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Developing writing competence with AI in high school: a self-study on the guided use of a writing assistant

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Abstract

This research examines the educational impact of artificial intelligence (AI) technologies on the development of writing skills in secondary education, an area that has been little studied despite the transformative potential of these digital tools. Our study, which is qualitative and reflective in nature, is part of a self-study approach focused on the personal use of AI-based writing assistants, namely: Deepseek, Qwen AI and Monica AI. Through critical analysis of our own writing and revision process, we explore the real effects of these tools on the development of writing skills among secondary school students, while assessing the challenges and opportunities they present.
The results are very satisfactory and confirm the potential of these AI models to help students improve their writing skills. In addition, this study takes stock of the adoption of these tools by teachers. The conclusions of this study open up avenues for reflection and formulate useful recommendations for teacher training and the effective integration of AI technologies into teaching.

Keywords: Artificial Intelligence, AI Models, Writing Skills.

Introduction

Although secondary school students are encouraged to develop their writing skills, many still struggle to acquire them. As Bonnéry and Rispail (2021) point out, evaluating these learning processes is a complex challenge in terms of long-term research. Indeed, the integration of AI-powered writing assistants allows for the development of new personalised and self-directed learning tools. However, there is a lack of documentation on the effectiveness of these strategies in an educational context, particularly for the development of writing skills through guided self-learning.

This research therefore examines how these assistants can contribute to the development of learning skills, particularly with regard to writing skills. The main aim of this study is to assess the relevance of these digital learning tools in the field of education, specifically their impact on the acquisition of learning skills. It is based on written work produced in secondary school and answers the following question: to what extent can learners improve the quality of their writing by using intelligent assistants such as Deepseek, Qwen AI or Monica AI (non-exhaustive list)?

The data analysis focuses on the influence of the correction, rephrasing and feedback features offered by these language models. In addition, it highlights preferred writing strategies, such as rewriting, vocabulary enrichment and idea structuring. Through self-experimentation, this research aims to better understand the conditions for the critical and educational use of these technologies in the learning process, while taking into account their limitations, the risks of dependency, and the ethical issues they raise, particularly the loss of creativity and the question of student autonomy.

Our self-analysis is based on an operational methodological framework to examine, in a contextualised manner, the effect of these adaptive AI teaching aids on strengthening writing skills. Therefore, by focusing on a personal and well-defined experiment, it allows us to observe precisely the evolution of writing practices thanks to the multiple functionalities of these intelligent assistants, such as correction, rephrasing, feedback and other tools such as translation.

In short, it sheds new light on the conditions for AI-assisted autonomous learning in a field that is still poorly documented, while contributing to the debate on their rational integration into teaching practices.

Research question

Our analytical research approach is based on a reflective study structured around a methodical approach aimed at evaluating the observable results of AI text-generating assistants in the acquisition of writing skills in the field of education. By combining pedagogical, cognitive and technological approaches, we examined the impact of these digital writing assistants on the development of writing skills among high school students.

Context

High-quality writing relies above all on the development of cross-disciplinary language skills. According to Phillips Galloway et al. (2020), these skills are essential for successful academic writing and also have a direct influence on academic performance and even career paths. Writing is therefore seen as the main mode of assessment in the education system, which is largely oriented towards summative assessment methods (Barré de Miniac, 2000).

This area has been the subject of extensive research, demonstrating that changes in the methods used to assess written work significantly improve the quality of writing, with a marked differential impact on learners with difficulties. This improvement is due in particular to the integration of tools such as self-assessment, formative feedback and structured programmes for the development of self-regulated strategy development (SRSD) (Kim et al., 2021).

Today, writing is no longer limited to a simple exercise; thanks to these automated tutors, it is defined as an intellectual process that is both creative and reflective, allowing ideas to be expressed, organised and given meaning (Amaral, 2019). Furthermore, as a skill that is integrated into all disciplines, writing plays a central role in the development and transformation of ideas, thereby facilitating the acquisition of learning skills. Graham, Kihara and MacKay (2020) present another example: according to them, writing is much more than a simple means of expression; it actively contributes to the integration of knowledge and the structuring of thought.

Currently, as shown by Zawacki-Richter et al. (2019), it is essential to adopt a balanced approach to AI in language teaching and learning, combining technological revolutions with pedagogical frameworks. This ensures pedagogical differentiation while allowing each student to achieve fundamental objectives at their own pace and according to their specific educational needs.

