerpt as well, the student begins by requesting an example of how an introduction can be written – a request for structural guidance. However, the student receives a ready-to-use answer to the assignment, generated by the system. The AI-generated text appears to address the writing assignment perfectly, leading the student to adopt a different prompting strategy – requesting content generation, paragraph by paragraph.

*Example 5: Feedback on text (excerpt from IA-P1002)*

Many of the participants in the study asked for feedback on their own texts during conversations with the chatbot. In class 'IA,' the students wrote an academic text on language use. In this example, the student has pasted in the introduction and asked for general feedback.

Student: Is there anything else I should include in the introduction? (...)

Chatbot: Your introduction is already clear and provides a good introduction to the topic! Here is some feedback and suggestions for improvement: What's good: 1. Clear thematic focus: You clearly present that you will discuss the development of youth language. 2. Concise and to the point: The introduction is brief and gets straight to the point, which is great for capturing the reader's interest. Areas for improvement: 1. Add a definition: Consider including a brief definition of what youth language is. For example: "Youth language is the specific way young people communicate, often characterized by slang and media influence." (...) 4. Overview: You might also include that you will explore specific factors such as social media and pop culture in your text.

Revised example: "Many factors influence the Norwegian language, and it is constantly evolving. (...)" What do you think about these changes?

Here, the student receives a comprehensive response containing two positive comments and four suggested areas for improvement. The feedback not only provides suggestions for improvement but also demonstrates how these improvements can be implemented, sentence by sentence, in the text.

*Example 6: Follow-up clarifications (Excerpt from AB-J3)*

This category was the least frequently observed type of request in the material and consists of highly varied follow-up questions and comments from the students. In this context, I have included an illustrative example showing how a student in class 'AB', after initially asking for structural guidance, handles the repeated rewrites performed by the language model.

|          |   |
|----------|---|
| Student: | I think the paragraphs in the text are a bit short and I want to combine them.<br>Can you help me with that? (...)  |
| Chatbot: | Here is a suggestion for how you can combine the two paragraphs into one longer paragraph: (...)  |
| Student: | What changes have you made?   |
| Chatbot: | I have made the following changes in the text: (...) These changes are small adjustments to improve sentence structure and flow in the text. Hope this was helpful! |

The example is perhaps not representative, but it is interesting in the context of scaffolding theory because it demonstrates a possible strategy students can use when facing extensive rewriting by the generative AI system.

## 4. Discussion

### 4.1 Themes and prompting strategies

The results section above reveals that the students participating in the study primarily engaged with the chatbot for writing support in five distinct ways: for information requests, structural guidance, example requests, content creation, feedback, and follow-up clarification. These themes were inductively established based on patterns in the data, while also sharing several characteristics with key theories reviewed in Section 2. As previously discussed, scaffolding for writing involves providing students with support to develop their writing skills through guidance from 'a more knowledgeable other' (Vygotsky, 1978), which can include individualized responses, examples, and simplification (Benko, 2012). It is conceivable that an educational chatbot powered by a large language model could simulate these qualities. The students' modes of interaction reflect this expectation, particularly in prompts categorized as requests for structural guidance, example requests, and feedback on text.

The information requests category is prevalent in the data, possibly reflecting students' habitual interactions with data systems for seeking and retrieving information, such as internet search engines. At the same time, the examples from the material show that the students also used the chatbot as a sparring partner for ideas in the initial stage of the writing process. Viewed through the lens of scaffolding for writing, structural guidance and example requests are particularly intriguing. With these prompting strategies, students explicitly seek guidance on text structure and the generation of illustrative examples. The construction of such scaffolds aligns with the genre-based pedagogical approach, where students receive explicit training in genres and collaboratively model texts (Cope & Kalantzis, 1993; Rose & Martin, 2012).

Nevertheless, the challenge remains that extensive generative content production may reduce students' agency and ownership of their writing, potentially hindering their development. This concern is particularly relevant for content generation requests, potentially providing segments they can incorporate into their own texts. While it is possible that such strategies might support learning – especially if students employ a critical approach and metacognition in interacting with these data-generated texts – this must be conceived as a different form of writing support than what is typically associated with scaffolding.

