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A typology of learners' AI usage patterns in secondary EFL writing tasks

When and why do students rely on AI?

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Wenn verfügbar, greifen Lernende bei der Bearbeitung von Schreibaufgaben häufig auf generative KI zurück, wobei die genauen Nutzungsmuster stark variieren. Aktuelle Studien betonen die ambivalenten Auswirkungen von KI auf den Lernerfolg und beschreiben Risiken für die sprachliche Handlungsfähigkeit der Lernenden. Diese Studien legen nahe, dass die konkreten Nutzungsmuster wichtige Indikatoren für die kognitive Aktivierung der Lernenden darstellen. Während im tertiären Bildungsbereich bereits Nutzungsmuster bei Schreibaufgaben identifiziert wurden, sind Daten aus der Schulpraxis rar. Dieser Beitrag gibt einen detaillierten Einblick in KI-gestützte Schreibprozesse von Lernenden der Sekundarstufe und beantwortet, wann, wie und warum sich Lernende beim Schreiben auf KI verlassen. Die qualitative Analyse zeigt Nutzungsmuster von Kollaboration bis Ghostwriting auf, die sich in der Interaktion mit der KI sowie im Grad der Eigenständigkeit des Schreibverhaltens unterscheiden. Die Analyse zeigt zudem, dass Faktoren wie die zugeschriebene Autorenschaft, Gefühle von Fairness und motivationale Aspekte diese Unterschiede bedingen könnten. Auf der Grundlage der Ergebnisse werden abschließend Ansatzpunkte für didaktische Interventionen erörtert, die einen gezielten Umgang der Lernenden mit KI im Schreibprozess fördern.

Schlagworte: AI-assisted Writing; Argumentative Writing; Generative AI; Human-AI Collaboration; Secondary EFL
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A typology of learners' AI usage patterns in secondary EFL writing tasks

When and why do students rely on AI?

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Abstract

Wenn verfügbar, greifen Lernende bei der Bearbeitung von Schreibaufgaben häufig auf generative KI zurück, wobei die genauen Nutzungsmuster stark variieren. Aktuelle Studien betonen die ambivalenten Auswirkungen von KI auf den Lernerfolg und beschreiben Risiken für die sprachliche Handlungsfähigkeit der Lernenden. Diese Studien legen nahe, dass die konkreten Nutzungsmuster wichtige Indikatoren für die kognitive Aktivierung der Lernenden darstellen. Während im tertiären Bildungsbereich bereits Nutzungsmuster bei Schreibaufgaben identifiziert wurden, sind Daten aus der Schulpraxis rar. Dieser Beitrag gibt einen detaillierten Einblick in KI-gestützte Schreibprozesse von Lernenden der Sekundarstufe und beantwortet, wann, wie und warum sich Lernende beim Schreiben auf KI verlassen. Die qualitative Analyse zeigt Nutzungsmuster von Kollaboration bis Ghostwriting auf, die sich in der Interaktion mit der KI sowie im Grad der Eigenständigkeit des Schreibverhaltens unterscheiden. Die Analyse zeigt zudem, dass Faktoren wie die zugeschriebene Autorenschaft, Gefühle von Fairness und motivationale Aspekte diese Unterschiede bedingen könnten. Auf der Grundlage der Ergebnisse werden abschließend Ansatzpunkte für didaktische Interventionen erörtert, die einen gezielten Umgang der Lernenden mit KI im Schreibprozess fördern.

1 Introduction

While generative AI (GenAI) can help assist students in overcoming challenging tasks through adaptive feedback and personalised assistance (Su et al., 2023), overreliance on GenAI may negatively affect cognitive involvement (Fan et al., 2025). This phenomenon makes the targeted use of GenAI especially important during traditionally challenging activities for learners to ensure targeted support does not devolve into overreliance on technology. One of these challenging fields for L2 learners is argumentative writing (Siekmann et al., 2022), which, at the same time, is fundamentally important for several overarching competences of EFL. These include media literacy, critical thinking and aca-

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demic writing ability (Su et al., 2021). Küplüce et al. (in print) show that secondary EFL students tend to use AI-generated text heavily when completing writing tasks, which could ultimately impact learning progression and improvements to writing competence. Prior studies found fundamental differences with respect to how students employ GenAI in writing (Su et al., 2023), with potential implications for their cognitive involvement. However, most of these studies target learners in tertiary education, with comparatively little research using data from secondary education (Liang et al., 2023; Chuang & Yan, 2025). Furthermore, there is a lack of insight into why students choose particular ways of using GenAI, which is highly relevant for the design of pedagogic interventions trying to foster a more targeted approach. The present study aims to address this gap in research for instructed secondary EFL by triangulating screen recordings of AI-assisted writing tasks, interviews of learners, and surveys on AI usage behaviour and the assignment of authorship (Draxler et al., 2024). It offers a detailed and contextualised insight into the AI-assisted writing processes in combination with students' own perception of and reasons for the use of GenAI. By providing interpretable and contextualised data of students' writing processes, the patterns they showcase, and learners' corresponding reasoning, the article gives suggestions on how to guide and support students in making informed and responsible use of AI assistance. More specifically, the article provides a typology of different usage patterns that emerge within the participating students, showcasing key differences in the use of GenAI and enabling tailored support. The article concludes by discussing potential avenues and strategies for pedagogical interventions in secondary EFL that aim to ensure the critical and targeted use of GenAI applications like ChatGPT and enhance students' ability to produce and evaluate valid arguments.

2 Literature Review

2.1 Argumentative writing in EFL classes

Argumentative writing is central to EFL as a key feature of common language proficiency and admission tests and because of its importance for language and soft skill development (Küplüce et al., in print). As such, it is extensively discussed in international discourses on EFL and in writing pedagogy (Su et al., 2021). While there are fewer publications in the German field of EFL focusing on argumentative writing (Willems, 2015), the activity is firmly anchored in EFL curricula due to its importance for overall academic writing and discourse ability (Kultusministerkonferenz [KMK], 2012, p.17).