The systematic integration of these teaching practices is a fundamental lever for reducing learning inequalities and implementing the principle of 'equity in education systems' (Demeuse et al., 2005). Furthermore, these double-edged digital tools require a systematic framework that incorporates a comprehensive reflection on the ethical and critical issues involved in their integration into the school environment. In this sense, Naymark (1999) asserts that 'the use of new technologies in education can be the best or the worst thing'. Thus, although they are widely adopted, writing assistants are often used only to make superficial corrections, thereby neglecting their deeper educational value.

1. State of the art

Our systematic review, consisting of a rigorous selection of academic publications (1981-2025), analyses the evolution of the educational uses of artificial intelligence (AI). The data comes from recognised databases: Scopus, Web of Science, ScienceDirect, Google Scholar and ResearchGate. Our analysis focuses on four main areas: the development of learning skills, case studies revealing mastery of writing, technological solutions for writing, and the ethical challenges of AI in education. Thanks to AI, learning skills is smarter than ever before. Current technological changes are enabling the use of digital teaching assistants and the adaptation of content to the specific needs of learners (Zhang, 2024). In addition, adaptive learning and automated assessment are now possible.

Advances in the field of natural language processing, which 'is a multidisciplinary field encompassing linguistics, computer science, logic, mathematics, and the philosophy of language and reasoning' (Biskri and Jibali, 2011, p. 16, cited by Hassani, 2016, p. 16), have led to the creation of autonomous writing assessment systems. These intelligent machines are capable of providing detailed feedback on various aspects, such as style, grammar and coherence. In this study, Wang et al. (2024) propose an innovative model that harmonises autonomy and support, self-assessment and grammatical correction, and consequently offers immediate and constructive feedback that is essential for the continuous improvement of writing skills.

AI, based on machine learning and deep learning techniques, UNESCO (2019), is redefining educational scenarios. This makes it possible to predict learners' results and identify potential difficulties in advance, thereby enabling tailored educational intervention strategies. Added to this are 21st-century tools, which now go beyond simple corrective functions. They effectively reinforce the development of learning skills, specifically writing proficiency, while strengthening creativity and critical thinking and encouraging self-regulation strategies. Furthermore, these features help to strengthen learner autonomy through motivation and engagement (Shafiee Rad, 2025).

These reflections will serve as a basis for studying how to intelligently integrate AI-based writing tools. Numerous studies, as highlighted by Mekaoussi (2024), also highlight the ethical issues surrounding technologies such as ChatGPT. Among other things, Li et al. (2023) add three main challenges to be addressed: confidentiality, algorithmic bias and academic integrity.

While real progress has been made in the existing literature, it must be noted that few studies have actually examined educational success and the acquisition of long-term learning skills. Writing skills, in particular, deserve in-depth investigation. This is a crucial point for developing communication and interculturality. Our research therefore seeks to answer the following question: how do these technologies

specifically influence the writing skills of high school students?

In this sense, these educational assistants act as technological resources capable of reducing or even eliminating learning inequalities, in line with UNESCO's recommendations (1981) on how to plan education with the aim of achieving greater equity. While offering individualised support to students with difficulties or from disadvantaged backgrounds, they promote their progress in written production.

For example, in special educational needs settings, this approach could form a pedagogical basis for consolidating writing skills. Indeed, there is no denying that AI in education is attracting growing interest; however, most research focuses on higher education or developed countries, while its effects in resource-poor contexts have been little studied. As Hassan Razouki et al. (2025) point out, its impact on learning remains mixed.

Mastery of writing, which is at the heart of language proficiency in the context of historical education (Allard et al., 2017), is the focus of our qualitative study, based on a self-analytical approach. Our objective is to determine the role of AI in the development of high school students' writing skills, particularly regarding self-learning and creativity, while identifying its limitations.

In summary, there is a lack of scientific literature on the integration of AI in secondary vocational education, particularly from the perspective of acquiring learning skills rather than assessment. This analysis provides didactic innovations and suggests avenues of research for profoundly changing didactic interactions. It also invites exploration of research areas aimed at ensuring the ethical and equitable use of AI.

