Research Article

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Detecting Innovators in the Field: Teachers' Perceptions and Adoption of Generative AI in Education

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Abstract

The adoption of Generative Artificial Intelligence (GenAI) has gained popularity since late 2022, sparking discussions about its role in education. An important issue is understanding teachers' perceptions of this technology, given that teachers are seen as key actors in integrating GenAI into teaching and learning processes. This qualitative research explores secondary school teachers' perceptions of GenAI, using an adapted Technology Acceptance Model (TAM) and Rogers' Diffusion of Innovation Model. TAM, known for assessing user acceptance of technology, was employed to gauge perceptions, while Rogers' model provided insights into how teachers distribute across GenAI adoption stages, from innovators to late adopters. Data was collected through semi-structured interviews and an online survey with 20 in-service teachers from Flanders, Belgium. Findings reveal mixed attitudes among teachers towards GenAI, as participants express enthusiasm about its potential for time-saving and personalized learning benefits, while also voicing significant concerns about plagiarism, GenAI's trustworthiness, and its possible negative impact on students' cognitive abilities. The study also highlights the current lack of sufficient training and support for teachers integrating GenAI.

Keywords: generative AI, GenAI, teachers, perceptions, attitudes, views, TAM, technology acceptance, diffusion of innovation

Introduction

The release of ChatGPT, the first Generative Artificial Intelligence (GenAI) chatbot widely adopted by the public, has initiated a new era in the history of education, often termed as a revolution (Carceller, 2024). On the one hand, the emergence of GenAI introduced many new opportunities, such as personalized support for students – a long-held ambition for the future of learning – which can now be delivered instantly and even without requiring effort from teachers (Haesol & Bozkurt, 2024). Another area in which GenAI is claimed to have high potential is improving the efficiency of teachers' practices, such as lesson planning (Van den Berg & Du Plessis, 2023) and providing feedback (Dai et al., 2023). On the other hand, GenAI has brought unique challenges to teaching and learning processes. Educators have sounded the alarm over plagiarism (Hiniz, 2024) because, for example, generating an essay on any topic has become a matter of seconds, and no AI detector is considered entirely reliable. Moreover, GenAI can negatively impact the development of learners' key cognitive processes related to thinking, reading, and writing, which could have significant societal consequences (Chan & Lee, 2023). Furthermore, unresolved issues around academic integrity and the ethical use of GenAI content continue to raise concerns about the role of GenAI in education (Alier et al., 2024).

At this moment, GenAI is still a relatively unfamiliar and underexplored concept for educators and institutions (Chiu, 2023). To date, heated debates continue about how to leverage its potential to enhance teaching and learning while also addressing its challenges (Jauhiainen & Guerra, 2023; Kaplan-Rakowski et al., 2023; Lim et al., 2023; Lozano & Fontao, 2023; Zhang et al., 2023). Research on the use of GenAI in education is developing rapidly but remains in its early stages, given its limited systematic implementation (Yau et al., 2022; Jauhiainen & Guerra, 2023). This is also because not enough time has passed since the arrival of GenAI to conduct studies on its long-term consequences for teaching and learning.

In the context of mixed opinions, overhyped claims, and the unclear status of GenAI in education, exploring schoolteachers' views on GenAI and its impact on teaching and learning has become increasingly important. Teachers have always been central actors in technology integration in the classroom (Wood et al., 2005; Abel et al., 2022), and their perceptions consistently emerge as predictor of the successful integration of technology and adoption of ICT within educational settings (Abel et al., 2022). This means that if GenAI becomes a regular presence in classrooms – rather than an invisible assistant in students' homework – its adoption will have been promoted more by teachers. Currently, there is a gap in understanding how close we, as a society, are to integrate GenAI as a new educational agent in daily teaching and learning, as well as for what purposes educators find it most suitable. To address this, this study investigates teachers' perceptions of the potential of GenAI in education, along with the challenges and risks it presents. Moreover, recognizing that technology adoption is not a static state but rather a continuous process comprising multiple stages, this study also examines how teachers vary in their stages of technology integration.

This study employs a combination of theoretical approaches to gain a deeper understanding of teachers' perceptions of GenAI and its relationship with their stage of technology integration. To explore teachers' perceptions, the Technology Acceptance Model (TAM-1) is used, a widely recognized framework for analyzing the factors influencing technology acceptance. While many studies rely solely on the TAM model (Dehghani et al., 2024; Mutammimah et al., 2024; Shahzad et al., 2024), this study also incorporates Rogers' Diffusion of Innovation Model to examine where each participant stands in terms of the stage of GenAI adoption. By combining these models, this study provides a more nuanced perspective on the relationship between

teachers' perceptions of GenAI and their stage of technology adoption. In addition, most studies exploring GenAI in education have taken place in Asian countries, such as China (Yau et al., 2022) and South Korea (Kim & Kwon, 2023), or in the United States (Kim & Kim, 2022) – which are important pioneers when it comes to the use of AI in education. However, research in the European context remains limited. This study aims to address this gap by investigating the European perspective, specifically focusing on teachers' perceptions of GenAI in Flanders, Belgium.

Theoretical Models to Study Teachers' Perceptions of GenAI and Its Use in Education

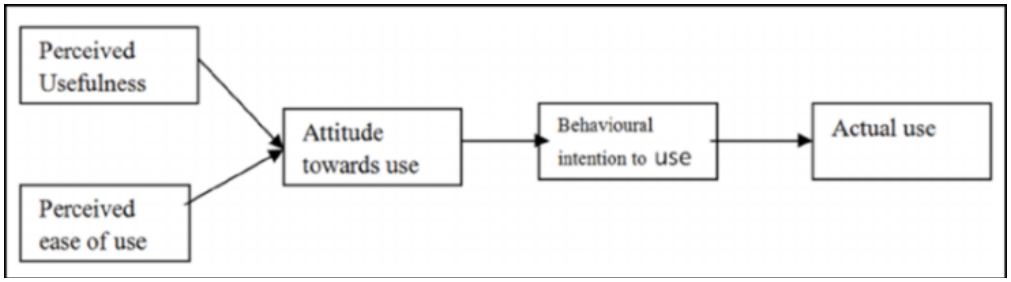
Technology Acceptance Model

The Technology Acceptance Model (TAM) was first proposed by Davis in 1989 as a framework to understand and predict users' acceptance and adoption of new information technology. TAM centers on the following two key constructs (Figure 1):

- **Perceived Usefulness (PU):** This pertains to the users' perception of how using a particular technology would enhance their job performance or productivity.
- **Perceived Ease of Use (PEOU):** This relates to the users' perception of the simplicity or complexity of using the technology.

Figure 1

The Original TAM by Davis



Note: TAM model by Davis (1989, as cited in, Tella & Olasina, 2014, p. 50)

The main determinants interact with several other key components. The first of these is *Attitude Towards Use*, which refers to users' overall feelings about using a technology (Davis, 1989). It implies that users are more likely to have a positive attitude toward using the technology if they believe it is useful and easy to use (i.e., PU & PEOU). *Behavioral Intention to Use* is another key component that refers to users' readiness to adopt a new technology. The model states that users with a positive attitude toward technology are more likely to intend to use it (Davis). *Actual Use* refers to users' observable behavior in using the technology. Users' behavioral intentions are expected to lead to its actual use.

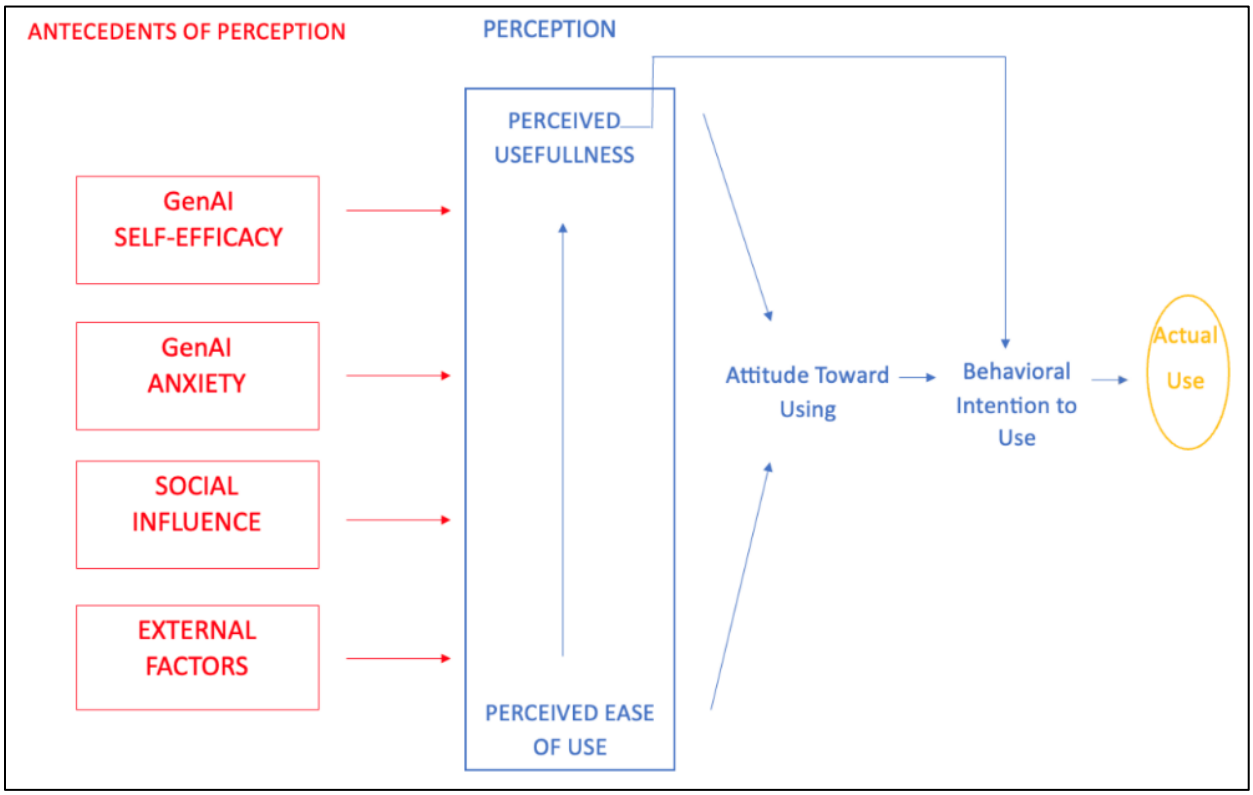
TAM has been applied in several studies investigating the adoption of GenAI by teachers. Al-Abdullatif (2024) found that perceived ease of use (PEU) significantly influenced GenAI adoption, while perceived usefulness (PU) did not directly impact acceptance. Conversely,

Mutammimah et al. (2024) highlighted the importance of both PU and PEU in shaping instructors' perceptions of ChatGPT, emphasizing that a favorable attitude toward the technology enhances behavioral intention (BI) and actual use (AU). Some studies on GenAI adoption employed the UTAUT (Unified Theory of Acceptance and Use of Technology) framework (Nikolic et al., 2024), which builds on TAM and includes four key determinants of technology adoption: performance expectancy (similar to PU), effort expectancy (similar to PEU), social influence, and facilitating conditions. The studies that used UTAUT (Ahmad et al., 2023; Alhwaiti, 2023; Al-Riyami et al., 2023) confirmed that these factors significantly impact AI adoption. Al-Riyami et al. (2023) found that performance expectancy was the strongest determinant of AI adoption among faculty members, followed by facilitating conditions and effort expectancy. Ahmad et al. (2023) and Alhwaiti et al. (2023) further validated these findings, with the latter extending UTAUT2 to include hedonic motivation, price value, and habit as additional predictors of AI adoption among faculty members. These studies collectively underscore that both TAM and UTAUT frameworks offer valuable insights into the determinants of GenAI adoption, with ease of use, perceived usefulness, and performance expectancy emerging as critical factors shaping behavioral intention and actual usage.

