PARENTS' VIEWS ON THE USE OF AI-BASED CHATBOTS SUCH AS CHATGPT IN HIGH SCHOOL (STEM) EDUCATION

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Introduction

As digital technology becomes increasingly available in education, educational researchers around the globe increasingly have to confront how it may affect school students' academic success. With the emergence of generative Artificial Intelligence (AI) and AI-based chatbots—especially ChatGPT—this issue has attracted even more attention (Lo, 2023), particularly in Science, Technology, Engineering, and Mathematics (STEM) education research (e.g., Bitzenbauer, 2023; Cooper, 2023; Nasution, 2023; Vasconcelos & dos Santos, 2023; Zhai, 2023). For example, within the last 12 months, educational researchers around the globe have investigated the academic and media discourse on the use of AI-based chatbots in educational settings (e.g., Fowler et al. 2023; Jarrah et al., 2023), assessed the quality of responses generated by such chatbots (e.g., Cooper, 2023; de Winter, 2023; Frieder et al., 2023; Nasution, 2023), and explored whether and to which extent classroom activities that incorporate the use of AI-based chatbots may benefit teaching and learning processes (e.g., Baidoo-Anu & Owusu Ansah, 2023; Bitzenbauer, 2023; Imran & Almusharraf, 2023; Vasconcelos & dos Santos, 2023; Zhai, 2023). However, aside from the results of some rather holistic opinion polls (e.g., Hartley, 2023; Vodafone Foundation Germany, 2023), hardly any research has assessed parents' views on the use of AI-based chatbots in high school education, especially when it comes to STEM education.

Numerous studies have provided evidence that parents have a decisive impact—presumably even the most decisive impact—on their children's educational outcomes and influence children's academic performance and attitudes through their support, beliefs, and expectations (e.g., Ceka & Murati, 2016; Fan & Chen, 2001; Hill & Tyson, 2009; Ma, 2001). Notably, parents' impact also extends to the use of digital technology in high school education, since several studies have verified that parents crucially shape their children's perceptions of digital technology (e.g., Kong et al., 2019; Kotrla Topić et al., 2020; Ortiz et al., 2011). This is especially the case when parents themselves hold positive views regarding digital educational technology; their children also tend to view digital educational technology in the same way (Ortiz et al., 2011). This, in turn, reinforces the need to understand parents as important stakeholders in educational systems when considering the expansion and ongoing implementation of digital technology in high school education (Maxwell et al., 2021). Therefore, the aim of the present editorial is to provide some initial insights into parents' views on the use of AI-based chatbots, such as ChatGPT, in high school (STEM) education and to offer some suggestions for forthcoming research.

Parents' Views on the Use of AI-Based Chatbots Such as ChatGPT in High School (STEM) Education

To this end, I conducted an exploratory survey with a convenience sample of parents from around the globe. This survey was an anonymous and voluntary online questionnaire administered via SurveySwap (www.surveyswap.io). The sample I surveyed consisted of 73 parents, and the survey was conducted between May and September 2023. Female participants constituted the majority (65.8%), followed by males (31.5%), and a small percentage identified as neither female nor male (2.7%). Geographically, the surveyed parents predominantly hailed from Europe (76.7%), with fewer from Central, North, and South America (12.3%), Asia (6.9%), Africa (2.7%), and Oceania (1.4%). To assess participants' views on the use of AI-based chatbots in high school (STEM) education, I implemented three scales based on adapted versions of items developed by Maxwell et al. (2021) (response format: 1 = strongly disagree to 5 = strongly agree). These three scales (see Figure 1) captured the extent to which participants held a positive stance toward the use of AI-based chatbots such as ChatGPT in high school education in general ($M = 3.05$, $SD = 0.80$, $\alpha_{Cronbach} = 0.82$, $glb = 0.89$, number of items = 5), the extent to which they held a negative stance toward such use of AI-based chatbots ($M = 2.72$, $SD = 1.04$, $\alpha_{Cronbach} = .79$, $glb = 0.80$, number of items = 3), and participants' stance toward the use of such chatbots in high school STEM education ($M = 3.55$, $SD = 0.83$, $\alpha_{Cronbach} = .68$, $glb = 0.70$, number of items = 3). Moreover, using single-item measures, I asked participants how often they used AI-based chatbots such as ChatGPT themselves (response format: 1 = never, 2 = once, 3 = occasionally, 4 = frequently; $M = 2.70$, $SD = 1.05$) and how they would rate their own knowledge about AI-based chatbots (response format: 1 = very poor to 10 = excellent; $M = 5.27$, $SD = 2.39$).