2. Theoretical framework

In recent years, AI has radically changed the education sector by introducing new forms of learning and teaching tools tailored to the needs of learners and teachers. In fact, writing assistants such as Qwen AI, Monica AI and DeepSeek, which we have studied, are versatile resources that integrate AI-based technological solutions. Each model has specific functions that can be used according to the teaching objective.

In the context of language teaching and learning, these interactive resources offer several advantages. Firstly, they offer remarkable flexibility, being accessible and usable regardless of the learning location, thus making learning more adaptive and individualised. Secondly, they aim to promote personal development and professional integration among learners, while also helping teachers to refine their writing teaching methods. Thirdly, as formative assessment tools, they encourage autonomy, provide personalised learning and self-correction. In addition, they provide visible assessment benchmarks to guide and evaluate written work.

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Learners can, for example, use the grammar correction function, but also other features offered by these writing assistants, such as the translator, a particularly useful tool that is frequently used in class to enrich their vocabulary. They can thus easily switch between correction, translation and writing in a fluid and intuitive environment, which promotes the gradual improvement of their writing skills.

In the context of this study, we analysed academic writing learning from the perspective of cognitive models, notably that of Flower and Hayes (1981), which identifies three main mental operations involved in writing: planning, textualisation and revision. By intelligently combining digital tools and AI, we discovered that these technologies really do help students to write better.

Learning planning is facilitated by suggestions for improving ideas or structures guided by these AI models, which help organise students' thinking. Writing is enhanced by lexical and automatic paraphrasing features that modify the writing process and improve written expression. Finally, revision is also made very simple and gradual thanks to immediate feedback on grammar, style and coherence, allowing for self-regulated management and error control. Our analysis therefore highlights the mediating role of these intelligent writing assistants and tutors in the development and acquisition of writing skills in secondary education.

This research is part of a qualitative self-study (LaBoskey, 2004). This method favours reflective analysis. As Lunenberg et al. (2019) point out, it helps improve teaching practices by reflexively analysing teaching methods. It also offers the opportunity to test the use of these AI-based writing assistants to develop students' skills, while measuring their success during interaction with these intelligent models.

3. Methodology

In conducting our study, we adopted both a researcher and practitioner perspective in order to understand and evaluate the effect of the educational chatbot models in question—Qwen AI, Monica AI, and DeepSeek—on learning to write in secondary school. This dual approach enabled us to analyse the concrete consequences in detail, based on observations, logbooks and formative assessments. While our approach involves a degree of subjectivity, which is inherent in any action research, we placed great importance on the quality of our approach, while regularly questioning our methods and the real impact of these tools on learning.

Table 1: Description of the protocol (text corpus, reflective journal, AI tools).

Corpus (text written by a first-year science baccalaureate student)

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In light of our reading of the work "Antigone", Creon exploited his power to try to protect his niece from death, Creon exploited his social status for Antigone, this subject has made a lot of ink and opinions are divergent, so what is the most logical and realistic opinion?

Some people say that we must exploit our social status, our power to achieve our interests and our goals, because these people say that their place in society can help these people to succeed and that they are lucky, most of these people are responsible and administrators, in society and it's simple to achieve his personal interests

But, on the other side there are people who say that social status, and is not a logical thing because there are those people who are able to occupy a business or an interest and another who is not able and with a little money and social status It will take the place of the other who makes great effort and works very hard, for that our society is materialistic and corrupt, and for that there is no equality between the candidates of everyone.

Date/session	Writing objective	AI tool used	Type of interaction	Perceived improvements	Personal reflections
03/03/2025 S1	Correction of an argumentative text.	Qwen AI	Rewording and correction	Greater clarity, increased confidence: Correction of spelling, grammar and punctuation errors.	• Difficulty rephrasing a complex sentence. • Progress after several attempts.
08/03/2025 S2	Lexical enrichment	DeepSeek	Lexical suggestions	More varied vocabulary, fluent expression: vocabulary enrichment and improved sentence fluency.	• Lexical variations Enriched vocabulary.
15/03/2025 S3	Drafting and organising ideas.	Monica AI	Generating paragraphs and rephrasing	More fluid text, good structure with clear paragraphs: introduction, two argumentative sections (thesis/antithesis), and a conclusion.	• Improvement and clarity by incorporating the proposed structure.