Federal state-specific curricula, like those in Baden-Württemberg, incorporate argumentative writing in several grades of the *Sekundarstufe I*. It is mentioned for grades 7, 8, and 9 in 3.2.3.5 "writing", 3.2.2 "intercultural communication", and 3.2.1.2 "non-fictional texts" for the *Realschule* (secondary school) as well as for the *Gymnasium* (grammar school) (Ministerium für Kultus, Jugend und Sport, 2016). In addition, students in grammar schools in grades 9 and 10 are explicitly expected to know and apply genre-specific conventions of argumentation and present and defend arguments on a controversial topic (Ministerium für Kultus, Jugend und Sport, 2016, p. 43). Independent of

state-specific regulations, the KMK declares argumentative competences in written and oral expression as necessary prerequisites for the *Allgemeine Hochschulreife* (A-Levels) (KMK, 2012), emphasising their role as fundamentally important skills for higher education.

In general, many students in secondary and even tertiary education experience problems with argumentative writing. These problems have been highlighted for learners of English as L1 (Wambsganss et al., 2022) but especially in EFL education, where students struggle with structure and coherence in argumentative texts (Siekmann et al., 2022), and also with genre-specific lexical abilities (Lötscher et al., 2025). To support students in the challenging and critical task of argumentative writing, researchers in the field of Computer Assisted Language Learning (CALL) have historically focused on the use of technology to offer feedback (Wambsganss et al., 2022) and to increase motivation (Warschauer, 1996). Interest in CALL and argumentative writing has only increased with recent developments in the field of generative AI, which have captured the attention of educational policymakers and CALL researchers.

2.2 AI-assisted writing

There are two major interconnected questions regarding the discussions on AI-assisted writing in EFL. The first question concerns the roles GenAI can, and does, take on in practice during the writing process. Here, several possibilities have emerged that are similar to discussions regarding the impact of machine translation on foreign language education (Jiang et al., 2024). GenAI is attributed the ability to scaffold, to correct, and even to strengthen the dialogic aspect of writing (Hartwell & Aull, 2022). In addition to this, AI-assisted writing models have emerged that try to model AI as a participant in the writing process, assuming different roles like *partner* and *tutor* but also *ghostwriter* (Steinhoff & Lehnen, 2025). The second area of interest regarding AI-assisted writing is the question of its impact on writing competence development and general (language) competence development. Summarising here, the main points of concern involve students' agency and their cognitive engagement in the writing task. In other words, the question arises whether learners actively participate in the co-authoring process and stay "in the loop" (Mosqueira-Rey et al., 2023, p. 3006) or whether GenAI takes over with students' cognitive involvement being minimal. This is of particular importance for EFL, due to the challenge that "[a] central requirement to be able to use technologies for English writing development is, ironically, a good grasp of the language and the ability to write effectively already" (Warschauer et al., 2023, p. 3). For students to stay in the loop when GenAI is available, they need skills that make up competent writing, including linguistic skills, writing strategies, and self-regulation (Becker-Mrotzek, 2022, p. 19). This leads to a dilemma, where the use of technology to aid with problems in argumentative writing requires students to be able to solve these problems on their own already. The issue is then further exacerbated by premature use potentially interfering with students' ability to use these technologies for learning progression (Fan et al., 2025).

While the dilemma is not new (see discussions on offloading and deferring, Dawson, 2020), the significant evolution with GenAI compared to earlier technological inno-

vations is the number of partial tasks Large Language Models (LLMs) in particular are able to take on. These include not only language-related aspects but also the content of written tasks. It has become increasingly clear that LLMs can produce language- and content-related aspects of tasks that by and large exceed what secondary L2 learners are able to produce (Küplüce et al., in print). Because of this, focussing on the writing process as a learning opportunity is more important than ever. Of particular interest, taking into account the discussion on AI-assisted writing, seems to be what specific usage patterns students exhibit to not only produce a high-quality product but also keep some form of agency and involvement in the production of the text.

Not least because of the balance between necessary support in challenging tasks and the danger of overreliance, the KMK (2024, p. 10, translated by the author) sees "[t]he responsible, age-appropriate and competent use of AI [...] as a key competence for students"[2]. Keeping the idea of cognitive involvement in mind, responsible and competent use in the field of writing may be interpreted as the targeted use of GenAI for support and as a *partner* (Steinhoff & Lehnen, 2025) with the goal not only of task completion but also of learning assistance.

2.3 The writing process and AI usage patterns

In the context of AI-assisted writing, product outcome and proficiency development can be largely independent of each other. Because of this, students' roles in the writing process are of particular interest, since they hint at students' actual involvement in text generation. The writing process itself – with or without AI – is often described referencing Hayes & Flowers' (1980) cognitive model of writing. While the model has been updated several times, its core stays intact. Summarising here, Hayes and Flowers describe writing as an iterative process based on three phases: planning, translating and reviewing (Hayes & Flowers, 1980, p. 11). In the planning phase, the writer uses their prior knowledge of the topic and the anticipated recipient to organise task requirements and set goals for the text. In the translation phase, the writer produces language under the guidance of the writing plan. Reviewing consists of reading and editing, constantly reiterating on the text produced so far (Hayes & Flowers, 1980, p. 12). In this general process, GenAI may take over different subprocesses with students still being involved overall. It could, for example, provide ideas in the planning phase with students focusing on goal setting and organisational aspects. It may also help with putting existing ideas into text by providing scaffolding, or it may help with the review by editing the text produced so far. This targeted use of GenAI in practice, however, comes with several challenges, especially for less advanced learners. The phenomenon may arise that writers severely overestimate their own contribution when using AI assistance, claiming authorship of texts even when involvement is minimal (Draxler et al., 2024).