Figure 1
Participants' Response Behavior Across the Three Scales for Assessing Parents' Views on the Use of ChatGPT in High School Education
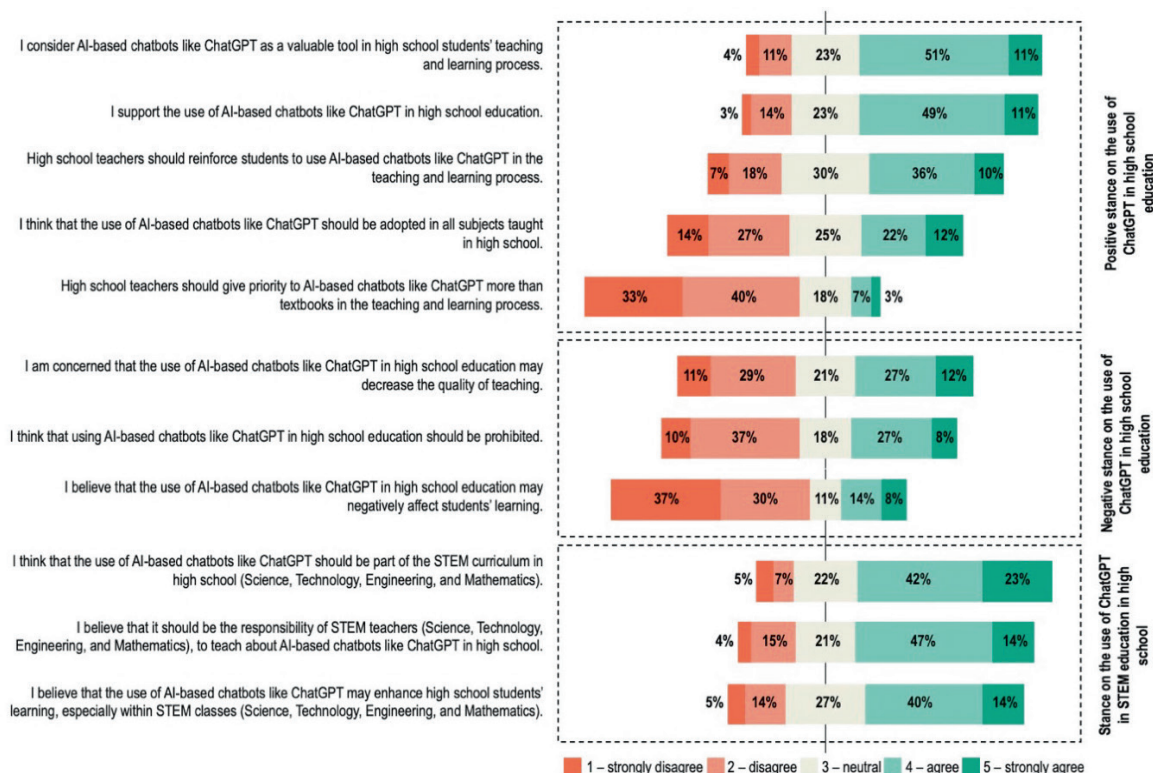

Figure 1 summarizes participants' response behaviors across the three scales used to assess parents' views on the use of AI-based chatbots such as ChatGPT in high school education. To begin with, the participants' responses to the items that explicitly addressed STEM education revealed a consistently positive stance toward the use of AI-based chatbots in this regard. A clear majority of the participants believed that the use of such chatbots may

enhance high school students' learning, especially within STEM classes (54%). Furthermore, they (strongly) agreed that the use of such chatbots should be part of the STEM curriculum in high school (65%), and they (strongly) agreed that it should be the responsibility of STEM teachers to teach about AI-based chatbots such as ChatGPT in high school (61%).