In the context of this research an adapted version of the original TAM was created to fit the specific GenAI context, visualized in Figure 2.

Figure 2

Adapted TAM-1 Model with the Antecedents of Perception and the Original TAM by Davis



Note: Antecedents of perception is shown in the left column in red font. Original TAM by Davis (1989) in the center column in blue font.

The main adaptation of Davis' TAM (shown in blue) was to introduce *Antecedents of Perception* (highlighted in red) in order to enhance the model's explanatory power, going beyond its main indicators *Perceived Usefulness (PU)* and *Perceived Ease of Use (PEOU)*. Four key antecedents have been incorporated to predict technology acceptance, particularly focusing on teachers' use of GenAI systems. First, *GenAI Self-Efficacy*, defined as teachers' belief in their ability to effectively use GenAI, is considered as a significant predictor of the *Perceived Ease of Use (PEOU)*, drawing from Bandura's concept of self-efficacy and recent findings by Zhang et al. (2023). This reflects a positive relationship between self-efficacy and ease of use in technology. Secondly, *GenAI Anxiety* addresses the apprehensions teachers might have about GenAI, such as the fear of job displacement and privacy violations. Inspired by the study by Wang et al. (2024), in which GenAI anxiety was conceptualized as "unfamiliarity, concerns about privacy, and ethical issues" (p. 14), we have defined it more broadly, conceptualizing it as all negative feelings teachers may have about GenAI. Studies by Johnson and Verdicchio (2017) and Li and Huang (2020) suggest that such anxiety negatively affects the perceived ease of using these systems. *Social Influence* is included to represent the effect of peers and social contexts on technology adoption, based on research by Luo et al. (2019), indicating that social environments significantly shape technology perceptions. Lastly, *External Factors* such as system features and technical support are added as they directly impact perceived usability and usefulness, as identified by Khan et al. (2022) and Luo et al. (2019). These factors collectively enhance the original TAM framework, aiming to provide a more robust understanding of how various elements influence teachers' adoption and use of GenAI in educational settings, synthesizing insights from multiple recent studies into a comprehensive model.

Roger's Diffusion of Innovation Model

Roger's Diffusion of Innovation Model, first introduced in 1962, serves as another framework for this research. This model provides insights into how new ideas and technologies spread within societies, helping to identify the patterns and behaviors associated with the adoption process across various sectors.

Rogers' Diffusion of Innovation Model categorizes individuals into five distinct groups based on their willingness to adopt new innovations, which is key for understanding how teachers in educational settings might adopt GenAI:

- **Innovators:** The first to adopt new innovations, innovators are risk-takers and enthusiasts who are driven by curiosity and a desire for novelty.
- **Early Adopters:** Following innovators, early adopters influence their social circles with recommendations and play a crucial role in spreading positive attitudes towards new innovations.
- **Early Majority:** These individuals adopt innovations after witnessing their success among earlier groups. They are practical, cautious, and prefer to observe others' experiences before adopting new technology.
- **Late Majority:** More skeptical and cautious, the late majority adopts innovations only after they become mainstream and often due to societal pressure.

- **Laggards:** The last to adopt, laggards are traditionalists who resist change and are minimally connected to social networks, typically adopting innovations only when absolutely necessary.

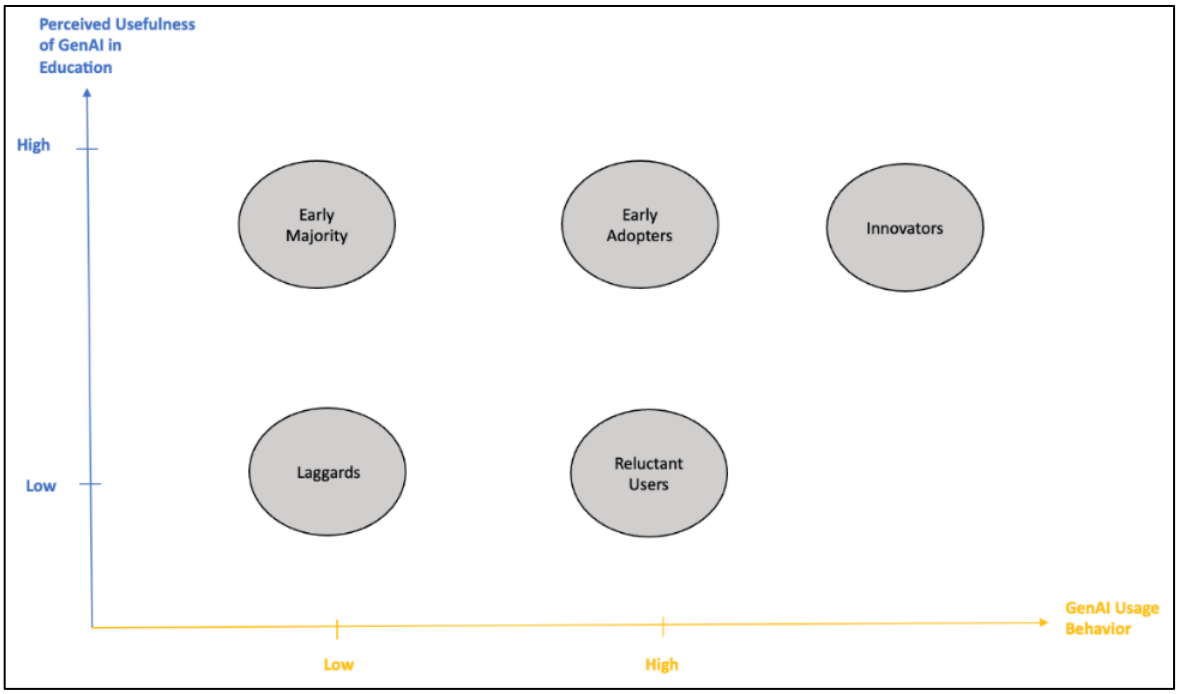
In Rogers' model, innovation is closely associated with high levels of technology usage, which can inadvertently cast "laggards" in a negative light. Nevertheless, this framework remains valuable, as it effectively illustrates the continuum of teachers' varying stages of technology integration.

GenAI Taxonomy

Based on Luo et al.'s (2019) study, which explored students' perceptions and usage of microblogging platforms like Twitter in educational contexts, a GenAI taxonomy was developed to be used in this study. Luo et al.'s taxonomy categorizes students based on their readiness to integrate Twitter into their learning. The taxonomy plots students' perceived usefulness against their usage behavior, identifying four distinct user types: expert, novice, veteran, and resistor. This classification aligns with Rogers' Diffusion of Innovation Model, linking types like experts (early adopters) and resistors (laggards) to their respective traits in adopting new technologies. Inspired by Luo et al., this study adapts their approach to create a GenAI taxonomy within the educational context. This new taxonomy will classify teachers based on their responses to interview questions framed by the adapted TAM, helping to understand different levels of readiness and attitudes towards adopting GenAI technologies.

Figure 3

The Use of a GenAI Taxonomy (i.e., Participants' Placement on Rogers' Diffusion of Innovation Continuum)



The taxonomy visualized in Figure 3 utilizes two primary axes: Perceived Usefulness of GenAI derived from teachers' responses to TAM-based interview questions, and *GenAI Usage Behavior* reflecting actual classroom usage. The taxonomy initially identified five key groups of teachers:

- **Innovators:** Teachers who are the first adopters of GenAI, exhibiting high usage and high perceived usefulness.
- **Early Adopters:** Teachers who adopt GenAI after seeing its effectiveness, also with high perceived usefulness but slightly less usage.
- **Early Majority:** Teachers who recognize the utility of GenAI but are more conservative in their usage.
- **Laggards:** Teachers with low adoption and usage, skeptical of GenAI's value.
- **Reluctant Users:** Teachers who frequently use GenAI outside of teaching contexts but remain skeptical about its educational benefits.

Both the Technology Acceptance Model (TAM) and Rogers' Diffusion of Innovation (DOI) have limitations in capturing the complexities of GenAI integration in education. TAM may oversimplify the factors influencing adoption, while Rogers' model, with its linear view of innovation diffusion, risks marginalizing late adopters. Although these models do not fully complement each other, considering insights from both can provide a more nuanced perspective than relying on either model alone.

Research Questions

Based on the current understanding of the theoretical models and concepts described above, this study seeks to answer the following research questions:

- **RQ1:** What are the secondary education teachers' perceptions about the use of GenAI in education, based on the TAM framework?
- **RQ2:** What is the distribution of secondary education teachers across the GenAI taxonomy, combining Rogers' Diffusion of Innovation model and the TAM model?
- **RQ3:** What is the relation between secondary education teachers' perceptions about GenAI and their actual usage in education?

Methodology

Phenomenological Approach

In this study, a phenomenological descriptive approach was employed to examine how individuals perceive and utilize GenAI tools in secondary education. This approach focuses on understanding the essence of participants' experiences and perceptions related to a specific phenomenon, in this case the use of GenAI in secondary education (Ravitch & Carl, 2021). Specifically, the study aims to explore the motivations driving secondary education teachers to integrate GenAI into their classroom practices, as well as the factors contributing to any reluctance.

To ensure a systematic analysis of the data, we opted for deductive coding, using predefined categories derived from existing literature (Shulman, 2004). This methodological choice aligns closely with the study's objectives, enabling a structured exploration of teachers' interactions with GenAI. By combining a phenomenological approach with deductive coding, the study aimed to capture and elucidate the nuanced dynamics of how teachers engage with generative AI in educational contexts.

Participants and Sampling Procedure

The targeted group of participants includes 20 participants who were recruited through snowball sampling. Our inclusion criteria required participants to be employed as in-service secondary school teachers in the Flemish region in Belgium. In Flanders, secondary school lasts for six years (typically ages 12–18) and is divided into three stages: first stage (grades 7–8), second stage (grades 9–10), and third stage (grades 11–12), where students choose different educational tracks such as general, technical, artistic, or vocational education. Participants could teach any subject in the curriculum and had varying levels of teaching experience.

After receiving ethical approval to conduct the research (reference number G-2024-7573), the recruitment process began with a small group of participants. Upon agreeing to participate, these individuals recommended others who met the criteria and were interested, continuing until the desired number was reached (Parker et al., 2019). In this study, an equal number of male and female teachers, aged 21 to 62 years and with diverse teaching experiences ranging from 1 to 25 years, were included. The subjects taught varied widely, from sciences like mathematics to humanities such as philosophy, with a notable emphasis on languages, including English and Dutch. Most participants taught either second or third grade in secondary education.