The issue is exacerbated by secondary EFL writing traditionally focussing on the writing product rather than adopting a process-orientated approach (Porsch, 2010), which may add to difficulties of a targeted use of GenAI for particular sub-processes. This reali-

2 Original quote: "Der mündige, altersangemessene und versierte Umgang mit KI wird zu einer neuen Schlüsselkompetenz [...]" (KMK, 2024, p. 10).

sation concludes the literature review with a central mismatch between writing pedagogy, classroom practice, and the involvement of GenAI. Writing pedagogy describes writing as an iterative process including several repetitive steps. Within this framework, the use of GenAI can be integrated into various stages without the student necessarily resorting to using GenAI as a ghostwriter (Steinhoff & Lehnen, 2025), i. e., handing over the writing process to GenAI. Practice, however, shows a focus on product orientation. At the same time, with the last large scale-assessment taking place long before the widespread adoption of GenAI, how students learn and apply written argumentation in the age of AI is underexplored. A notable exception is the large-scale study by Meyer et al. (2024), who highlight that AI-generated feedback may improve motivation and performance in argumentative writing tasks. Still, while this study provides valuable insight into the potential of GenAI in secondary writing tasks, it focuses only on the revision process after the initial text is completed without GenAI. Studies covering the whole writing process from planning and translating to reviewing are thus needed to better understand GenAI's relation to student writing.

3 Purpose of the study and research questions

The research overview on argumentative writing in EFL and its connection to GenAI has highlighted a gap in research regarding students' use of GenAI during the writing process. Usage patterns are especially important, because they give insights into students' involvement in the writing process, with potential consequences for their writing proficiency development. Importantly, how students experience and report their use of GenAI may be largely unreliable due to authorship bias, which emphasises the importance of analysing the writing process itself rather than relying on self-reports. The present study provides detailed insights into students' use of GenAI in writing and highlights potential reasons for different manifestation patterns between groups of students. This allows for a differentiated needs analysis, informing pedagogic measures to support students in using AI assistance not only for the production of text but also as a resource for their writing proficiency development. The research questions are as follows:

RQ1: How do students describe their use of AI assistance and how accurate is the reporting compared to their use in the observed writing tasks?

RQ2: What distinct types of AI-usage patterns can be identified within the recorded writing processes? What are potential variables connected to these types?

4 Methodology

The study uses qualitative methods to analyse survey data, screen recordings, and student interviews. Additionally, it constructs a typology (Kuckartz, 2020) with four distinct emerging usage patterns.

4.1 Participants and procedures

The analyses use data from the participants of (Küplüce et al., in print). Data were collected from a total of $N = 104$ EFL students in years 10 and 11 from a grammar and a secondary school in Baden-Württemberg. Contact with the classes was established via the schools' principals, who introduced interested EFL teachers to the author. In total, five regular EFL classes participated in the data collection. Informed, written consent was obtained from the participating principals and all guardians with the help of the teachers.

All students underwent the same procedure. After a standardised language competence test and an unassisted writing task (cf. Küplüce et al., in print), they completed an AI-assisted, digital argumentative writing task using iPads (10^{th} gen.) and Apple Magic Keyboards within one week of the first task. Since at the time of data collection AIS.chat (*Adaptives Intelligentes System*) was not yet available for schools, the platform Fobizz (https://fobizz.com) was employed, enabling the creation of virtual classrooms, where students could access an LLM-based chatbot without the need to sign in using personal data. During data collection, Fobizz still used the ChatGPT-4o mini model. Writing tasks were taken and adapted from previously used tasks in final examinations in Baden-Württemberg for secondary schools (Krampert et al., 2024). Students had forty minutes for each task, requiring them to comment on controversial statements, list pro and con arguments and include their own opinion in no more than 250 words. Screens during the second task were recorded to gain insight into the AI usage patterns. After the second task, students completed an online survey on their previous experience with GenAI and their assignment of authorship regarding the second text. Lastly, based on the screen recordings, a total of 16 students were interviewed using stimulated recall. The author went through the individual screen recordings together with each of the 16 students, prompting for motivations and strategies. Specifically, the prompts asked the students to spell out their thoughts while watching the recording, their experience while interacting with GenAI and whether they felt like the interaction helped them achieve their goals. These interviews were recorded, transcribed and coded with the help of MaxQDA (version 24.11.0).

To provide a better understanding of the AI-assisted writing process and elicit potential reasons for the AI usage patterns, this study introduces the qualitative analysis of the interview data in connection to the stimulated recall as well as additional survey data. By showcasing the students' perspectives and systematising the patterns of GenAI use, it supports a contextualised interpretation of how the written products come to be – and how differences in the use of GenAI in writing might be explained. Together with an in-depth description of the writing process, it builds on earlier work and enables a stronger focus on process orientation, where previous work was mainly limited to linguistic product analysis.

4.2 Data and measures

4.2.1 Video data

For the writing process analysis, the study uses the coding scheme described in Küplüce et al. (in print). This scheme introduced 21 inductive categories to describe the

students' writing process, with special emphasis given to student-AI interactions. For the screen recordings, a total of 2928 events were coded across $N = 87$[3] videos. However, instead of relying on frequency reporting, the article at hand uses the document portrait and the document comparison chart functions of MaxQDA to visualise and compare exemplary writing processes in their entirety, following their chronological sequence.

4.2.2 Survey data

The survey was conducted using the platform SoSci Survey (version 3.7.06) (Leiner, 2025). The survey contained closed questions about previous experience regarding the regularity of AI use in private and educational contexts, which students rated on a 5-point Likert-type scale from "never" (0) to "daily" (5). Additionally, the survey asked students to assign authorship to different aspects of text creation, rating on a 5-point Likert-type scale whether they attributed authorship of the text to themselves or the GenAI. Items on authorship were based on Draxler (2024). Finally, it contained open questions, where students explained their authorship rating, their understanding of AI, and their opinion on its use in schools. A total of $N = 97$ students completed the survey.