However, the participants' response behaviors across the two scales that addressed the use of AI-based chatbots, such as ChatGPT in high school education, in general, revealed a rather heterogeneous pattern. On the one hand, a clear majority of the participants did not believe that the use of such chatbots in high school education may negatively affect students' learning (67%), supported the use of such chatbots in high school education in general (60%)—but at the same time thought that high school teachers should not prioritize them over textbooks (73%)—and considered AI-based chatbots to be a valuable tool for high school teaching and learning (62%). On the other hand, participants' responses to four items did not indicate a clear majority or consensus in their views on the use of AI-based chatbots such as ChatGPT in high school education. Instead, participants' views seemed divided as to whether the use of such chatbots may decrease the quality of high school teaching (39% [strongly] agree; 40% [strongly] disagree), whether the use of such chatbots should be adopted in all subjects taught in high school (34% [strongly] agree; 41% [strongly] disagree), whether high school teachers should reinforce their students' use of such chatbots (46% [strongly] agree; 25% [strongly] disagree), and finally, whether the use of AI-based chatbots in high school education should be prohibited (35% [strongly] agree; 47% [strongly] disagree).

Table 1

Pearson/Point-Biserial Correlations with Participants' Background Information

Variable	Pearson/Point-Biserial Correlation		
	Positive	**Negative**	**STEM**
Gender identification (dichotomized: 1 = female; 2 = non-female)	−.04	.01	.08
Geographical origin (dichotomized: 1 = European; 2 = non-European)	−.25*	.27*	−.16
Own use of AI-based chatbots such as ChatGPT (self-evaluation)	.17	−.09	.21°
Own knowledge of AI-based chatbots such as ChatGPT (self-evaluation)	.23*	−.20°	.38***

Note. Positive = positive stance on the use of ChatGPT in high school education; Negative = negative stance on the use of ChatGPT in high school education; STEM = stance on the use of ChatGPT in STEM education in high school; ° $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

In addition to the above, a correlation analysis based on the three scales for assessing parents' views on the use of AI-based chatbots such as ChatGPT in high school education and participants' background information yielded some remarkable patterns (see Table 1). Specifically, this analysis revealed significant correlations between participants' geographical origin (European/non-European) and their views on the use of AI-based chatbots such as ChatGPT in high school education in general, as well as between their views on the use of such chatbots in high school (STEM) education and their self-evaluated knowledge of AI-based chatbots. Regarding participants' gender identification and their own use of AI-based chatbots, (narrowly) no significant correlations emerged.

Outlook

To summarize, the survey I conducted revealed that parents generally hold a positive view of integrating AI-based chatbots such as ChatGPT into high school STEM education, with most believing it enhances learning and should be part of the STEM curriculum. However, the participants' views diverged on the broader use of such chatbots in high school education, with mixed stances on their impact and adoption in all high school subjects. Moreover, a correlation analysis revealed links between participants' views on the use of AI-based chatbots in high school education and their geographical origin, as well as their self-evaluated knowledge about the use of such chatbots.

Given that the survey I presented in this editorial was exploratory and the convenience sample was rather small, the results are clearly not generalizable, especially since, for example, parents from Europe and female parents were heavily over-represented. Instead, the results of this survey should be seen as initial insights into parents' views on the use of ChatGPT in high school (STEM) education, which may motivate future educational research. To suggest only a few examples, based on these initial insights, future research could conduct investigations on the following:

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- Whether the response patterns and correlations detailed above may also occur or substantially differ within larger and more robust samples of parents,
- Whether additional background information (e.g., parents' vocational background or level of education) also correlates with parents' views on the use of AI-based chatbots such as ChatGPT in high school education,
- Potential causes of the response patterns and correlations detailed above, if they can be replicated within future studies,
- Whether parents' views on the use of AI-based chatbots such as ChatGPT in high school (STEM) education may change over time as generative AI and AI-based chatbots become more and more commonplace, or
- What specific concerns and expectations do parents have regarding the use of ChatGPT in high school (STEM) education (e.g., via in-depth interviews), especially when it comes to the role of STEM teachers in this regard?

To conclude, the use and potential benefits of AI-based chatbots such as ChatGPT within high school (STEM) education is a novel area of educational research with a broad variety of research gaps. To the best of my knowledge, this is especially true when it comes to parents' views in this regard. Therefore, it is plausible to assume that delving into an in-depth inquiry of parents' attitudes, perspectives, and concerns about the use of such chatbots in educational settings would substantially contribute to bridging some crucial voids in our understanding of the overall impact of these digital technologies on high school (STEM) education and thus may be a particularly promising area for future research.

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