Data Collection Instruments

Data was collected through semi-structured in-depth interviews conducted by two researchers and a preceding online survey (Appendix A). These interviews allowed us to explore educators' viewpoints, gain insights into their encounters with GenAI, and acquire a deeper understanding of how they view, interpret, and attribute significance to this phenomenon. The online survey focused on participants' familiarity with GenAI and their utilization of GenAI tools in their teaching practices.

Data Analysis

The first phase of transcribing the qualitative data was done by AI, using the software Sonix. The collected transcriptions served as the essential foundation for the subsequent stages of analysis. In this study, deductive coding by means of NVivo was used for coding the transcripts, a method that involves systematically examining data with a predefined focus based on prior literature or research (Shulman, 2004). The codebook was constructed based on a modified version of the TAM-model, including main categories like GenAI Knowledge & Familiarity, GenAI Self-Efficacy, and Perceived Usefulness, each with further detailed subcategories. For example, in GenAI Knowledge & Familiarity, we looked at how participants defined GenAI and their familiarity with these tools, both generally and in educational settings. Each code also includes unique subcodes with their respective code definitions as visualized in Table 1.

Table 1

Subcodes and Their Corresponding Descriptions Employed for the Analysis

Code	Subcode	Code Description
Social Influence	School support for GenAI integration	When the participants talked about some training programs, teacher collaborations, policies, or workshops that their school provides for the integration of GenAI in their schools and classrooms
	Colleagues and friends' views on using GenAI	When the participants talked about the views on the use of GenAI in education and how these people's insights affected their own views on the use of GenAI in education

Using this coding approach helps to efficiently process the data and provides valuable insights based on established theoretical categories. It showed us key areas that educators care about, such as how GenAI affects their teaching and engages students. This method also helped us capture detailed views that might have been missed without such a structured analysis framework.

To ensure the reliability of our coding process, we implemented several measures to maintain intercoder reliability. Initially, a standardized interview guide was developed (Appendix B) to ensure that both researchers asked the same questions in the same sequence. Additionally, the detailed codebook was created collaboratively (Appendix C) to ensure consistent data collection and analysis across the coders. Additionally, during the analysis phase, inter-rater reliability was further strengthened by double coding a subset of three English transcripts. By thoroughly comparing and discussing the coding among the researchers, consistency in the application of codes could be verified.

Following these initial coding sessions, we engaged in discussions to reach additional agreements on the interpretation of specific terms and the approach for coding all subsequent transcripts. For instance, when participants referred to the 'motivation' of their students using GenAI tools, we agreed to uniformly code such references as “student engagement.” These agreements and the overall coding strategy are comprehensively outlined in a document (Appendix D), ensuring a transparent and reliable coding process throughout our study.

Results

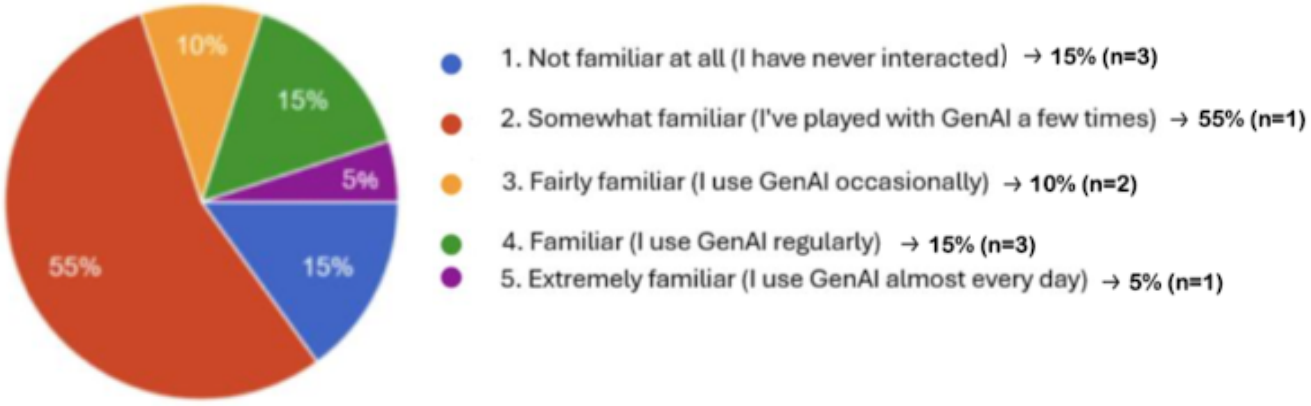
Before proceeding to the analysis related to the three research questions, we will first present data on secondary education teachers' levels of familiarity and understanding of GenAI, as this provides essential context for interpreting the subsequent findings.

Participants' Familiarity and Current Use of GenAI

In this study, understanding the current level of GenAI use among the teachers entailed participants' familiarity with GenAI and their utilization of GenAI tools in their teaching practices. These findings were derived from the preceding online survey.

Figure 4

Familiarity with GenAI (e.g. tools like ChatGPT): A Pie Chart Analysis



The pie chart above depicts the different levels of familiarity with GenAI (1-5) among the participants. The largest segment, comprising 55% (n=11) of participants, represents those who are somewhat familiar with GenAI, having used it a few times before the interview. Following that, 15% (n=3) of participants are familiar with GenAI, using it regularly. In contrast, another 15% (n=3) have no familiarity with GenAI, indicating they have never interacted with it. The segment of participants who use GenAI occasionally, indicating moderate familiarity, constitutes 10% (n=2). Finally, the smallest segment, at 5% (n=1), represents those who are extremely familiar with GenAI, using it almost every day.

These results are in line with a study conducted by Kaplan-Rakowski et al. (2023) on teachers' perspectives regarding the implementation of GenAI in education, where the majority of participants reported that they were beginning to use GenAI tools in educational settings and were in the early stages of familiarizing themselves with the technology.

Most teachers cited ChatGPT when asked about GenAI tools, but only four out of twenty could name education-specific tools like Photomath. This aligns with existing literature, which notes a surge in GenAI adoption since November 2022, primarily through models like ChatGPT-3.5 and ChatGPT-4 (García-Peñalvo & Vázquez-Ingelmo, 2023; Lim et al., 2023).

Additionally, teachers were asked when they use GenAI tools (Table 2), and it was found that they most often use GenAI for pre-class activities such as brainstorming and preparing learning activities. Only a few teachers used GenAI during class for tasks like facilitating formative assessments and responding to student questions. For post-class activities, GenAI was also used infrequently, predominantly for administrative tasks such as writing emails and evaluating student assignments.

Table 2

Teachers' Use of GenAI Tools Before, During, and After Class

Activity	Number of Participants (Frequency)
Use of GenAI Tools Before Class	
Brainstorming to find ideas for a lesson	8
Designing activities for students	7
Developing learning materials	6
Finding resources (using GenAI as a search engine)	6
Creating warm-ups	5
Developing assessments	5
Translating materials to other languages	3
Editing or writing emails	3
Improving my content knowledge	3
Creating personalized learning pathways	2
Creating lesson plans	2
Use of GenAI Tools During Class	
Answering student questions	2
Conducting formative assessments or quizzes	2
Taking attendance	1
Guided use by students to search for substantive information and learn to interpret it critically	1
Other: The students got started with AI and used it to design an artwork	1
Other: Solving exercises (PhotoMath)	1
Handling unexpected situations or disruptions	0
Monitoring student engagement	0
Use of GenAI Tools After Class	
Managing administrative tasks	3
Checking mistakes in student assignments	2
Providing feedback on assignments	2
Generating reports on student performance	2
Reflecting on the lesson	1
Grading assignments	0

Teachers' Perceptions About the Use of GenAI in Education

In the following sections, quotes have been carefully selected and incorporated to provide concrete examples illustrating the results. It is important to note that while these examples offer valuable insights, they are not exhaustive.

Perceived Usefulness

The vast majority of participants (17 out of 20) praised GenAI for its efficiency and time-saving features, particularly emphasizing its role in automating routine educational tasks like exam creation.

> *It (GenAI) provided me, in total about 50 exam questions, which would have been very time-consuming if I had to make them all by myself. (Participant 20)*

Additionally, more than half of the teachers (14 out of 20) appreciated how GenAI can facilitate personalized instruction, potentially enhancing the learning experience.

> *I think that GenAI could be very valuable for us if it works well and when it is on point. As I mentioned earlier, when you let students practice something, they all make different kinds of mistakes (...) But it's often very difficult to go to every student and answer their questions as teachers (...) …. Often, students must practice something boring, very frequently, while they could better jump to their level, you know (...)I think AI could really add significant value in that respect. (Participant 2)*

Moreover, the tool's ability to generate new teaching materials was particularly valued, serving as a creative resource for teachers.

> *For me, it's a tool to create images, figures, and models. (Participant 20).*

These results align with Kaplan-Rakowski et al. (2023) who also noted that time-saving is a key factor in teachers finding GenAI useful and with Jauhiainen and Guerra's (2023) stressing that GenAI is helpful for automating tasks like evaluations, echoing findings on GenAI's role in education.

Perceived Ease of Use

The majority of the participants (16 out of 20) described GenAI tools like ChatGPT as straightforward and user-friendly, citing attributes like easy login, tool's speed and intuitive interaction. However, despite the initial ease of use, some participants (3 out of 20) indicated a learning curve, especially in effectively writing prompts to maximize tool utility.

> *That seems very straightforward, but practicing asking the right questions shapes the input within ChatGPT. … It seems like something very obvious, and it's not always that straightforward. (Participant 3)*

Antecedents of Perception

GenAI Self-Efficacy. Participants generally showed a moderate level of confidence in their abilities to use GenAI tools effectively. While most felt equipped to start using these technologies due to some background in IT or their current usage, a few expressed concerns about their lack of skills. Notably, five participants felt they needed more structured training to fully integrate GenAI into their teaching practices effectively.

> *I'm confident that I will be able to use it if perhaps I get the ability to follow courses about it. (Participant 11)*

Despite limited familiarity, a few participants confidently expressed their ability to quickly become proficient with GenAI tools, citing their adaptability skills as part of the teaching profession.

GenAI Anxiety. In our study we addressed the following concerns associated with GenAI anxiety: ethical issues, reliability and accuracy, teacher-student interaction, and impact on the job.

- **Ethical issues** emerged as particularly significant, with concerns about plagiarism highlighted as the most critical problem. Participants expressed worries about students using GenAI to bypass creative processes, potentially leading to learning loss and

undermining academic integrity. This finding aligns with Alasadi and Baiz (2023), who reported similar concern about academic integrity when GenAI tools were introduced.

This is a serious threat to us. (...) It's mostly about plagiarism. Um, because our students, they use ChatGPT, uh, we're giving them brilliant scores while we feel in class that they don't have this level of English or Dutch. And this is a serious, serious problem at this moment. (Participant 16)

- **Reliability & Accuracy** was another major concern, with participants worrying about the authenticity and source verification of information provided by GenAI tools, affecting the trustworthiness of the content used in educational settings. This mirrors Hsu and Ching's (2023) findings, where participants noted instances of misinformation due to a lack of transparency in data sources.
- **Teacher-student interaction** surfaced as a key topic, with varied perspectives. While some felt that GenAI would not drastically change their interactions, citing the irreplaceable nature of personal support, others were concerned that extensive automation could undermine personalized teaching approaches developed through direct experiences with students.