Source: developed by the authors

Table 2: Measurable impact of adopting AI solutions

Date	AI-supervised revisions	Changes	Observations
08/03/2025	Syntactic restructuring and optimisation of editorial cohesion	Certain ideas deemed too simplistic or inconsistent have been removed, e.g. 'to try to protect his niece' corrected to 'to protect his niece'. (paragraph 1)	Sentences restructured to optimise their fluidity and comprehensibility.
15/03/2025	Suggest relevant synonyms and common expressions.	Using the verb 'estimate' rather than 'say' enriches the lexical variety of the text. (paragraph 3)	Marked improvement in vocabulary diversity and stronger involvement
22/03/2025	Concordance and grammatical correction.	Correction of agreements, e.g. 'to exploit' corrected to 'has exploited'. (paragraph 1)	The student took almost all of the suggestions into account, which helped to improve clarity.
24/03/2025	Review of consistency and style, correction of errors.	Suggestion for rewording, e.g. 'because there are people like that' instead of 'Indeed, some individuals', for greater clarity. (paragraph 3)	The student has developed their independence and critical thinking skills.

Source: developed by the authors

Table 3: Evaluation criteria and analysis method.

Competence	Criterion	Performance level		Explanation
		Before AI	After AI	
Pragmatic skills	Adherence to instructions, overall coherence (logical sequence of ideas)	Average	Good	Reformulation of transitions.

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	Text structure (introduction, body, conclusion)	Poor	Good	Proposal of a clear plan.
	Compliance with the rule of objectivity: Originality	Good	Very good	Improvement of several overly personal formulations.
Linguistic competence	Vocabulary (richness and lexical precision)	Average	Very good	More technical terms proposed.
	Syntax and grammar Correct	Poor	Very good	Very effective automatic correction.

Syntax	Automatic correction (grammar and conjugation) accompanied by suggestions to enrich the syntax (subordination, varied expressions).	✓ Immediate feedback allowing for instant corrections.

Source: developed by the authors

Designed for learners, these AI models are intuitive and user-friendly, allowing everyone to progress at their own pace in learning to write. They do not require complicated instructions, as their relevant suggestions and clear interface make them true companions for progress, making writing improvement accessible and motivating.

Source: developed by the authors

4. Results

Our analysis focused on key features of our study, such as the '*grammar checker*' and the '*translator*.' These tools enable learners to quickly develop essential writing skills through utilities specifically designed to suit their needs. Among the concrete results observed:
• Better text structure.
• Enriched vocabulary and syntax.
• Nuanced perceptions of the contribution of AI.
• Awareness of limitations and risks (plagiarism, loss of authenticity, automatism).
The use of AI writing assistants has led to remarkable progress and benefits in several aspects of written production.

Table 4: Improvements observed (structure, vocabulary, syntax).

Aspects	Improvements	Observed benefits
Structure	AI supports text construction while structuring content (introduction/development/conclusion) and organising ideas (titles, connectors, paragraphs).	✓Independent proofreading. ✓ Continuous improvement in writing quality.
Glossary	The use of precise synonyms and lexical variety helps to create richer and more nuanced texts.	