4.2.3 Interview data

For the stimulated recall, all screen recordings were marked for potentially noteworthy interactions by the author and a trained assistant. The recordings were then sampled to achieve a broad range of interactions on the spectrum between co-authoring and de facto ghostwriting. Stimulated recall relies on the stimuli to be applied shortly after the event (the written task), which is why a maximum of three to four students in each class were interviewed. This way, all interviews could be conducted within a 24-hour timeframe of the screen recording. The 16 resulting interviews were recorded during the regular lessons in separate rooms. The screen recording of the interviewed students' writing process was shown on an iPad (10^{th} gen.) with the student being prompted to describe the recording. The transcribed interviews were coded using the Structured Qualitative Content Analysis (SQCA) (Kuckartz, 2018), starting with the deductive categories based on the prompts during the stimulated recall that were then differentiated using inductive subcategories. To compare the students' explanations in the interviews with what can be seen in the screen recordings, the coding scheme for the interviews focused on explanations for strategies regarding the use of GenAI, arguments for and against the use of GenAI, evaluation, and the integration of AI-generated output.

3 Missing videos can be explained by incomplete recordings, exempt students and two instances of faulty data transfer.

5 Results

5.1 Students' self-descriptions of their use of GenAI in writing

Using the SQCA, the interviews were fully coded, resulting in 394 events across 12 codes. The thematic key areas of the interviews are summarised in Table 1, highlighting the most prominent topics.

Table 1: Frequency of the main topics in students' self-descriptions of the writing process

Code	*n*	*M*	*SD*	Sum
Strategy of AI use	16	4.06	2.06	65
Arguments for AI use	16	2.19	1.77	35
Arguments against AI use	16	1.93	1.52	22
Evaluation of AI output	16	3.25	1.98	52
Integration of AI output	16	1.69	1.25	27
Motivational aspects	16	4.31	2.05	69
Authorship	16	1.69	1.58	27

While students spend considerable time evaluating AI-generated output in the interviews, justification for or against using GenAI within their writing occurs less frequently. Explanations of their integration of AI-generated material in their text and aspects of authorship are also comparatively infrequent, especially considering the presence of authorship in the survey, which was conducted before the interviews. *SD* is high for all main topics, which is expected with the sampling including a wide range of usage behaviour.

According to the students' answers, uses of GenAI occur throughout different phases of the writing process, from idea and argument generation (11 events) to information and translation (10 events) and finally feedback and revision (16 events). While some students describe their strategy as a division of labour (7 events), several cases openly admit to letting the GenAI take over the task (6 events), giving different reasons. Motivational aspects, which are closely connected to the description of the usage pattern, reveal a focus on reasons related to their language skills (or lack thereof) with 25 events. This is followed by task-related aspects (16 events) and fairness-related aspects (10 events). Answers related to the (perceived) skills of the student seem to be strong motivators for using GenAI (low perceived skills) as well as for not using GenAI (high perceived skills). This can be exemplified with interviews with student such as BE16CH, who attributes their use of GenAI to their own perceived lack of skills: "Well, I need a very long time to write, also for assignments and such, because, yeah, I don't

know, I just can't write, [...] [a]nd, yeah, if I have that kind of support, then I take it"[4] (BE16CH, Pos. 133–134). Contrasting this to the other side of the spectrum, i. e., strong perceived language skills, the refusal to let GenAI take over text production could be attributed to students challenging themselves to prove they can do better than GenAI, like KE11DI, who notes: "I intended to write a text that was at least as good as what the AI could write"[5] (Pos. 18–19). In the context of their interview, KE11DI's drive to challenge themselves to excel in comparison to the GenAI seems rooted in their belief in their own writing abilities but also in their aspiration to claim authorship of what they have written, which leads to the second group of subcategories.

The concept of authorship is particularly noteworthy, since students rarely explicitly claim authorship of the written products but still express a strong desire for the text to read and feel like they wrote it themselves. More specifically, some students emphasise a desire for a distinction between their own style of writing and typical ChatGPT texts. However, students within the interviews are mostly unable to explain what they mean by this, except for mentioning GenAI using sophisticated language. While some of the students express the importance of the text sounding like it was written by them solely for the reason of convincing their teacher, in far more cases, claiming authorship was explained with the sense of responsibility for the content. One example is AL01CH, who explains: "[...] Because I don't want to write down just anything that ChatGPT tells me, which I may not even understand myself, or which aren't my arguments or what I think like"[6] (Pos. 86–87). This ties in directly with the evaluation of AI-generated content by the students. When evaluating the output and giving reasons for whether they integrated it into their text, several students expressed that the language (12 events) or structure (11 events) does not fit their own style of writing. Some even explicitly remark a lack of authenticity and GenAI being non-human-like in their evaluation of the generated answers (8 events).

In general, students appear to be aware of the potentially negative impact of using GenAI for text generation. This is true regarding the impact on the text itself, as evidenced by their evaluation of the generated output, but also regarding GenAI's impact on the writing and learning process: "[W]ell, first of all, I think you kind of forget how to learn when you do absolutely everything with AI, something like that"[7] (IN29GUe, Pos. 89–90). Despite this awareness, most interviewed students use AI-generated content in their texts to a great extent. While intention-behaviour gaps (Sheeran & Webb, 2016) are expected, enriching the interview data with the screen recordings, the survey on authorship, and opinions on GenAI enable a clearer understanding of this phenomenon. To make sense of the different data strands – interviews, video data, and surveys

4 All direct quotes by the students are translated from German by the author.
Original quote: "Also, ich brauche sehr lange beim Schreiben, auch bei Arbeiten und so, weil, ja, keine Ahnung, ich kann einfach nicht schreiben, mein Satzaufbau ist auch nicht so gut. Und, ja, wenn ich halt so eine Unterstützung habe, dann nehme ich sie auch" (BE16CH, Pos. 133–134).

5 Original quote: "Ja, wahrscheinlich, weil ich vorhatte, einen Text zu schreiben, der mindestens, also selbst zu schreiben, der mindestens genauso gut ist, wie die KI es machen würde" (BE16CH, Pos. 18–19).

6 Original quote: "[...] weil ich brauche jetzt nicht irgendwas hinschreiben, nur was ChatGPT mir sagt, was ich aber dann selber schon nicht verstehen oder das nicht meine Argumente oder Sichtweisen sind" (AL01CH, Pos. 86–97).