  …The teacher is also giving them, um, the chance to communicate the personal thing, they can come and ask me things when they don't understand it well or just communicate about anything they want. A computer or ChatGPT can't offer that emotional connection. (Participant 17)

- **Impact on the Job** was discussed with optimism about GenAI serving as a supplemental tool rather than a replacement, emphasizing the irreplaceable human elements of teaching. Participants noted that while GenAI could automate some tasks, the essential human interaction and personalized instruction cannot be replicated by AI. This aligns with Molenaar's (2022) concept of "hybrid intelligence," which implies that AI can augment but not replace teachers' intelligence.

Social Influence

In our study, social influence refers to various social factors that can affect how individuals perceive the integration of GenAI, including two subcategories: the views of colleagues and friends, and the support of the school.

About half of the participants noted that positive feedback and experiences shared by colleagues spurred their interest in GenAI, leading them to experiment with these tools. However, negative experiences also impacted perceptions, with skepticism arising from colleagues' challenges, such as difficulties in fair assessment when students use GenAI to complete assignments.

Yes, a teacher who assigns an essay or a writing task and then suddenly says, <<Well, they all just did it with AI, and I have to give them all ten out of ten, almost.>> So, in that sense, I really need to learn more about it first before I dare to use it in the classroom. (Participant 6)

Responses on institutional backing for GenAI integration varied widely. About half expressed to experience growing support through professional development and workshops, while 12

participants felt unsupported, citing a lack of formal policies and substantial support systems. Only one participant mentioned an active engagement strategy at their school.

> *At our school, they started this year with having three sessions every Friday afternoon that we can attend about AI applications in education. (...) I think by the end of this year, those guidelines will be there, and be included in the school regulations. (Participant 3)*

These findings align with Wang et al. (2024), who noted that social influence strongly affects pre-service teachers' intentions to integrate GenAI. Additionally, over half of the participants reported a lack of school support for GenAI integration, consistent with Barrett and Pack (2023), where 95.6% of educators received no AI training. Some participants did acknowledge initial support from schools but emphasized the need for more substantial assistance to build confidence in using GenAI.

Additionally, more than half of the participants (11 out of 20) shared that the current training available on GenAI is inadequate for applying GenAI tools to their full potential.

> *The problem I have with the training is that … it is very broad. Uh, so they're a bit vague, and they show us the potential of what we can do, but it's not really tailored to our needs. So, I'm really asking for somebody who can work together with us, collaborate with us here at school, and show us all the potential it (GenAI) has for my courses. (Participant 16)*

These findings highlight the need for domain-specific professional development, a point also emphasized by Barrett and Pack (2023).

External Factors

External factors refer to the aspects of the technological tool itself, such as its features including on-site navigation, technical help, subscription costs, and others.

Most participants (18 out of 20) stressed the importance of "cost-free access" for teachers when using GenAI tools. Twelve were reluctant to pay, while six were open to reasonable costs.

> *If it's something that's relatively affordable compared to how often I use it, then that's okay. (Participant 2)*

This finding aligns with Alasadi and Baiz (2023), mentioning that charging for these kinds of cutting-edge tools could create financial burdens and restrict access for individuals from low-income backgrounds, which might perpetuate the inequalities in education.

More than half of the participants (11 out of 20) emphasized that easy navigation is crucial for effectively using GenAI tools.

> *I think that for, uh, both teachers and students, it's important to know how to navigate through ChatGPT. (Participant 14)*

A smaller group (2 out of 20) valued GenAI tools' flexibility in supporting multiple languages, enhancing accessibility and usability for non-English speakers.

Attitude Towards Using GenAI

Our results show mixed attitudes towards GenAI. Nearly half of the participants are positive about its potential to support teachers and improve efficiency, highlighting its speed and ease of use. Some are optimistic about adapting to technological advancements, expecting GenAI to become more prevalent. However, several participants balanced their enthusiasm with caution, recognizing both the benefits and risks, such as the impact on critical thinking skills.

> *I'm interested but, at the same, time afraid... Aware is another word that comes to mind. Um, so I'm very aware of, uh, all the potential and then the threats such as ... some thinking skills being underdeveloped. (Participant 16)*

> *Initially positive but also cautious because I know too little about it (Participant 6)*

> *At this moment. Uhm. Frightening, but still positive. (Participant 4)*

These findings align with the study by Barrat and Pack (2023), who reported that teachers' attitudes range from enthusiasm to skepticism. While teachers are open to GenAI, they remain cautious due to concerns about privacy, cost, and other factors.

Behavioral Intention

The study shows a strong behavioral intention among participants to continue using GenAI in their teaching practices, especially among those with prior experience. Most participants emphasized the value that GenAI adds to education, allowing for more innovative teaching and the potential for improved tools in the future. However, some participants who had not yet used GenAI cited barriers such as cost, the need to create an account, and insufficient support and training. A few expressed conditional willingness to adopt GenAI, provided they receive adequate training.

> *Maybe after training or an overview of the possibilities, I would be willing to try it. (Participant 12)*

These findings highlight the importance of training for teachers to use GenAI tools in education, as echoed by Alasadi and Baiz (2023), who emphasized that comprehensive programs are crucial for equipping teachers with the skills needed to integrate GenAI into their teaching.

Distribution of Teachers Within the GenAI Taxonomy

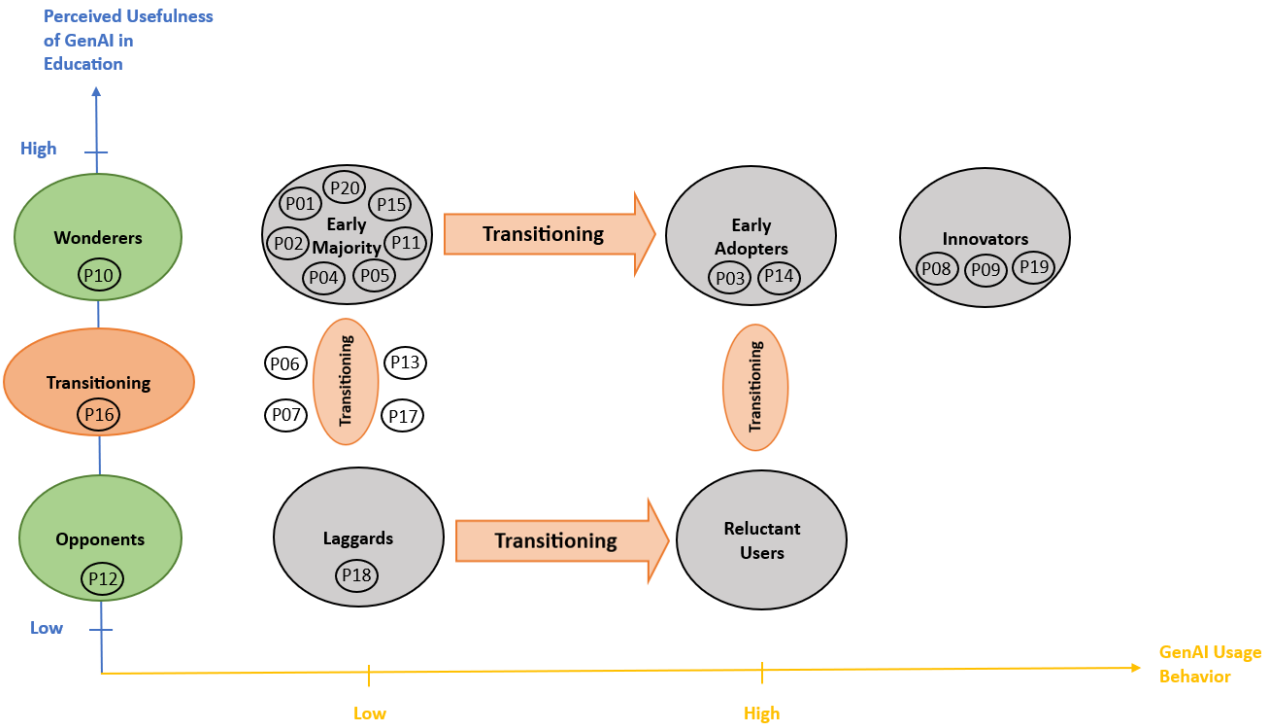
The second research question aimed to map the participants on the GenAI taxonomy including both the level of technology acceptance and participants' usage behavior. Based on the data analysis, it was decided that the initial taxonomy had to be refined as visualized in Figure 4, also including transitional groups between the main categories, representing teachers at various stages of adoption and the acknowledgment of GenAI's potential. These transitioning groups, depicted in orange, illustrate the dynamic shifts in teachers' perceptions and usage behaviors. An elliptical shape was chosen to indicate fluctuating perceptions.

Additionally, three new groups were added to capture the spectrum of teachers who had not yet used GenAI. 'Opponents' are teachers who have never used GenAI and do not perceive its

educational value, whereas 'Wonderers' recognize the high potential of GenAI in education and are eager to integrate it.

Figure 5

Categorization of Participants on the Extended GenAI Taxonomy



Based on qualitative analysis, participants were categorized into various groups based on their perceptions and usage of GenAI in education, revealing a spectrum of adoption patterns.

- **Innovators:** Three participants were identified as Innovators, adopting GenAI tools early, which was surprising given the expected hesitancy due to concerns like academic integrity and the relatively new introduction of GenAI in education (c.f. Alasadi & Baiz, 2023; García-Peñalvo & Vázquez-Ingelmo, 2023)
- **Early Adopters:** Two participants, both in their twenties, were classified as Early Adopters. This aligns with literature suggesting that younger educators are more likely to embrace new technologies (c.f. Kim & Kim, 2022), though the small sample size of this study limits broad generalizations.
- **Early Majority:** The majority of participants fell into this category, indicating recognition of GenAI's potential but limited actual use. This was somewhat unexpected, as the literature suggests that teachers often stick to traditional methods (c.f. Kim & Kim, 2022).
- **Laggards and Opponents:** Only one participant each was categorized as a Laggard and an Opponent, contrary to expectations that more teachers would resist adopting new technologies like GenAI (c.f. Kim & Kim, 2022; Alasadi & Baiz, 2023).

- **Transitioning Groups:** Four participants were transitioning between Laggards and the Early Majority, reflecting limited implementation and awareness of GenAI in education. One participant was transitioning between Opponents and Wonderers, acknowledging the potential of GenAI but remaining skeptical about its quality.
- **Wonderers:** One participant was classified as a Wonderer, finding GenAI tools potentially useful but not yet having used them due to time constraints.

Notably, there were no participants in the "Reluctant Users" category or several transitional groups (e.g. Laggards-Reluctant Users, Reluctant Users-Early Adopters, and Early Majority-Early Adopters) which provides more insights into the adoption patterns of GenAI tools among secondary education teachers.

Relationship Between Secondary Education Teachers' Perceptions of GenAI and Its Actual Use in Education

In analyzing the relationship between teachers' perceptions of GenAI and their actual use of GenAI tools in education, distinct patterns emerged. Among participants who perceived GenAI as highly useful, there was generally a high level of usage in their teaching practices. These educators, although not the earliest adopters, had integrated GenAI into their work due to its perceived benefits, such as enhancing creativity. Conversely, those with lower perceptions of GenAI's usefulness reported minimal use, often citing the complexity of the tools and concerns about reliability as barriers. Interestingly, some participants who had low usage of GenAI also demonstrated fluctuating perceptions; while they recognized the efficiency and time-saving potential of GenAI, their uncertainty stemmed from a lack of familiarity with the tools. Additionally, teachers who had never used GenAI before expressed critical views, fearing that it might undermine students' learning by overly assisting with tasks that students should handle themselves. These findings are consistent with Abel et al. (2022), who emphasized the influence of perceptions on technology adoption. Conversely, those with low perceived usefulness of GenAI, often due to concerns about complexity and reliability, reported minimal use of these tools.