Figure 1: Correcting an Argumentative Text
After reading Sophocles' *Antigone*, one might question Creon's motivations: did he truly act to protect his niece, or was he exploiting his power and social status for personal or political gain? This issue has sparked intense debate, with opinions sharply divided. So, what is the most logical and realistic perspective? Qwen
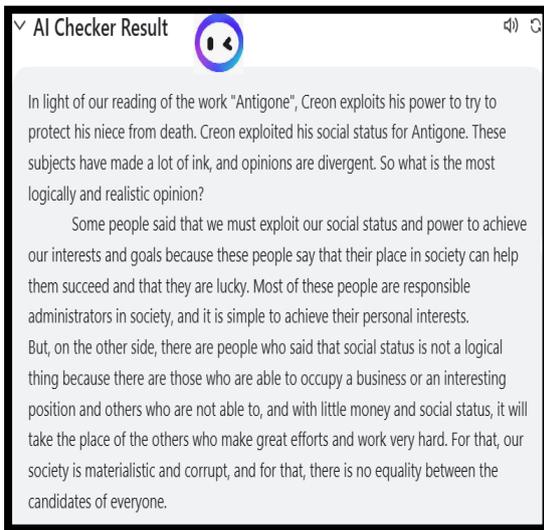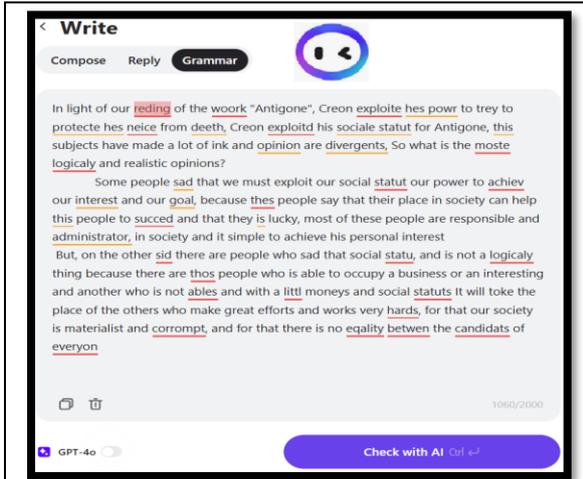
On one hand, some argue that individuals should use their social status and power to achieve their goals. They believe that one's position in society is a legitimate tool for success—especially when used responsibly. According to this view, those in positions of authority, such as leaders, administrators, or public figures, have earned their status and are therefore justified in leveraging it to protect their interests or support their families. After all, they argue, society functions more efficiently when people can rely on their influence to make decisions, especially in urgent or complex situations.

However, on the other side, many believe that relying on social status is neither fair nor logical. They point out that talent, effort, and hard work should be the true measures of opportunity—not wealth or connections. In reality, some individuals with little money or influence are denied opportunities, while others with powerful networks gain advantages regardless of merit. This imbalance, they argue, makes society increasingly materialistic and unjust. When privilege overrides effort, equality vanishes, and the system becomes corrupted.

In conclusion, while power and status can be used responsibly, as possibly intended by Creon in *Antigone*, their misuse threatens fairness and equality. A just society should not reward connections over competence. Therefore, the most realistic and ethical opinion is that social status should not override merit, and opportunities must be accessible to all, regardless of background. |
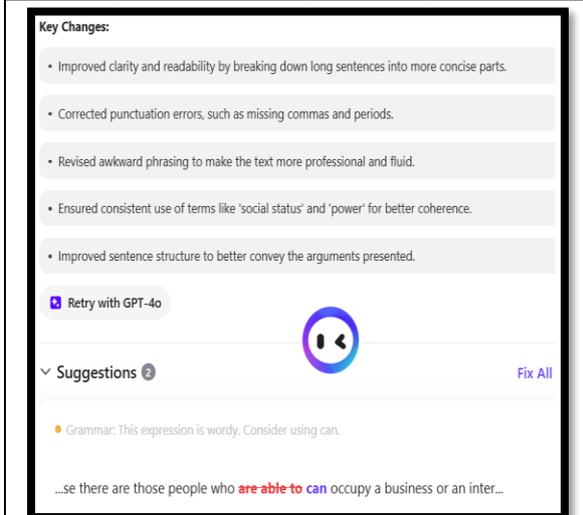| **Source** :https://chat.qwen.ai/c/ea0fa962-0c3e-417b-a8d4-eba435429039 |
| **Figure 2:** Screenshot of AI grammar checker results |
| |

Source : https://monica.im/home/write

Figure 3: Key changes and suggestions

Source : https://monica.im/home/write

Figure 4: Translator
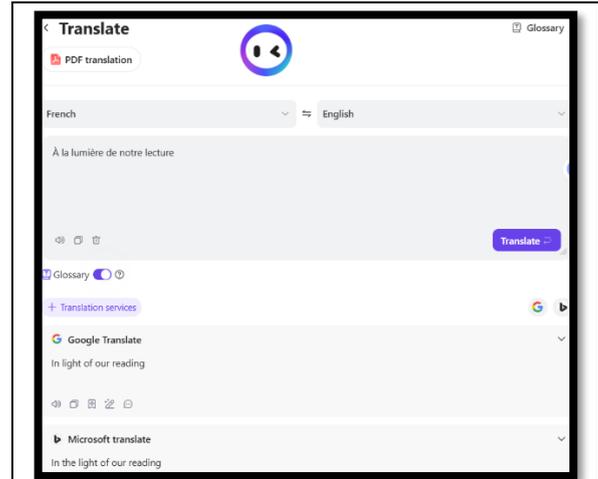
Source : https://monica.im/home/write