7 Original quote: "Also, ne, also, erstmal habe ich das, also ich finde irgendwie, man verlernt irgendwie das Lernen, wenn man komplett alles mit einer KI macht, irgendwie so" (IN29Gue, Pos. 89–90).

– it is helpful to highlight the distinct types of usage patterns and the possible explanations that emerge. The following typology will present prototypes of four patterns of usage behaviour. The interviews and surveys then provide possible explanations for the identified patterns.

5.2 Types of usage behaviour and students, reported motivations and feelings of authorship

The typology used in this article aims to identify cases which, in terms of their characteristics, are as similar as possible within a given type, whilst at the same time differing from other types and can be situated within a common framework of reference (Kuckartz, 2020). A fundamental component of the typology is the construction of a "Merkmalsraum" (Kuckartz, 2020, p. 800), i. e., the n-dimensional field of similar and distinctive characteristics in which the participating students can be placed.

The typology follows Steinhoff and Lehnen (2025, p. 3) in viewing GenAI as a participant of the writing process instead of a passive tool. Because of this, usage patterns focus on the types of interaction (or lack thereof) with GenAI. In addition, excluding GenAI from (phases of) the writing process is seen as an active decision potentially giving insights into students' relation to GenAI. This opens up a two-dimensional field in which the students can be situated, as shown in Figure 1.

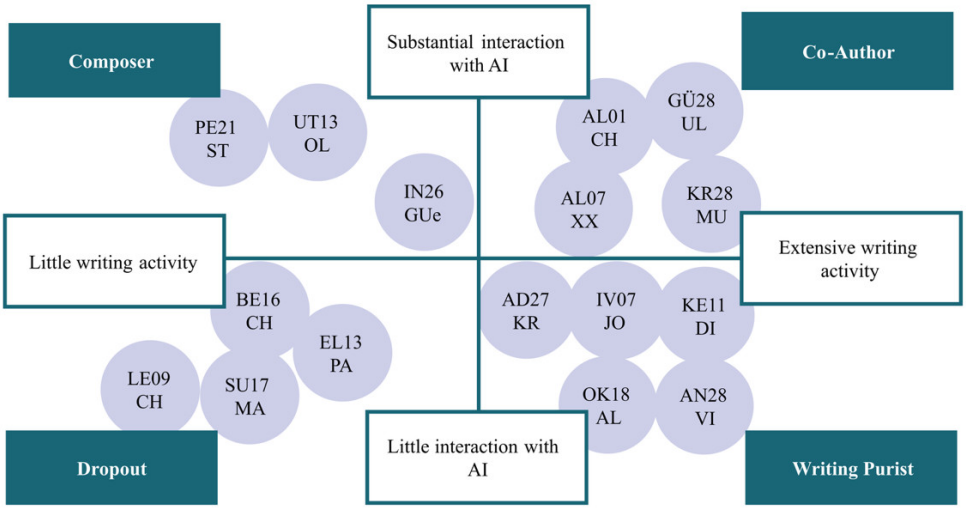


Figure 1: Typology of AI usage patterns[8] (Source: own depiction)

Within this field, all 87 screen recordings and the respective students can be placed. To better showcase the distinctive features of each type – composer, co-author, dropout, and writing purist – as well as the pedagogic consequences, the following subchapters each describe an exemplary case using the document portrait from the screen recording as well

8 To ensure clarity, the figure shows only the 16 cases interviewed.

as the interview and the survey to reconstruct the prototype (Kuckartz, 2020). The document portrait visualises the entire writing process across its chronological order using the 2928 events of the initial coding system for the screen recordings.

5.2.1 Dropout (32 cases)

Characteristic for the dropout pattern is a low agency in the interaction with GenAI *and* little independent writing activity by the student. This can result in an unfinished or unsatisfactory task result or a product generated without a constructive or editing presence by the student. The prototype for this pattern is SU17MA, whose writing process is visualised in Figure 2. The portrait uses a 40 x 30 grid with each resulting square approximately representing two seconds of real time.

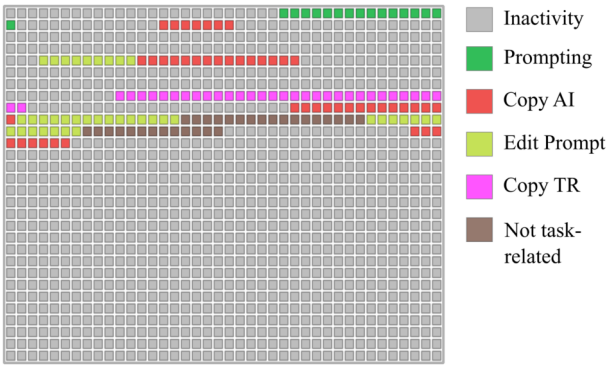


Figure 2: Writing portrait prototype dropout (Source: own depiction)

The most striking characteristic of the document portrait for the dropout is the substantial proportion of inactivity (grey tiles), which accounts for 86.5 % of the total recording. Inactivity is defined as no observable action in the screen recording for a prolonged time (>10 seconds). Additionally, as with other cases of the type, the pattern consists of an initial prompt (light green) and/or copying the task requirement (TR; pink), followed by some combination of direct, unedited copying behaviour (red). In contrast to, for example, the composer pattern, there is a distinctive lack of editing with regard to the prompts and with regard to the AI-generated answers. Dropout describes the student literally dropping out of the writing process. As mentioned before, this does not necessarily mean that the end product is not of high quality, quite on the contrary (Küplüce et al., in print). However, this quality is representative of GenAI, not of the student's contribution.

One potential reason for the early dropout of SU17MA can be found in their belief that the GenAI would be able to produce the superior text: "Well, I just know that the AI can write better than I can, I mean it just can do it better than I"[9] (pos. 28–29). Despite the pattern, the student still claims authorship of the text product, stating in the survey that they mostly see themselves as the author of the text. This mismatch between percep-

9 Original quote: "Also ich weiß halt, dass es die KI besser schreiben kann als ich, also die kann es halt besser als ich" (SU17MA, pos. 28–29).

tion and behaviour is confirmed in the other cases of this type, with claimed authorship being modest but comparatively strong considering the task recordings.