However, the study also identified a discrepancy where a high perceived usefulness of GenAI did not always lead to high usage. This inverse relationship was often due to practical barriers, such as the need for more training and the limited time teachers had to explore these tools amidst their busy schedules. Notably, one participant with no prior experience with GenAI held a positive view of its potential, recognizing its capacity to save time and enhance lesson preparation, despite never having used it. On the other end of the spectrum, a small group of participants, who had been early adopters of GenAI since as early as 2018, continued to use these tools extensively. They found GenAI highly beneficial for generating new teaching content and were less concerned about issues like plagiarism, seeing these as challenges related to broader academic integrity rather than specific to GenAI. These findings highlight the complexity of GenAI adoption, where both perceptions and practical factors play crucial roles in determining usage, as previously noted by Zhu et al. (2023).

Limitations and Future Research

Maintaining a critical perspective is essential in research as it helps contextualize findings and guide future inquiries. Our study focused on secondary education teachers within Flanders, potentially limiting the applicability of our findings to regions with different educational norms and policies. This focus may also overlook the varied influences of different educational levels

and subjects on teachers' perspectives (Oolbekkink-Marchand et al., 2014). Snowball sampling has been employed, an approach efficient in accessing hard-to-reach populations but criticized for potential biases such as limiting diversity and skewing results toward specific demographics or professional networks (Ravitch & Carl, 2021). Additionally, the qualitative nature of our study, involving a limited number of participants, constrains the generalizability of our findings. Our data collection relied on interviews, susceptible to social desirability bias despite efforts to minimize this through neutral questioning. Furthermore, our participant pool was not restricted to educators with extensive GenAI experience, raising concerns about the Dunning-Kruger effect, where individuals with limited experience might overestimate their competence in using generative AI. This could affect the reliability of their self-reported data collected in the survey, leading to an overconfident assessment of their skills and understanding of GenAI technologies. A theoretical limitation of this study concerns the use of Rogers' model to categorize educators based on their adoption of AI. The model implicitly equates innovation with high technology usage, which may inadvertently position non-users or late adopters in a negative light. Even though Rogers' framework remains useful in illustrating varying stages of technology integration, this perspective might oversimplify the complexity of technology adoption in educational contexts, where diverse motivations and constraints shape teachers' engagement with AI.

To enhance the scope of research and address the identified limitations, future studies could consider several areas. Expanding the participant pool to include educators from primary, secondary, and higher education settings across different disciplines could provide a more comprehensive view of generative AI's impact. Incorporating both qualitative and quantitative methods, such as surveys, focus groups, and experimental designs, would improve the robustness and generalizability of the data. These approaches could help overcome the limitations of snowball sampling by generalizing findings to a larger population, making results more representative, and reducing subjectivity in interpreting results (Ravitch & Carl, 2021; Gelo et al., 2008). Additionally, investigating pre-service teachers is crucial for understanding how generative AI can be integrated from the early stages of teacher education, which can enhance their understanding and significantly improve AI-based teaching practices (Celik et al., 2022). Understanding how students perceive and utilize generative AI tools in their learning processes is also vital as it can offer insights into the effectiveness of these technologies in enhancing educational outcomes (Barrett & Pack, 2023). Moreover, conducting studies that compare educational practices and perceptions across different regions or countries could broaden the validation of our study's findings and reveal cultural and systemic differences in the adoption of generative AI. As the landscape of technology and its integration into education evolves, it will be crucial to periodically revisit these research questions. Assessing how a more experienced and knowledgeable base of educators engages with generative AI could provide deeper insights. Additionally, future research could explore alternative models that offer a more nuanced understanding of adoption processes in education, where innovation is not exclusively linked to high technology usage but rather considered also in relation to diverse motivations, contextual constraints, and critical perspectives on AI adoption. Moreover, a longitudinal approach could help ensure that our understanding of generative AI in education progresses from merely reflecting common perceptions to capturing more nuanced, experiential knowledge, thus making the research more compelling and inclusive.

Concluding Implications for Policy and Practice

This research provides a foundational understanding of the intersection between GenAI and education, offering critical insights into educators' perspectives that researchers, practitioners, and policymakers can further explore. The findings underscore a clear need for targeted support

and bespoke training for secondary education teachers to integrate GenAI effectively into their teaching practices. Despite recognizing the potential benefits of GenAI, many teachers report limited use due to a lack of detailed information and overly broad training programs. This concern aligns with Zhu et al. (2023), who advocate for training programs specifically designed to address the distinct needs of educators in different subjects and teaching contexts.

Anxiety surrounding the ethical implications of GenAI, such as concerns about academic integrity, is another significant barrier. This mirrors findings by Abel et al. (2022) and Alasadi and Baiz (2023), who also report ethical concerns as major hurdles to GenAI adoption. To mitigate these anxieties, it is recommended that policymakers and educational institutions develop and disseminate clear, actionable ethical guidelines. These should not only include the existing specific protocols for the use of GenAI tools (e.g., the European Union's Artificial Intelligence Act and UNESCO's Recommendations on the Ethics of Artificial Intelligence) but also enhance their visibility and understanding to ensure they contribute to educational integrity and transparency. Additionally, creating forums for ongoing discussions and ethical reviews involving educators could foster a more informed and conscious use of these technologies, helping to bridge the gap between the actual availability of these protocols and educator awareness of them.

The results also highlight that time constraints significantly limit teachers' engagement with GenAI, leading to a superficial understanding of its capabilities. To counter this, it is advisable that educational leaders consider integrating GenAI training into the core curriculum of teacher education programs. Furthermore, professional development days could be dedicated to hands-on GenAI workshops that allow teachers to explore and understand these tools in depth, a strategy supported by the recommendations of Zhu et al. (2023) and Kaplan-Rakowski (2023).

Finally, the scarcity of GenAI tools specifically designed for educational purposes suggests an urgent need for closer collaboration between educators and technology developers. Such partnerships could focus on creating customized GenAI applications that meet the unique needs of the educational sector, enhancing both teacher proficiency and educational outcomes. Salinas-Navarro et al. (2024) highlights the success of such collaborations in improving the utility and user-friendliness of technological tools in classrooms.

In conclusion, addressing the ethical and practical challenges of GenAI in secondary education requires a concerted effort among schools, policymakers, and developers. By implementing targeted training, establishing clear ethical guidelines, and fostering partnerships for tool development, we can ensure the responsible and effective integration of GenAI technologies in educational settings.

Ethics Statement

Ethical approval was obtained prior to the interviews (reference number G-2024-7573).

Conflict of Interest

The authors do not declare any conflict of interest.

Data Availability Statement

Data is available upon request.

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Appendix A: Survey

Dear participant,
In this brief survey, we kindly ask you to share your background. The answers to these questions will shape the structure of the actual interview. If you have questions about the research, you can contact the following individuals: _____

Informed consent form
Your information will be pseudonymized for the purpose of this research. This means that identifying details, such as your name, will be separated from other research data and replaced with a unique, random code. This way, it will no longer be immediately apparent which data corresponds to a specific person. Only the researchers can link the data back to a particular person using the unique code. The data will be kept confidential on KU Leuven servers. We will ask you to sign the informed consent form at the beginning of the interview. However, please also read it now, before we collect your background data: Informed consent_teachers' perceptions.docx

□ I have read and understood the information in this document. I give my consent to participate.

Name and surname
_____

Gender
□ Male
□ Female
□ Prefer not to say

Age
_____

How long have you been working as a teacher in secondary education?
□ < 1 year
□ 1-5 years
□ 6-10 years
□ 11-25 years
□ >25 years

Which education or training have you completed to become a secondary education teacher?
□ Bachelor's degree of primary education
□ Bachelor's degree of secondary education
□ Master's degree + master's in education
□ Other:_____

Which subject(s) are you currently teaching in secondary education?
 Geography
 Biology
 Physics
 Chemistry
 Mathematics
 ICT (Information and Communication Technology)
 Religious Education
 History
 Dutch
 French
 English
 German
 Greek
 Latin
 Art Education
 Physical Education
 Economics
 Cultural Sciences
 Psychology
 Music Education
 Anders:
 In which grade do you teach?
 First grade
 Second grade
 Third grade
 Other:_____

The use of generative artificial intelligence
Generative AI can be defined as a technology that (i) leverages deep learning models to (ii) generate human-like content (e.g., images, words) in response to (iii) complex and varied prompts (e.g., languages, instructions, questions). (Lim et al., 2023). This concretely means that GenAI is a technology that generates human-like output based on the input of humans (e.g. instructions, questions, etc.).

The most well-known example of a GenAI tool is ChatGPT.
How familiar are you with generative AI, such as ChatGPT?
 Not familiar at all (I have never interacted with GenAI)
 Somewhat familiar (I've played with GenAI a few times)
 Fairly familiar (I use GenAI occasionally)
 Familiar (I use GenAI regularly)
 Extremely familiar (I use GenAI almost every day)
 Other:_____

Have you ever used a generative AI tool in your teaching practices? Please indicate if you have used it at least once.

Before classroom activity:
□ Brainstorming to find ideas for a lesson
□ Designing activities for students
□ Improving my content knowledge
□ Creating warm-ups
□ Creating personalized learning pathways
□ Developing learning materials
□ Developing assessments
□ Translating materials to other languages
□ Creating lesson plans
□ Editing or writing emails
□ Finding resources (using GenAI as a search engine)
□ Other:_____

Have you ever used a generative AI tool in your teaching practices? Please indicate if you have used it at least once.

During classroom activity:
□ Taking attendance
□ Answering student questions
□ Conducting formative assessments or quizzes
□ Monitoring student engagement
□ Handling unexpected situations or disruptions
□ Other:_____

Have you ever used a generative AI tool in your teaching practices? Please indicate if you have used it at least once.

After classroom activity:
□ Checking mistakes in student assignments
□ Grading assignments
□ Providing feedback on assignments
□ Reflecting on the lesson
□ Generating reports on student performance
□ Managing administrative tasks
□ Other:_____

Appendix B: Interview Questions

GenAI Knowledge & Familiarity:

- What is “GenAI” for you? What do you mean by “generative artificial intelligence”?
- Can you provide any examples of GenAI tools?
    - To what extent are you familiar with these examples?
- Can you provide any examples of GenAI tools in education?
    - To what extent are you familiar with these examples?

Perceived usefulness (PU):

If the participant has experience with GenAI:

- How valuable do you perceive GenAI in supporting you as a teacher?
- How valuable do you perceive GenAI in enhancing the learning experience for your students?
- Do you believe that GenAI could help improve student engagement, learning outcomes, or your teaching efficiency? Why do you believe so?

If the participant has no experience with GenAI:

- Based on what you know about GenAI, how valuable do you perceive it in supporting you as a teacher?
- In your opinion, could GenAI potentially enhance the learning experience for your students? Why?
- Do you believe that GenAI has the potential to improve student engagement, learning outcomes, or your teaching efficiency? Why do you believe so?