Figure 5: Screenshot of lexical suggestions and text enrichment

Source : https://chat.deepseek.com/a/chat/s/c06c50d9-b1e2-4e0c-ab8c-8a12aab6a654
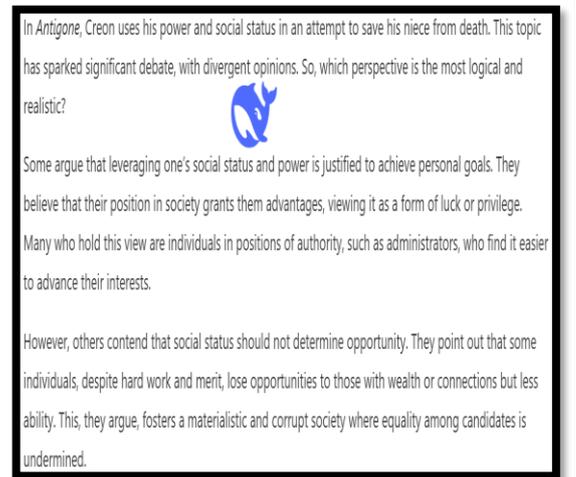
Figure 6 : key improvements

Source : https://chat.deepseek.com/a/chat/s/c06c50d9-b1e2-4e0c-ab8c-8a12aab6a654
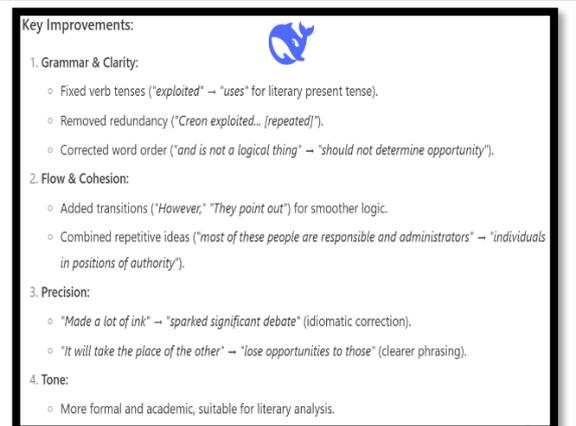
Grammar and style checkers help learners identify and correct their mistakes, while rephrasing suggestions enable them to improve the clarity and quality of their writing.

Personalised feedback tools offer automated assessment while providing targeted feedback on written work, highlighting strengths and areas for improvement. Through automatic analysis of structure, grammar and style, these tools facilitate teacher intervention and enable more individualised and effective support.

5. Discussion of teaching proposals

Although the use of these tools by some teachers remains limited, the texts generated retain a human stylistic imprint that is difficult to reproduce without precise individualised data, which demonstrates the complexity of natural writing. To effectively integrate AI-based assistants into the educational context, we believe three imperatives are essential: preserving learners' cognitive autonomy, maintaining the educational value of activities, and establishing a thoughtful balance between technological assistance and personal effort.

For the efficient integration of these educational AIs, it is necessary to formalise them while taking into account their ethical implications. These tools must be regulated to avoid harmful dependence on learning, involve teachers, educational designers and parents in this collective approach, and remind us that these assistants are supports and not substitutes, in order to preserve learners' motivation and editorial autonomy. Furthermore, it is essential to regulate the amount of time spent using these technologies to limit the risks of cyber addiction and strengthen cognitive skills.

These AI assistants can be considered complementary educational tools, provided they are integrated judiciously into writing instruction. We have noticed that they effectively support the development of writing skills, mainly in terms of linguistic correction and clarity of idea organisation. Nevertheless, technical improvements, such as image recognition (for certain features such as grammar correction), an offline mode and educational adjustments, are essential in the long term.

Feedback shows that the use of intelligent writing assistants paves the way for reducing gaps and repeated mistakes, thus demonstrating their value as adaptive learning tools. To this end, ongoing educational support (see the 'Educational support' chart) for both students and teachers remains central to the comprehensive development of writing skills in particular. To get the most out of them, it is essential to integrate these tools in a structured way into teaching practices, combining technological support with human guidance, in order to encourage both independent and original writing.