5.2.2 Composer (17 cases)

As with the dropout, the lack of independent writing activity is characteristic of the composer pattern. The difference to the previous pattern lies in the students remaining active during large portions of the task by interacting with the GenAI, exhibiting repeated prompting, editing and re-prompting, which can be seen in the portrait of the prototype PE21ST in Figure 3.

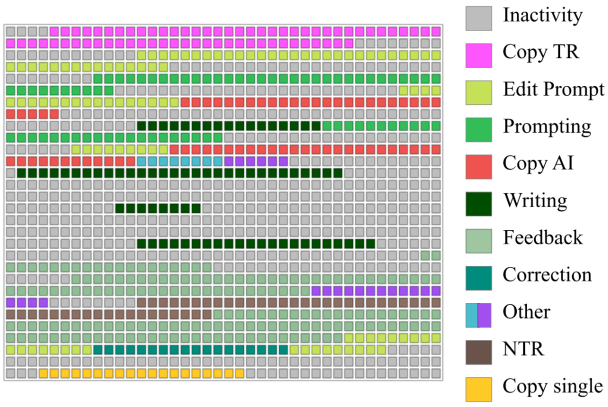


Figure 3: Writing portrait prototype composer[10] (Source: own depiction)

The writing process starts with the student copying the task requirement (pink). However, instead of directly using the answer generated by the GenAI, the portrait shows several instances of the student editing their initial prompt, represented by the yellow-green and light-green sections. After the initial copy of the AI-generated answer, highlighted in red, several additional prompts can be seen, marked by the light-green areas, before the AI-generated answer is copied (the second red area). After a considerable break, the student starts prompting again, this time focusing on feedback for the provided text, highlighted by the moss-green area in the last quarter of the portrait. In the end, the student edits their prompts again before copying single sentences from the GenAI to complete their text. As with the dropout, there is little writing activity that is not directed towards the chatbot (represented by the dark-green areas and only accounting for 6.42 % of the recording).

The description offered by PE21ST aligns with the pattern in how they see their role in planning the text. They assign GenAI the operative role, i. e., putting the student's vision into text. During the interview, the student describes the GenAI as doing "everything when it comes to producing the text"[11] (pos. 18–19), but they also empha-

10 NTR stands for "non-task-related".
11 Original quote: "Ich habe eigentlich alles dem Bot machen lassen sozusagen" (PE21ST, pos. 18–19).

sise staying in the loop by "re-reading, reformulating and making sure everything is correct"[12] (pos. 31–38). Reformulating is only partly supported by the screen recording, as there is no instance of the student actively editing AI-generated text. Notably, the student argues that using GenAI would benefit their learning progress, stating that the chatbot offers a best-practice effect. The composer prototype offers a weaker claim to authorship than the dropout prototype, attributing especially content and structure of the text to the GenAI.

5.2.3 Writing Purist (21 cases)

In stark contrast to the dropout and the composer, the portrait of the writing purist mostly contains writing that is not directed towards the chatbot. These students work on the text with little use of the chat function. The writing process is dominated by the dark-green areas visualising the code "student writing (no AI)". The prototype is represented by AN28VI in Figure 4.

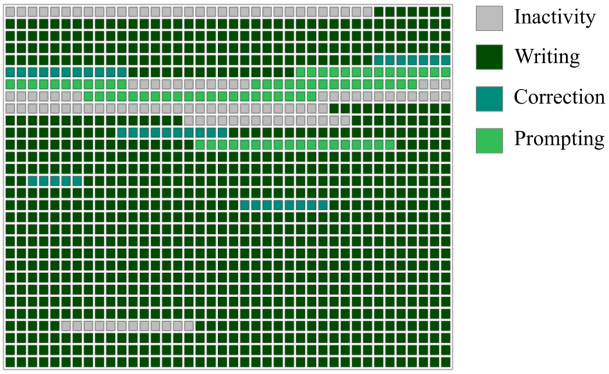


Figure 4: Writing portrait prototype writing purist (Source: own depiction)

With the exceptions of brief phases of inactivity (grey), the flow of writing is only interrupted in the first half of the writing process by teal and by light green segments, accounting for requests of translations (teal) and requests for information (light green). In their survey, AN28VI reports no use of GenAI in school or in private contexts. For schools, they argue in favour of an official, and therefore fair, integration. The aspect of fairness and perceived cheating is mentioned in several interviews and seems to be a unifying factor for the interviewed cases of the writing purist. Together with a strong focus on fairness, the prototype places a high importance on their authorship of the text, asserting that it would diminish their pride if they were to copy AI-generated answers. Lastly, there appears to be a perceived difference between using GenAI for information and translations and using it for the generation of text when it comes to feelings of fairness and authorship – despite all uses being explicitly allowed in the context of the task.

12 Original quote: "dass ich dann noch drüberlese und umformuliere und überprüfe" (PE21ST, pos. 31–38)

5.2.4 Co-Author (17 cases)

The last type's writing process is the opposite of the dropout's in that their process contains meaningful, i. e., inquisitive and task-oriented interactions with the chatbot and additional stretches of independent writing and editing. The prototype is represented by GUe28UL in Figure 5.