Perceived ease of use (PEOU):

If the participant has experience with GenAI:

- How easy is it for you to integrate GenAI into your teaching?
- Do you believe using GenAI in your classroom is straightforward and user-friendly? Why do you believe so?

If the participant has no experience with GenAI:

- Based on what you've heard about GenAI, do you think it would be easy or difficult to learn and use in your teaching experiences? Why do you think so?

Attitude:

If the participant has experience with GenAI:

- How do you feel about using Generative AI-tools in your teaching practices?

If the participant has no experience with GenAI:

- How do you feel about the general use of GenAI in the field of education?
- How do you think you would feel when using GenAI-tools in your teaching practices such as preparing course content, assessment and student engagement?

Behavioral intention (BI):

If the participant has experience with GenAI:

- Considering your experience with GenAI, do you intend to continue using it in your teaching practices? Why? Or why not?

If the participant has no experience with GenAI:

- Considering what you know about GenAI so far, do you think you would be willing to try it in the future? Why do you think so?
- What factors might discourage you from using GenAI in the future?

GenAI Self-Efficacy (Perceived self-efficacy (PSE) of GenAI):

- Do you believe you have the skills and confidence to effectively use GenAI in your teaching? Why? Or why not?
- Are you confident in your ability to adapt to and use GenAI tools? Why? Or why not?

Social influence:

- Do you feel that your school in general is supportive of GenAI adoption? Why do you feel so?
- Have you heard from colleagues or friends about GenAI? If so, have their opinions influenced your views on using it? How?

External factors:

- Are there any external factors (e.g., school policies, technical support, training) that influence your decision to use GenAI in education?
- What features of GenAI tools do you consider important to use/ not to use them in education?

GenAI anxiety:

- Do you have any concerns or anxieties about using GenAI in your work? Why? Or why not?
- Do you worry about the ethical implications of using AI in education? Why? Or why not?
- Are you concerned about the reliability and accuracy of GenAI tools? Why? Or why not?
- Do you have concerns about the security of sensitive information when interacting with GenAI tools? Why? Or why not?
- Do you have any concerns about the impact of GenAI on teacher-student interaction? Why? Or why not?
- Do you feel that the integration of GenAI may impact your job or role as a teacher?
- Do you have any fear of being replaced by AI?

Appendix C: Codebook

*Deductive Coding: In this codebook, the codes are deductive because deductive coding involves systematically examining the data with a predefined focus. In this method, researchers identify specific elements based on prior literature or research. In our coding process, we referred to the Theory of Acceptance Model (TAM) and based on our findings from the literature review under this theory, we created the codes.

Codes	Subcodes	Description of the Codes
1. GenAI Knowledge & Familiarity (GKF)	1.1. GenAI Definition 1.2. Examples of GenAI Tools (in General) 1.3. Examples of GenAI Tools in Education 1.4. Level of Familiarity with GenAI Tools (in General) 1.5. Level of Familiarity with GenAI Tools in Education	1.1. When the participants defined GenAI in their own words. 1.2. When the participants gave various examples of GenAI Tools that they knew. 1.3. When the participants gave examples of GenAI Tools that they knew (specifically) from the field of education. 1.4. When the participants talked about their level of familiarity (with various examples of GenAI tools that they knew). 1.5. When the participants talked about their level of familiarity with the examples of GenAI tools that they knew (specifically) from the field of education.
2. GenAI Self-Efficacy (GSE)	2.1. Skills and Confidence in Ability to Adopt and Use GenAI Tools in Teaching	2.1. When the participants talked about their own skills and confidence (e.g., typing skills, internet searching, online collaborating, etc.) in adopting and using GenAI tools while teaching.
3. GenAI Anxiety (GA)	3.1. Concerns or Anxieties about Using GenAI 3.2. Ethical Implications 3.3. Reliability and Accuracy of GenAI Tools 3.4. Security of Sensitive Information 3.5. Teacher-Student Interaction 3.6. Impact on the Job or the Role as A Teacher	3.1. When the participants shared their general concerns or anxieties about using GenAI in their work. 3.2. When the participants shared their worries about ethical implications of using GenAI in education (e.g., plagiarism). 3.3. When the participants shared their concerns about the reliability and accuracy of the information that they received from GenAI tools (e.g., wrong/biased information). 3.4. When the participants shared their concerns about the security of sensitive information while interacting with GenAI tools (e.g., GenAI tools keeping track of your search history). 3.5. When the participants shared their concerns about the impact of GenAI on teacher-student interaction.

		3.6. When the participants shared their worries about the impact of GenAI on their role as a teacher as well as their fear of being replaced by GenAI.
4. Social Influence (SI)	4.1. School Support for GenAI Integration 4.2. Colleagues and Friends' Views on Using GenAI	4.1. When the participants talked about some training programs, teacher collaborations, policies, or workshops that their school provides for the integration of GenAI in their schools and classrooms. 4.2. When the participants talked about the views of their colleagues or friends on the use of GenAI in education and how these people's insights affected their own views on the use of GenAI in education.
5. External Factors (EF)	5.1. Features of GenAI Tools	5.1. When the participants talked about what features of GenAI tools (e.g., being easy to log in, navigate, or being free, etc.) they consider important to use or not to use GenAI in educational practices.
6. Perceived Ease of Use (PEOU)	6.1. Perceived Easefulness for the Integration of GenAI into Teaching 6.2. Straightforwardness and User-Friendliness of using GenAI in Classrooms	6.1. When the participants talked about how easy they perceived the integration of GenAI into their teaching based on their experience with GenAI, or based on what they heard about it. 6.2. When the participants talked about how straightforward and user-friendly they perceived the integration of GenAI into their classroom practices based on their experience with GenAI, or based on what they heard about it.
7. Perceived Usefulness (PU)	7.1. Value of GenAI in Supporting Teaching 7.2. Value of GenAI in Enhancing Students' Learning Experience 7.3. Value of GenAI in Improving Student Engagement 7.4. Value of GenAI in Improving Learning Outcomes 7.5. Value of Gen AI in Improving Teaching Efficiency	7.1. When the participants talked about how useful and valuable they perceived GenAI in supporting their teaching (e.g., time saved while preparing lesson plans by using ChatGPT to invest in professional development). 7.2. When the participants talked about how useful and valuable they perceived GenAI in enhancing their student's learning experience (e.g., time saved while preparing lesson plans by using ChatGPT to focus on personal learning experiences of students and adjust task difficulty). 7.3. When the participants talked about how useful and valuable they perceived GenAI in improving student engagement. 7.4. When the participants talked about how useful and valuable they perceived GenAI in improving students' learning outcomes. 7.5. When the participants talked about how useful and valuable they perceived GenAI in improving their teaching efficiency (e.g., time saved by using ChatGPT to create multiple lesson plans and increase teaching efficiency).

8. Attitude Towards Using (ATU)	8.1. Overall Feeling Towards GenAI in Education	8.1. When the participants talked about their feeling towards the use of GenAI-tools in their teaching practices and in the field of education in general.
9. Behavioral Intention to Use (BIU)	9.1. Intend to Continue Using GenAI in Teaching (for participants with GenAI experience) 9.2. Willing to Try-out Using GenAI in the Field of Education in Future (for participants with no GenAI experience) 9.3. Factors Discouraging the Use of GenAI in the Field of Education in Future	9.1. When the participants shared their intention to continue using GenAI tools in their teaching practices. 9.2. When the participants shared their willingness to try-out using GenAI-tools in their practices within the field of education in the future. 9.3. When the participants talked about factors that are discouraging them from the use of GenAI-tools in their practices within the field of education.

Appendix D: Discussion Points About Coding

· When the participants talk about the fact they have spare time because they use GenAI (+) when they talk about the fact that they got more examples thanks to GenAI
→ Teaching efficiency

· When they talk about 'motivation' regarding the students.
→ Student engagement

· When the students score better because they can use GenAI
→ Student learning outcomes

· When the participants use GenAI to make an exercise more difficult or less difficult for the students.
→ Enhancing student learning experiences

· When they talk about 'plagiarism'
→ Double Code: PU (value in enhancing students' learning experiences) AND ethical issues

· Double Code:
→Anxiety in general (in response to the question) AND also code it in the specific subcode of GenAI anxiety.

· The examples of GenAI tools in education:
→ "ChatGPT" is not accepted under this category because it is not a tool that is specifically designed for the field of education at first place but then used in the field of education in general with the popularity it gained among the teachers and the students.

· GenAI tools not showing the resources and showing the resources that we can't really trust:
→ GenAI Anxiety (Reliability)

Appendix E: Transcriptions in the Codebook

The document is too long to be added here so please access it via the following link below.

https://docs.google.com/document/d/1_HNNSkIXk1XUJEz-UnlLyG6wgu1DYOEg/edit?usp=sharing&ouid=104916860779288014213&rtpof=true&sd=true

Appendix F: Categorization of Participants

The names and explanations of each teacher group that are shown on the GenAI taxonomy are as follows:

Innovators: Innovators represent the first group of teachers who immediately adopt the use of GenAI in their classroom practices compared to the other colleagues around them. These teachers have a high perception of the usefulness of GenAI in education and they also use it quite a lot in their teaching.

Early Adopters: Early Adopters are the second group of teachers who adopt and use GenAI in their teaching practices. Unlike Innovators, these teachers would first like to see some other colleagues test out the innovation before they actually use it in their own classrooms. Nevertheless, they also perceive GenAI as highly useful in education and implement it broadly in their classroom practices.

Early Majority: Early Majority is the group of teachers who highly perceive the use of GenAI in education but will not use it that much when it comes to their own teaching. Therefore, this group of teachers are placed high on the perceived usefulness of GenAI in education but are expected to be relatively low on their GenAI use behavior on the taxonomy.

Laggards: Laggards represent the group of teachers who have a low perception of the use of GenAI in education. Consequently, these teachers do not highly incorporate GenAI in their classroom practices. In short, these teachers hardly adopt and use new innovations since they do not see the value in changing their traditional techniques.

Reluctant Users: Reluctant Users are the last group of teachers who highly use GenAI in their daily practices that are outside of teaching such as translating texts/books, planning vacations, and searching topics of personal interest with GenAI tools. Therefore, these teachers are still high on their use of GenAI but they have low perceptions about the use of GenAI in the field of education since they are using it for personal interests that do not fall under their teaching practices. Reluctant Users is not explicitly identified in Rogers' Diffusion of Innovation Model as an adopter group, yet it has been incorporated into our GenAI taxonomy because similar to Laggards, they perceive the value of using GenAI in education as quite low (Rogers, 1962, as cited in Miller, 2015), and this can prompt a further investigation within this thesis to see what influences Reluctant Users (future) acceptance or resistance to GenAI in this specific educational context.

In the **transitioning group between "Laggards" and "Early Majority**," participants exhibited low usage rates of GenAI. While recognizing its potential in education, they maintained a degree of skepticism. Their fluctuating view on GenAI's usefulness in education, driven by their skepticism, manifests in a dual-directional shift in perception. To encapsulate this dynamic, an ellipse shape is employed to represent the variability in their stance.