Graph 1: educational support
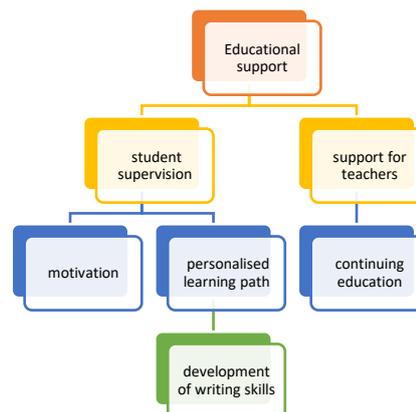
Source: developed by the authors

The limitations of this research are as follows: it focuses on a specific context and does not allow the results to be generalised to other profiles. The researcher's involvement introduces a risk of interpretative bias, a risk that is reinforced by the absence of external cross-validation.

We must ensure that AI does not erase the uniqueness of personal writing, which is often characterised by expressiveness and critical thinking that machines cannot reproduce. To achieve this, it is essential to train students in the vigilant, critical and ethical use of these digital platforms, in order to avoid any risk of loss of autonomy or intellectual property infringement. With supervision, these AI text generators can therefore become digital companions for self-learning, creativity and the development of writing skills.

Conclusion:

The results of our study reveal that AI assistants can truly support learners in their learning. We particularly appreciate their ability to identify linguistic errors and help structure ideas clearly. Functioning as a permanently accessible tutor, they suggest improvements while stimulating creativity and preserving the authenticity of each user. Their value lies less in replacing human writing than in improving it. However, several challenges related to the use of this new technology must be addressed, including technical and pedagogical issues, as well as the risk of excessive dependence.

We also confirm that the effectiveness of these generative AI tools lies in their ability to reduce persistent difficulties and develop writing skills. In fact, we believe that it is not the technology that makes the difference, but how it is used. We also note that the quality of writing fundamentally depends on teachers' understanding and training in AI.

In summary, this self-analysis leads us to the following conclusion: while AI is a concrete educational lever for strengthening autonomy and the quality of learning, its relevance depends on placing the student, not the machine, at the centre of the system. Therefore, the digital assistant must be considered as a pedagogical

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support tool and not as a technology for mass delegation, thereby preserving the human dimension of textual creation.

References

1. Allard, A., Barma, S., Cool, J., Deschênes, M., Dubé, F., Dumouchel, G., Girard, M., Gosselin, J., Lepage, A., Lille, B., Netto, S., Parent, S., Patiño, A., Plante, P., Proulx, J., Raynault, A., Romero, M., Sanabria, J., Spence, Y., Stan, C., Stockless, A., Villeneuve, S., & Viéville, T. (2017). *Creative uses of digital technology for learning in the 21st century*. Presses de l'Université du Québec. https://doi.org/10.1515/9782760548503

2. Amaral, C. (2019). *Writing in vocational high school: Obstacles and re-learning mechanisms* [Doctoral dissertation, Université Grenoble Alpes]. HAL. https://tel.archives-ouvertes.fr/tel-02484200

3. Bonnéry, S., & Rispail, M. (2021). *Writing in vocational high schools: Remediation or emancipation?* Revue française de pédagogie, (210), 69–80. https://doi.org/10.4000/rfp.10989

4. Demeuse, M., Crahay, M., & Monseur, C. (2005). *Efficiency and equity in education systems: two sides of the same coin?* In M. Demeuse, A. Baye, M. Straeten, J. Nicaise, & A. Matoul (Eds.), Towards a fair and effective school: 26 contributions on education and training systems (pp. 11–24). De Boeck Supérieur. https://www.researchgate.net/publication/255709860

5. Flower, L., & Hayes, J. R. (1981). *A cognitive process theory of writing*. College Composition and Communication, 32(4), 365–387. https://doi.org/10.2307/356600

6. Graham, S., Kiuhara, S. A., & MacKay, M. (2020). *The effects of writing on learning in science, social studies, and mathematics: A meta analysis.* Review of Educational Research, 90(2), 179–226. https://doi.org/10.3102/0034654320914744

7. Hassani, M. (2016). *Towards a formal application model for a new language and information engineering* [Master's thesis, University of Quebec at Trois-Rivières].