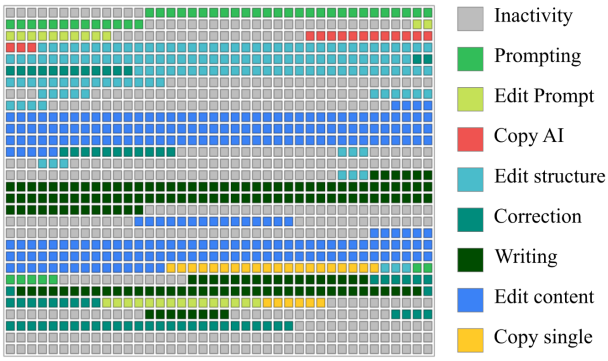


Figure 5: Writing portrait prototype co-author (Source: own depiction)

Unlike all other prototypes, the co-author's portrait is dominated by light-blue and blue sections, which represent the student manually editing AI-generated content. Like the dropout and the composer, the co-author starts their writing process by prompting the chatbot to provide parts of the text, followed by them copying the AI-generated answer (green, light-green and red segments in the first quarter of the writing process). Immediately after this, however, the student begins to work on the AI-generated answer, editing structure (light blue) and content (blue). In this section, they add introductory phrases, rewrite sentences, connect different ideas, and change the tone by rewriting terms and sections. Between the first and second blue segment, the student adds their own paragraph, explaining and refuting potential counterarguments, before moving on to work on the second half of the AI-generated text in the second blue segment. The last quarter of the writing process is especially noteworthy, as it combines short sections of the student writing independently with short sections of AI interactions in a back-and-forth manner, exemplifying the prototype. It is one of the few sections where students actively revise their text according to AI-generated feedback as well.

The student's explanation of their strategy mostly matches the writing process analysis, arguing for a division of labour between writer and GenAI. They explicitly mention that it is important to not let the GenAI completely take over the writing process. They place importance on producing the sentences themselves and on using GenAI only to gather information and for corrective purposes. In this, they differ from their task behaviour, which they explicitly acknowledge "[...] so you shouldn't do it exactly as I have done it here"[13] (pos. 128–130). The student claims authorship in the sur-

13 Original quote: "[...] also man sollte es vielleicht nicht so ganz so machen wie ich" (GUe28UL, pos. 128–130)

vey, which is consistent with other cases of the type. Still, for the sub-questions regarding authorship, the co-author seems to overestimate their own contribution, for example, strongly arguing for their authorship of the ideas of the text, despite most arguments being AI-generated.

6 Discussion

Analysing the writing processes along their chronological sequence and combining them with the interview and survey data provides and contextualises insights into how and why students rely on GenAI. In addition to identifying the distinct patterns of GenAI usage, the results may help in understanding how these patterns come to be. Notions of fairness, authorship and language-skill-related motivational aspects in particular may contribute to understanding AI-assisted writing in EFL.

6.1 Self-descriptions vs. task behaviour

For RQ1, which examines the accuracy in students' self-reports in contrast to their recorded task behaviour, the interviews reveal several mismatches. A discrepancy that becomes apparent, with the possible exception of reports by the writing purist, is the misalignment between students (partial) awareness of potentially negative consequences of GenAI use and their overwhelming use of AI-generated content. At the same time, students seem to systematically overestimate their contribution, especially in cases where much of the task result was AI-generated. There may be several explanations for this observation. First, students are adept at perceiving social desirability and may frame their answers accordingly. While this idea has some merit regarding the interview answers, it seems less convincing for the survey, which was anonymous and not overseen by a teacher. It appears more likely that the discrepancy is resulting from a genuine misconception, which aligns with recent theories relating to the "illusions of understanding" (Messeri & Crockett, 2024). Here, learners (and even researchers) tend to overestimate their understanding of a topic when using GenAI (Chromik et al., 2021), implying that the use of GenAI may suggest a greater involvement for the user than what can be seen in task practice. In the case of the writing tasks, situations could arise where students think that they would have had the same idea, used the same words, or would have made the same edits *after* reading the generated answer and thus convince themselves of authorship during the writing process. Lastly, the task design itself might contribute to the phenomenon. To mirror high-stakes testing tasks and provide a familiar environment to the students, the study adapted a task format used in final examinations in grade 10 in Baden-Württemberg. Keeping cognitive models of writing in mind, however, exposes several flaws of the task, especially regarding its process orientation. It lacks meaningful pre-activities for planning, or post-writing activities that elicit editing behaviour. This may have contributed to students focusing the product instead of the writing process – despite their awareness of potentially negative effects on learning progression.

Despite this, the interviews reveal a surprising number of patterns for using and integrating GenAI in the writing process, covering different parts from pre-planning to idea generation, text production, and editing. The co-author in particular referenced using GenAI for idea generation in the planning phase, to help with structuring sentences in the translation phase or by using edits to improve the text they had produced so far. Referring back to the model proposed by Steinhoff and Lehnen (2025), one could even argue students of the composer and co-author type do use GenAI as a *partner*, explicitly involving it in the writing process to discuss their ideas and arguments. While this is promising, the screen recordings also reveal that this targeted use of GenAI is limited to a specific group of students, with especially the dropout type showcasing many instances where planning, translation and editing are taken over by GenAI. Because of this wide variety in approaches to the use of GenAI in writing, it is essential to consider the potential reasons as to why some students rely excessively on GenAI. These differences may then enable tailored support.

6.2 The relation of authorship, motivational aspects and AI-assisted writing behaviour

Building on the observations in 6.1, RQ2 can be answered with at least four distinct types. Importantly, the four identified types can be connected to motivational aspects and claims to authorship when considering the stimulated recall and the survey data. Looking at the stimulated recall first, it becomes apparent that focusing on independent writing may be influenced by students' confidence in their own writing abilities and by strong notions of fairness. These feelings of fairness may, at least for the writing purist, depend primarily on the actual production of text. Feelings of fairness may also be connected to notions of authorship, which themselves vary widely across the different types.