An educational chatbot serves as an interface for Human-Computer Interaction (HCI) with Large Language Model (LLM), providing users opportunities to interact using natural language (Jurafsky & Martin, 2025), making the AI chatbot more 'teacher-like'. However, theories of AI literacies and prompt engineering points to a different use of 'script-like' language. Prompt engineering techniques such as the few-shot prompting method (Lee et al., 2024) appears recognizable in the material, when students insert their own texts and examples in the conversations. However, most of the students' prompts do not closely align with key prompting techniques, such as chain-of-thought prompting or assigning a persona to the chatbot. Critical prompting approaches to the information provided by the system may exist within the materials, but is not reflected in the aggregated themes provided, suggesting it is less extensively used. These findings align with previous research indicating that students often rely on direct requests and copy-paste strategies (Reeping & Shah, 2024; Sawalha et al., 2024).

#### 4.2 Age distribution

Section 4 also highlights that the way students interact with the chatbot varies across different age groups. Notably, the tendency to prompt for information retrieval decreases gradually with older students, while the inclination to request feedback on text and automate text generation increases. Although contextual factors within the writing assignments might influence these trends, the overall pattern appears clear. It is somewhat surprising that older students are more likely to request content creation; one might expect these students to be more cautious about employing chatbots in copy-paste strategies, which some might consider as "cheating." Nevertheless, this trend is evident in the data. In relation to the assignments given (refer to Table 2 in Section 3.2), the tasks for the oldest students are characterized by

significantly higher complexity, which could explain the increased need for assistance in writing. From the perspective of scaffolding theory, however, this approach appears to be less conducive to effective scaffolding, because it offers the writer too much support and leaves less agency with the student. These results may partly be explained by the fact that the system prompts of the two educational chatbots used in the study differed somewhat. The oldest students used the “Student Assistance” chatbot, which was specifically configured to act as an assistant. Consistent with previous research on chatbot roles in education, an AI system set up as a peer agent is more likely to perform tasks on behalf of the student than one configured, for example, as a tutor (Kuhail et al., 2023). While differences in system prompts may account for some of the variation, it is nevertheless noteworthy that the trend toward less information seeking and more content creation appears to begin already at the lower secondary level, where students used the same chatbot design as in the elementary classes.

#### 4.3 Interacting with a 'more knowledgeable other'?

As other writing researchers have noted, scaffolding is relational in nature (Kuiper et al., 2017). When interacting with generative AI, prompt engineering strategies play a crucial role in shaping the system’s responses – likely to a much greater extent than the wording of questions posed to a human ‘more knowledgeable other’ (Stojanov, 2023). Teachers that engage in scaffolding draw on their knowledge and experience to support students’ writing through, for example, assigning appropriate tasks, reducing complexity, directing attention, providing individual follow-up, and modeling (Benko, 2012). To address the main study question of how different types of requests for writing support can contribute to scaffolding in writing, students’ prompts must also be considered in relation to the responses provided by the educational chatbot.

The examples reviewed in Section 4.3 provide specific insights into the material, illustrating how students’ choice of words and prompting strategies shape the chatbot’s responses. These examples also reveal an aspect not addressed in the results analysis: the generative AI systems consistently produce written content on behalf of the students, even when the students seek other types of support.

In Example 1, when a student requests ideas, the student receive not only the suggested ideas but also a proposal on how to implement these ideas in practice. In Example 2, when a student seeks structural support for beginning an argumentative text, example sentences are provided in the response. Structural guidance from the AI system is often provided as a step-by-step guidance that simplifies the writing process by breaking the text into key sections with genre-specific modeling and examples (Tardy et al., 2020). This is a typical form of scaffolding where concepts are demonstrated with structured examples (Benko, 2012). However, the chatbot’s responses goes too far, presenting fully formulated statements.

The same pattern is evident in Example 5, where improvements are suggested both generally and through ready-made proposals. An effective ‘more knowledgeable other’ would explicitly teach why a particular approach is stronger and perhaps prompt students to analyze the differences between their own writing and the chatbot’s model. This kind of engagement

could stimulate better metacognition and deeper learning but is not provided in the chatbot interactions.