8. Kim, Y. S. G., Yang, D., Reyes, M., & Connor, C. (2021). *Writing instruction improves students' writing skills differentially depending on focal instruction and children: A meta analysis for primary grade students.* Educational Research Review, 34, Article 100408. https://doi.org/10.1016/j.edurev.2021.100408

9. LaBoskey, V. K. (2004). *The methodology of self-study and its theoretical underpinnings*. In J. J. Loughran, M. L. Hamilton, V. K. LaBoskey, & T. Russell (Eds.), International handbook of self-study of teaching and teacher education practices (pp. 817–869). Springer. https://link.springer.com/chapter/10.1007/978-1-4615-1363-7_32

10. Lunenberg, M., MacPhail, A., White, E., Jarvis, J., O'Sullivan, M., & Guðjónsdóttir, H. (2019). *Self-study methodology: An emerging approach for practitioner research in Europe*. In *2nd International Handbook of Self-Study of Teaching and Teacher Education* (pp. 1–27). Springer. https://doi.org/10.1007/978-981-13-1710-1_47-1

11. Cheng, F., Li, M., Enkhtur, A., & Yamamoto, B. A. (2023). *Ethical implications of ChatGPT in higher education: A scoping review* (Version 3). arXiv. https://arxiv.org/abs/2311.14378

12. Mekaoussi, N. (2024). *The impact of artificial intelligence on academic ethics and integrity: A study on the use of AI tools by Batna students*. Ziglibitha, Journal of Arts, Linguistics, Literature & Civilisations, 12(1), 351–366. https://www.ziglobitha.org/wp-content/uploads/2024/12/25-Art.-MEKAOUSSI-Naima-pp.351-366.pdf

13. Naymark, J. (1999). *Guide to multimedia in education*, critical review and outlook. Retz, Collection, Paris.

14. Phillips Galloway, E., Qin, W., Uccelli, P., & Barr, C. D. (2020). *The role of cross-disciplinary academic language skills in disciplinary, source-based writing: Investigating the role of core academic language skills in science summarisation for middle grade writers.* Reading and Writing, 33(6), 1455–1484. https://doi.org/10.1007/s11145-019-09942-x

15. Razouki, H., Cherradi, B., Hair, A., & Razouki, A. (2025). *The impact of artificial intelligence on teaching and learning: Challenges and prospects.* EDP Sciences. https://doi.org/10.1051/shsconf/202521401010

16. Samaras, A. P. (2011). *Self-study teacher research: Improving your practice through collaborative inquiry.* SAGE Publications.

17. Shafiee, R. H. (2025). *Reinforcing L2 reading comprehension through artificial intelligence intervention: Refining engagement to foster self-regulated learning*. Smart Learning Environments, 12(23). https://doi.org/10.1186/s40561-025-00377-2

18. UNESCO. (1981). *Planning education for reducing inequalities*: Contributions by Mark Blaug, Kjell Eide, Louis Emmerij, Torsten Husén, François Orivel, and a seminar report by Zsuzsa Ferge. Paris: International Institute for Educational Planning. https://unesdoc.unesco.org/ark:/48223/pf0000044577

19. UNESCO. (2019). *Understanding the impact of artificial intelligence on skills development.* UNESCO-UNEVOC. https://unevoc.unesco.org/pub/understanding_the_impact_of_ai_on_skills_development.pdf

20. Wang, I. X., Wu, X., Coates, E., Zeng, M., Kuang, J., Liu, S., Qiu, M., & Park, J. (2024). *Neural automated writing evaluation with corrective feedback* [Preprint]. arXiv. https://arxiv.org/abs/2402.17613

21. Zawacki-Richter, O., Marin, V. I., Bond, M., & Gouverneur, F. (2019). *Systematic review of research on artificial intelligence applications in higher education – where are the educators?* *International Journal of Educational Technology in

Higher Education, 16*(1), 39. https://doi.org/10.1186/s41239-019-0171-0

22. Zhang, Q. (2024). *Harnessing Artificial Intelligence for Personalized Learning Pathways: A Framework for Adaptive Education Management Systems*. Applied and Computational Engineering, 82, 167–172. https://doi.org/10.54254/2755-2721/82/20241102

AI models:

1. https://www.deepseek.com/en
2. https://monica.im/home
3. https://qwen.ai/home