On the other side of the spectrum, students dropping out of the writing process could be explained by a lack of belief in their writing ability as stated in the interviews. Simultaneously, the writing ability of GenAI is often overestimated, especially by the dropout type, with students stating that the chatbot knows everything in the open survey answers. For the composer and co-author type, the relation between authorship, motivational aspects, and the use of GenAI seems more ambivalent. As mentioned in the type description, the composer strictly separates the planning and the translation phase, with the former being seen as their responsibility, while the latter is handed to GenAI. One explanation for the separation may simply lie in the ease of use and the speed of generation of text by the GenAI. While this is true for all students, especially considering the arduous and challenging task of argumentative text production (Siekmann et al., 2022), there seems to be no counterbalancing influence of feelings of fairness or authorship for the composer. What is more, some students seem to attribute a stronger learning effect to this method (compared to producing the text themselves based on their writing plan). They assume that the chatbot gives them the correct linguistic and genre-specific features which they then just have to remember. Again, this points towards problematic conceptions of AI-generated output and illusions of understanding. That being said, several cases within the composer type acknowledge the dangers associated with the use

of GenAI and its potentially negative effects on learning outcomes. Considering this, the reason for the reliance on GenAI seems to stem less from a lack of knowledge about its impacts and more from a potential overestimation of their own contribution to text production.

Finally, the co-author is similar in approach to the composer, but introduces some of the notions also discussed in relation to the writing purist. Here, students claim authorship even more explicitly in the interviews, which may be connected to their understanding of fairness, stating that the use of GenAI for unedited text generation should not be permitted. An additional difference may stem from a more critical view of GenAI, both in terms of its abilities and its impact on their own learning progression. Several students describe the worry of forgetting how to plan, generate and edit texts themselves when relying on GenAI, citing reasons similar to recent discussions on "deskilling" (Rafner et al., 2021).

Combining the four types, for all interviewed students the claim to authorship, notions of fairness, and motivational aspects seem to play fundamental roles for their observed writing behaviour. However, how the use of GenAI is related to their descriptions of authorship and aspects of fairness differs, particularly among the dropout and composer types, who tend to overestimate their own contribution. Looking at the individual writing processes and students' reasoning in-depth reveals that there may be multifaceted interactions between these aspects that could help in understanding their use of GenAI in writing. Importantly, it seems unlikely any individual aspect – authorship, motivation, fairness, views of GenAI – can fully explain students' use of the technology. Instead, a combination of different aspects, i. e., a strong claim to authorship, a critical view on GenAI's capabilities and a specific sense of fairness need to be considered to better understand how GenAI is used.

7 Conclusion

The article showcased how students' task behaviour and their own perception of the use of GenAI can differ considerably and gave potential reasons for this phenomenon. By exploring the writing process along its chronological sequence and contextualising it with the interviews and survey answers, the article makes two additional contributions to understanding AI-assisted writing in a foreign language. First, it visualises the various roles that GenAI plays across different phases of the writing process, in combination with specific patterns that emerge in secondary education. These patterns are not just characterised by the frequency of GenAI use but instead by a complex interplay between GenAI interactions during planning, production and editing of the text. Second, it identifies and characterises claims to authorship and motivational aspects as potential contributors to students' behaviour when using GenAI in writing. Motivational aspects themselves, the study further suggests, could be the result from feelings of fairness and students' perception of their writing ability as well as their understanding of GenAI.

7.1 Pedagogical Implications

When listing the different types, one may come to the conclusion of a hierarchy with the co-author being the desired form of AI-assisted writing and the dropout showcasing undesirable task behaviour. However, it does not make sense from a pedagogical point of view to put these types into a strict hierarchy. The chronological analysis of the writing processes reveals that task involvement cannot solely be determined by the frequency of GenAI use. Both the composer and the writing purist may represent desirable behaviour depending on the learning goals. If the task focuses on an authentic scenario with a real-life outcome in the sense of technology-mediated TBLT (Ziegler, 2016), guiding students to use GenAI as a co-author might be the most desirable outcome. If students are supposed to learn to accurately use AI, the composer type could be beneficial, just as the writing purist might be desirable whenever basic writing competencies are central to the session's learning goals. The exception to this is the dropout. While GenAI enables this type's delegation and ghostwriting, the issue seems to be grounded in the students' lack of belief in their writing abilities, a lack of interest in task completion and a lack of desire to claim authorship of the product – all aspects that can be the target of pedagogical interventions. Considering this, the article advocates for teachers to not generally encourage or prohibit students' use of GenAI but rather to align its use with their (learning) goals and/or offer specific usage opportunities for individual phases of the writing process. Importantly, specific learning goals may sometimes require explicit exclusion of GenAI from the writing task. As for how to integrate GenAI in a way that keeps students cognitively engaged in the task, the study identifies potential areas to focus on. On the student side, fostering critical understanding of GenAI, encouraging a claim to authorship, and working on language-skill-related motivational factors could be especially promising. Considering the task itself, a stronger focus on writing as a process regarding idea generation and editing via pre- and post-writing activities seems to be advisable. Finally, how these tasks encourage roles that are assigned to GenAI and those that are assigned to the students might be of particular importance for learning progression. However, designing these tasks in practice and measuring their impact on learning progression warrants further analysis and discussion.

7.2 Limitations and Further Research

This study aimed to provide a contextualised, in-depth view of GenAI use in the writing process. Given the use of stimulated recall and the qualitative analysis, the sample is necessarily limited in scope. Consequently, the identified patterns and potential variables are not exhaustive, nor can the study confirm the effects of the identified types on long-term learning progression. Future research should address these areas by employing larger samples and investigating the connection between task behaviour, role assignment, and learning progression. Collecting longitudinal process data in classrooms on such a scale is an ambitious undertaking that requires significant resources. Nonetheless, there are also opportunities for smaller-scale studies focusing on task and lesson design. Most urgently, there is a need for studies that design and pilot interventions to reduce student dropout during AI-assisted writing, especially during early planning

phases of the writing task. Such interventions could include attention to task design to more clearly value and evaluate sub-processes of writing, efforts to increase the desire to claim authorship, and designs to practise collaborative writing strategies. Additionally, examining students' interactions with GenAI during tasks that target other basic competencies, such as reading, may further enhance the understanding of GenAI's relation to language learning.

Research in EFL is still only beginning to understand how GenAI influences and shapes foreign language learning. Nevertheless, the challenges, questions, and opportunities presented in this article are situated at the core of what EFL research arguably does best: identifying, designing, and testing suitable learning environments that enable learners to thrive in authentic communicative scenarios – both with and without GenAI.

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