The **transitioning group between "Reluctant Users" and "Early Adopters"** consists of participants with a high frequency of GenAI usage, predominantly in daily life. On the other hand, their growing recognition of GenAI's value in education is reflected by their intermediate positioning on GenAI's usefulness in education which still includes a critical stance towards its use due to ethical concerns such as academic integrity. To capture this dynamic in teachers' perceptions about the usefulness of GenAI in education, an ellipse shape is also employed to illustrate the two-sided variability in their perceptions.

In the **transitioning group between "Early Majority" and "Early Adopters,"** participants recognized GenAI's significance in education but were still increasing their usage day by day. They were on the verge of transitioning to higher usage levels, so they were in between with regard to their GenAI use. Therefore, this transition group was depicted with an arrow shape to symbolize the gradual increase from low to high usage of GenAI.

Finally, in the **transitioning group between "Laggards" and "Reluctant Users,"** participants started to utilize GenAI gradually, foreseeing even more increased usage possibly in the future due to its perceived value in daily life rather than in educational settings. This transitioning group was also illustrated with an arrow shape to reflect their increasing use of GenAI.

The **"Opponents"** group comprised individuals who had never used GenAI and did not see its value in education.

Conversely, the "**Wonderers**" group acknowledged the high value of GenAI in education, expressing eagerness and curiosity to integrate it into educational settings.

Between the "Opponents" and "Wonderers" groups, we identified a transitioning group. This group included participants who, despite never using GenAI, showed curiosity for potential future integration and recognized its value in education, while requiring some support to learn more about GenAI and to get rid of their skepticism about it. To represent this dual fluctuation in teachers' perceptions of GenAI's educational usefulness, an ellipse shape is also used to depict the variability in their views.

Dutch Participants	GenAI Taxonomy Category	Perception About GenAI (Quotes from the Interview Transcripts about Perceived Usefulness of GenAI)	Use (Answer from the survey)
Participant 1	Early Majority	• Will use it more in the future. • Very critical towards the reliability of the information provided bij a GenAI tool. • She finds it particularly useful in education because it is very efficient. *“I'll definitely expand that.”* *“Is it true or is it not true? They can also start creating things that are not possible in reality.”* *“It is very efficient and it works fast.”*	Somewhat familiar (low in use)
Participant 2	Early Majority	• Intend to use it more in the future. • She sees it primarily as added value in supporting her in her role as a teacher.	Somewhat familiar (used GenAI, especially as a

		"It's more likely that I'll use it more in the future." *"I find it very useful that ChatGPT develops your lesson plans, allowing AI to add more depth to the lessons. I can't do this for 20 students."*	search engine. e.g. ChatGPT)
Participant 3	Early Adopter	• The participant is not that anxious (ethical issues, reliability,...). • The participant says it supports teachers really well. *"I'm going to continue to use."* *"Perhaps there are indeed ethical implications, but just like with many other things on the internet, it ultimately depends on the user."* *"It is very practical. I notice that certain tasks my colleagues and I used to spend a lot of time on, like creating evaluation matrices, are now done much faster. What impresses me most about generative AI is the fact that it creates something better than what I could have done on my own."*	Extremely familiar (uses GenAI almost every day)
Participant 4	Early Majority	• Open and positive attitude to use it more in the future. • A bit scared how far it will go. *"I am absolutely willing to invest the necessary time and energy into it and to further find my way in it."* *"And I also want to learn more about it. But at the moment, I am not being offered any support."* *"I'm afraid that at some point it might go too far, and we'll end up experiencing the downsides of it.* *There's also the fear of the unknown."*	Somewhat familiar (low in use because the participant teaches a practical course, not a theoretical one)

Participant 5	Early Majority	• Will use it more in the future thanks to the positive experience with it. • Thinks that it seems very usefull *"I think that it's actually very valuable. Especially what I just mentioned about always drawing inspiration to keep doing something fun."* *"I'm going to use it more in the future because I've seen from a colleague, who has demonstrated it before, that it actually offers many possibilities."*	Somewhat familiar (used GenAI a couple of times before)
Participant 6	Transitioning (Early Majority-Laggards)	• She is willing to keep using it. • She thinks it's efficient in gaining more time to do other things. • The participant is a little bit sceptical. *"I'll use it more, because it is the future."* *"Rather positive, but also cautious because I know too little about it."* *"Creativity in terms of providing extra exercises or trying a different approach or method. But also in terms of efficiency, where you save time—perhaps more than anything else."*	Somewhat familiar (low in use)
Participant 7	"Transitioning" from Laggards to Early Majority	• Wants to use it more if she receives assistance. • The participant thinks it is not that easy in use. • The participant finds it valuable to enhance and support the learning opportunities for students. *"I'm open to learn more about it if there is an additional training to follow."* *"I still don't find it easy. Definitely not."*	Somewhat familiar (low in use)

		"For some students, it would be really beneficial to have such a tool. Their language skills aren't always that strong, and so on."	
Participant 8	Innovator	• Will keep using it because he thinks it's really usefull. • Is really trained in using it. Uses it a lot. • thinks it is very valuable. . *"I am willing to put more effort into it in the future to explore it further."* *"Yes, it's very valuable because you can actually think of it as a sort of helper. It's like brainstorming with two people, and that second partner you're brainstorming with is just constantly available, so that's the biggest advantage. I would almost be unable to work without it now."*	Extremely familiar (started to use GenAI very early and uses it both in personal & professional life)
Participant 9	Innovator	• He's willing to continue using it. Because he knows how to work with it and it is really efficient for him. *"I want to continue using it in the future because it can provide extremely valuable input."*	Extremely familiar (started to use GenAI very early - i.e. first versions of GPT in 2018 - and uses it both in personal & professional life)
Participant 10	Enthusiast	• Will use it in the future more, but only if he gets more help from the school. • Thinks it is useful. Especially in teaching efficiency. *"Once I dive deeper into it and have broader knowledge about it, I'm convinced it can be a huge asset. But only if I can familiarize myself with it more and receive support in doing so."* *"I strongly trust that I would adapt to working with it because I believe that's part of the job as a teacher—adapting to different things."*	Not familiar at all (never used it)

		"I do believe that this could be something that will save us a lot of time."	
English Participants	**GenAI Taxonomy Category**	**Perception About GenAI (Quotes from the Interview Transcripts about Perceived Usefulness of GenAI)**	**Use of GenAI Tools (Answer from the survey)**
Participant 11	Early Majority	• Perceives it useful as an assistant and to make the classroom activities more attractive for the students. *"I think that AI will be helpful as an assistant, that AI will be, uh, good to provide you with, uh, help during your lesson to make, uh, certain, uh, things more engaging, uh, that you can use it to your advantage as a teacher and as students."* *" Yeah, but it's not that I'm, I'm I'm asking my ChatGPT to create a whole lesson for me. I usually, yeah, it's for an exercise or to, for an introduction or, um, well, to ask for a summary about, uh, for German... It's just a support."*	Somewhat familiar (low in use)
Participant 12	Opponent	• Very critical towards it (reliability, accuracy, damaging learning experiences, etc.) • Perception; doubtful • Attitude; critical *"But, um, I'm not really a fan of, um, Generative AI"* *"...critical about the, um, assessment part. Um, I think it would be more easy for a student to, um. Well, cheat. Yeah."* *"Where does the support stop and where does it take over the thinking process? Okay. Um, so. Uh, we still want, I think our students to, well, think, uh, for and by themselves… I'm afraid that it will, um. Almost entirely take over the, uh, the student and study process."*	Not familiar at all (never used it)

		"Of course, students always have to be careful, um, what they see, how they use it…If you ask, uh, GenAI to write something about, uh, a celebrity, for instance. Well, it will give an entire story or information about that person and, um. Maybe also information that it's not true. Yeah. So that is something to be, um, well to be careful about."	
Participant 13	"Transitioning" from Laggards to Early Majority	• Perceives it somewhat useful in certain educational aspects such as finding classroom activity ideas (not for him but in an ideal world for the teachers) • Doesn't trust in the reliability of the results the GenAI tool provides due to the quality of its resources • Whenever he makes a good comment about GenAI or its tools, he mostly follows his comments with a critical point of view. So, he looks towards both ends of PU → is in the middle of PU. *"Well, to draw up lessons. It can be useful… Then it's a tool for the teacher that can help because uh, you can ask ChatGPT to change the level of the texts. So that might be helpful… On the other hand, it might make my work more difficult. When you consider teaching pupils how to write a good text, or how to properly read a text, that might make it more difficult."* *"Even if I use that as a search engine, I don't know what the sources are. I don't know how, um, reliable they are. Um, so even for that, I have, I have my, um, reserves… It uses, um, texts and sources that it finds on the Internet… The veracity of the sources gets less and less clear… When it comes to generating text without having a clear view of what sources are and yeah that. It's it's a bit problem for me."*	Somewhat familiar (only uses it as a search engine)

		"I can imagine that in some cases it can help me because it may, um, give me more time to, to focus on, on other things and certain things. But on the other hand, it might make my work more difficult. When you consider teaching pupils how to write a good text, or how to properly read a text, that might make it more difficult. Um. So. Balancing on two sides there."	
Participant 14	Early Adopter	• Sees mostly the good value in using GenAI tools to support education while being aware of its downsides and trying to take precautions towards them (like trying some AI checkers for assignment similarity or looking for additional resources) • Uses the GenAI tools (and perceives them) as "assistant" while teaching--> very close proximity with the tools. *"I think, uh, not just ChatGPT, but AI, in general, can be, uh, a tool that we can use as a teacher, but also as, uh, as for the pupils themselves, um, all the ways that it can be used… Uh, so I think it's promising for, uh, both the teachers and the pupils."* *"Concerns and anxieties? Not really. As I said, uh, in my work I use it only for, uh, creating texts, etc… The fact that the students can use it at this point in the same way, or even better than I can, is something that perhaps concerns me… [c]reating the book report itself. So that's maybe a concern that I have, that it's difficult to check whether or not it is created by ChatGPT (i.e. students used ChatGPT to create the text)"* ↳ (The teacher mentioned employing an AI checker to manage this situation, although there was some uncertainty regarding the tool's effectiveness in detecting AI-generated text. Nevertheless, his awareness of these factors and his proactive approach to regulating the use of generative AI highlight a positive	Uses it regularly (high in use)

		perspective towards the integration of GenAI in education.) *"For me, it's (i.e. GenAI tools like ChatGPT) a tool to find general information or, uh, create things or, uh, if you need some specific ideas and you don't have a lot of time. That's why I use it (i.e. ChatGPT), to provide me with ideas, um, if I need it, if I need to write a text and it needs to meet some requirements, then it's easy to put those requirements in ChatGPT. And then it gives me a text that I can use, but I'll always check, uh, what it provides just to make sure that there are not any mistakes."* *"Sometimes when I use it as a search engine, I will always try to check it in a way to check the information, uh, that it gave me. Um, but when I really need to use like specific information, specific data that I will always find other sources because ChatGPT gives you information, but not the source."* *"I use it as an assistant to create these texts that, uh, when I want to create my own materials. So I think it has some good value."* *"I don't yet know if I'm going to start using it more than I am just now, but I think that it's very helpful, uh, to use it… And I am going to keep on using it and explore more."*	
Participant 15	Early Majority	• Uses it mainly as a search engine to quickly look up some things when needed • PU high! (Recognizes the future potential/value of GenAI in education) *"For the moment, like, um, I'm not using it so much yet, so, uh, so not really valuable, but I think it will be very valuable in the future…But in theory, it's all super nice for your teaching because you can check*	Somewhat familiar (low in use)