In Example 3, however, the chatbot's initial response deviates from this pattern. While the response to the first prompt is general, the outcome becomes a complete, ready-to-use solution when the student subsequently requests a sample text. These examples illustrate the limitations of the chatbots utilized in this study as writing support tools, likely stemming from the fact that LLMs are originally designed as text generators and story machines rather than writing aides (Sharples & Pérez y Pérez, 2022). Additionally, it seems that the systems are further tailored to be perceived as helpful and accommodating, which may lead to an excessive helpfulness that compromises student agency in educational tasks. While these insights are less than novel, the study demonstrates how these issues manifest in specific student work, with extensive assistance provided even without explicit requests for it.

Example 4 highlights this issue. Initially, the student asks for general ideas but receives a complete text, subsequently altering the prompting strategy to request continued text development. It is likely that the student's subsequent strategies would have differed if the system had simulated a more typical teacher response, offering generalized support and encouraging independent writing. As the interaction progresses, the system generates increasingly more content, conflicting with the scaffolding principle of gradual release of responsibility (Belland, 2013; Wilkinson & Gaffney, 2015).

Example 5 – the final example – can be seen as a student's attempt to regain control over text production by asking what modifications had been made to the text. In the context of scaffolding, this approach could be viewed as a potential method for addressing this challenge. However, such follow-up questions are very rarely observed in the material. This suggests a need to teach students specific strategies for critically evaluating generative content and for steering the chatbot's responses toward guidance and scaffolding, rather than producing the text on the student's behalf.

## 5. Conclusion

The central question posed by this study, as outlined in Section 1.1, was: How do Norwegian L1 students of various ages seek writing support from educational chatbots, and how might these requests contribute to scaffolding in writing? The study analyzed a dataset comprising 108 students' instructions and questions related to various writing tasks. From the students' prompts, five thematic categories were established: information requests, structural guidance, example requests, content creation, feedback, and follow-up clarification.

The distribution of these categories revealed that information requests were the most frequently used approach overall, particularly among younger students. Conversely, for the older students in the sample, content generation and feedback on text accounted for over half of their interactions.

These strategies can both support and undermine key principles of scaffolding in writing. In their nature, requests for *structural support*, *example texts*, and specific *feedback on text* would have a potential to significantly contribute to scaffolding in writing. On the other hand,

requests for *text generation* might compromise a student's ownership of writing, oversimplify tasks, or otherwise restrict their autonomy in the learning process. Applying relevant prompting strategies might lead the writing process into a learning-oriented direction. However, examples including responses from the chatbots indicate that the generative AI systems utilized by the students in this study could not limit their responses. Even in conversations where students sought support in clearly scaffolding-oriented ways, excessive assistance was provided, as the generative system often generated both structural feedback and complete solutions within the same response.

There is limited evidence of a gradual release of responsibility in the materials for this study. Addressing this challenge may not solely rely on enhancing students' prompting literacies but also requires system-level adjustments, focusing on developing and training AI systems to prioritize support over extensive text creation.

Since the educational chatbots examined in this study lack adaptive support, it may be advisable to limit their use to well-regulated stages of the writing process – such as the idea generation phase or general questions about structure – rather than employing them as continuous support throughout the entire process. Further research is warranted to undertake a more in-depth examination of how generative AI systems respond to students' requests.

## 6. Limitations

This study collected materials from diverse schools, classes, and writing assignments. However, the analysis and discussion gave little attention to the rich contextual variations from which these materials originated. Some classes may have received more extensive training than others and certain assignments were likely better suited for educational interactions between students and chatbots.

Additionally, the materials were gathered as part of a university-school collaboration project. In some classes, as the researcher and university representative, I participated by suggesting and discussing potential implementations of generative AI. As a result, these classes may have received more instruction prior to data collection than others, introducing potential biases into the dataset.

Furthermore, little attention has been given to the underlying system settings of the educational chatbots, such as variations in hidden system prompts and language models. While most classes used an educational chatbot based on the GPT-3.5 model, some utilized the newer GPT-4 model. As discussed above, these differences may have influenced the chatbot's role, behavior, and agency in the writing process.

The data-assisted thematic analysis was reviewed and corrected, but errors and omissions may still occur. Notably, many prompts could potentially fit into multiple categories, and systematic variations in the interpretation of prompts could have influenced the results.

## 7. Author's notes

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