		some new ideas or sports techniques or so to teach your students. Yeah. But in real life it still have to find a way to make it all smooth." *"...Definitely super valuable. It's like a win-win because you make your lessons faster because of the AI, and then you can get a better quality of learning experience, like teaching because you can focus on the grades or something else related to each learner, or do some differentiation between the students and stuff…"* *"I still do have a positive attitude towards the use of it, I am not against it, yeah. Even though I don't use it so much."* *"I'm gonna try to use it as much as I can in the future. Yeah, but, uh, I think it's going to be with trial and error how it's going to go… For the preparation, I will still keep using it and maybe use it more and more to find some more different exercises… For the feedback and stuff maybe, yeah, to find some pointers. But I think, in real life, it's going to be harder with the sports because the feedback is personal and you actually need to watch students, how they do the body exercise and then give feedback, but in general, for sure because to like to keep, yeah, renewing the lessons and maybe, like, to find new tips or new exercises or even better techniques."*	
Participant 16	Transitioning (Opponent to Enthusiasts)	• Never used it • PU → sees the potential • But described their perception towards GenAI in one word with "Fear" → we should be careful towards the ethical use. • Says might be valuable and useful in teaching efficiency and learning experiences if the quality of the GenAI tools is high (conditional) *"Fear… So we see the potential, but we are also afraid of what is going on, uh,*	Not familiar at all (never used it)

		because we are afraid that some of some very important skills will become underdeveloped, uh, because students rely on ChatGPT already… I don't want them to become too lazy or reliant on ChatGPT. I'd like to create, of course, creative thinkers and, um, also critical thinkers. And I'm very afraid that ChatGPT, uh, will take over these jobs." *"So we see the potential, but we are also afraid of what is going on, uh, because we are afraid that some of some very important skills will become underdeveloped, uh, because students rely on ChatGPT already… Also, I really want to know where the information comes from. Uh, because it can be very misleading… And if I can't see what the sources are and where the information comes from, uh, I don't wouldn't like to use it (GenAI) in my lesson"* *"It (GenAI/ChatGPT) might be a threat, uh, but, uh, if we can implement it correctly and in a useful and modest way, uh, I think I see some advantages too. But again, okay, I'm looking for some guidelines or some help."* *"So I'm a bit anxious, of course, uh, a little bit afraid. But in the end, I think it will be okay. And, uh, there's no real reason to really worry. Uh, if we get guided and if we get trained, uh, to cope with this new reality. Because I do believe that it's a new reality."* *"The teaching efficiency. I do believe in that… Yeah, I would be in favor and I would appreciate this kind of help, but it all depends on the quality, of course. Uh, so I've experimented with it, and I see that it's sometimes still makes mistakes. But I think that these programs are progressing also very fast. So in the near future they will be close to perfect and then they can be certainly a great help."*	

Participant 17	Transitioning from Laggards to Early Majority:	• Skeptical about the 'Perceived Usefulness'. • In general, believes that it can be valuable (especially for efficiency) but is also very skeptical about its (GenAI tool's) quality, and how real what the tool provides can be → mentioned this as a factor keeping her away from using GenAI more. *"I am very pro especially about its' efficiency in use…But also skeptical because of the fair evaluation problem that I mentioned to you in the case of Thibaut who used ChatGPT to write his motivation text for Erasmus exchange."* *"For me, I think it's a good tool… Um, like a teacher, they say, oh, you have a lot of holidays, huh? Okay. Yes. But we have to prepare our things also in advance. It's not only teaching, it's working in advance. How do I organize the things? If ChatGPT can help me with my preparations and meetings, oh, I would love it… I can see it more like an assistant."* *"The only concern I have is how are we going to evaluate this fairly, the outcomes of students who do their tasks by using GenAI?.. Yeah, that they use the easy way that that it is, um, the quickest, the easiest way."* *"I'm concerned about that part. Is ChatGPT 100% correct?"* *"...but it (the use of GenAI) still gives me a lot of questions like is it real, does the student understand, etc."*	Low in use (only used it 1-2 times before)
Participant 18	Laggard	• A lot critical • Never trust GenAI alone, always combine it with other sources and techniques--> "old fashioned teacher" who doesn't perceive it useful quite easily and trust what it produces	Somewhat familiar (low in use)

		• For the questions under PU, she always highlighted the critical aspects • Will use it more in the future not because of PU (Perceived Usefulness) but thanks to PEOU (Perceived Ease of Use) *"I use it as a tool but it's not the only source. No no, I've got lots of sources but it's more a support. Nothing else. Nothing else."* *"I'm an old-fashioned one. And I still prefer books but then AI use. I have no problem with that if it's combined with other sources like the information in the books…AI never mentions their resources. The information they give changes a lot."* *"… You know, it's a tool that will help you. But you have to be very cautious about that tool. That's why uh I'm confident. Yeah, I teach history and I always tell my students to pay attention. Uh, so that's why I'll be confident I think."* *"They have to be very critical about it. They never copy. Because when they copy uh it's. Yeah. Yeah. What's that in English, plagiarism and that's a big ethical problem… I am very concerned about the ethical aspect because I gave you an example. Uh, pupils had to write down a personal view. And what do they do? They use AI but that's no longer personal. If you use AI for that reason, that's a huge problem."* *"I will use it more, I think, because it's, uh, it's it's easy (to use). Um, look, if you have to, for example, for translation of texts, it's very easy."*	
Participant 19	Innovator	• Perceives it highly useful (PU high!) • Also, doesn't have many concerns specific to GenAI tools, viewing them as part of broader	Very high in use (extremely familiar; uses

		technological issues. Holds users of these GenAI tools more accountable than the tools themselves, seeing no unique concerns compared to the internet or other initial technological innovations. • Is the first one who used GenAI (ChatGPT) at the school where this participant is currently working. *"Very valuable. Um, I feel that if used correctly, then it can add extra depth to all the communication that you do with students and parents without adding extra workloads… Generating software will sort of assist in providing the work and the teacher will be more of behind the joystick… ChatGPT is actually my assistant explaining things... I think that would be an enormous benefit for a whole classroom if we could sort of move those tasks of repetitive teaching to AI and the teacher will do the the much more fun tasks."* *"I'm looking forward to, as I said before, to have (AI) software to take over the basic learning experience and me being able to do much more work, one one-on-one, on individual learning, experiences for students. So I think it's only going to impact if, as a teacher, we're open to using it…I think it's going to enhance our job and make it much more challenging instead of having to explain the same thing over and over again. We will just that the basics will be taking over… I think if we use it correctly it will make the job of a teacher more interesting and more challenging."* *"I don't think I would be very concerned, but we'd have to use discretion and we'd have to think about the extent that we're using it. But if used correctly, then I would be fine with it… We now have teachers as well who will give a student the assignment and just sit at their desk and grade papers. And you have teachers that give assignments and walk around in class and*	GenAI almost every day)

		interact with students. So my answer, it's the same as it was for a lot of the other questions. It's not that different from the way it was before. And you will have both teachers, the ones that are using it (ChatGPT) to enhance the interaction and the ones that will use it to replace the interaction." *"Not really concerned. I do know that it's far from accurate all of the time, but I think that's a benefit actually because it forces you to be very critical about the answer and you have to read through it. And, um. I don't know if it's for all the subjects, but if it's math related, um, ChatGPT makes quite a lot of, uh, errors. But that's okay because you can still work through it and you can provide feedback and say, well, um, thank you for your answer, but that is actually not the correct formula. You should use this and then, uh, and that's, that's a learning process in itself… So, yes, it's far from accurate, but it's not really a concern because I actually use that inaccuracy to teach students how to use ChatGPT… It doesn't really matter that it's not always correct because people aren't always correct either."* *"I don't think that. Well, obviously there will be students that will use it to have it do their work for them. But it's not very different from the way it is now because we already have a lot available for students who don't want to do the work. So I don't think that is going to be any different…Because it's just a different tool. And, the problem is not in students having the possibility to copy-paste or to infringe upon, author's rights. It's that we have to teach students that they are doing their work and that the education is for their benefit."* *"I think I was the first to use it in my school because of curiosity and because I liked it."*	

Participant 20	Early Majority	• Perceives it useful • Admits that it's (GenAI tools like ChatGPT) not perfect and makes mistakes "in sciences" like physics but even sees these mistakes as learning opportunities for students so PU in edu is high in the end! • Regarding the problems and concerns like plagiarism etc. with the tools --> says that it was already happening and was an issue so doesn't specifically blame the GenAI tools and says we should trust our students so that they can learn it better by 'trial & error'. *"I mostly perceive it (GenAI tools like ChatGPT) as valuable and useful because it exists. And I think students should be aware it exists. They can use it, but it's not always perfect. So they have to be aware of the flaws and the way how to work with it. Okay, but they need to know it. It works and how it works, to teach this is on us, uh, is put on our teaching."* *"Another thing it could help to would be to differentiate in your teaching, differentiating uh to your students. Their capacities are different. So you can challenge the stronger ones or you can aid better the weaker ones. So I think I think it can help with differentiation in classroom activities, uh, uh, and with a lot of activities provided to you by GenAI in a short time."* *"I have no objections to it (GenAI). I think, uh, I look upon it as a challenge. An interesting challenge. Uh, something I want to try and maybe, uh, find cool applications for… I still look upon it (GenAI) as a tool, a very efficient tool - simulated thing. Yeah. But, uh, it can only do that with what we, uh, give them to it."* *"In the first place, for my personal case, again, uh, like physics, I'm not afraid for, uh, misuse or something, uh, ethical that*	Somewhat familiar (only used on a couple of occasions for classroom activities)

		would bother me… Uh, so did they write it themselves or not? Um, but again, that's - in fact - the same problem that always existed. Students before could also find, uh, on the Internet information which wasn't from them. So, yeah, plagiarism. The only thing is, now it's more difficult to check if it's plagiarism. For us, so it's just, uh, it's not another problem. It's like, uh, the practical implications are more difficult." *"Like I said, uh, the for exact sciences, it can be right, but it can be completely off sometimes. And it's easy to see that because it just doesn't make sense for the makes of it. Yeah. Um, so that's I don't think that's a real concern. It's something just to watch out for and that is why there is still not, uh, why we still need a teacher… I think it will impact it (our job). Yeah, maybe I already said it. You need to be very alert of, all the information. You have to have a good knowledge of the background of the course you're giving."* *"... a little bit like, they (students) have to know, uh, like I already said, uh, what are the possible, mistakes it can make or the possible pitfalls it has to look out. You have to look out for, so it's a learning experience too because they (GenAI tools) exist and they (students) can use it… I think there will be, uh, interesting possibilities in learning. But, uh, we are only scratching the surface at this moment, so we need to continue our research all together and learn more about GenAI… We have to be very careful, uh, in the way we approach it. Yeah, because it can make mistakes. And then students learn mistakes and sometimes it's more difficult to unlearn a mistake than to learn something new. So I think it's a long process. Uh, it's a long journey ahead to discover all the possibilities in that field. Uh, but it's for everything. Yeah, uh, in all fields of education…"*	