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Opening education through emerging technology: What are the prospects? Public perceptions of Artificial Intelligence and Virtual Reality in the classroom

Education technology (Edtech) is a nine-billion-dollar market in the United States (Millward, 2019). In 2018 alone, nearly 1.5 dollars were raised for new Edtech investments (Wan, 2019), and a recent marketing research report predicts that Artificial Intelligence specifically will grow almost 50 per cent by 2022 (TechNavio, 2018). Similar optimism is seen for Virtual Reality (VR, which for our purposes also includes augmented reality technology) on the educational front (Radianti, Majchrzak, Fromm & Wohlgenannt, 2020). The booming market betrays an optimism for Edtech's potential to transform education and learning outcomes. Some look to AI's capacity for pattern recognition to more individually customize learning plans (Levesque, 2018); some predict that AI-driven initiatives can expand opportunities for underserved student populations (Allen, 2019); some even characterize the integration of emerging technologies like AI and Virtual Reality (VR) as a national imperative for remaining relevant and competitive in the 21st Century (Allen, 2019).

There is also the notion that Edtech may open up opportunities for more visual engagement with material parity across educational contexts (Allen, 2019). Research has found that school districts' socioeconomic level is a strong predictor of one academic indicator, test scores (Reardon, Kalogrides, & Shores, 2019). Some have proposed VR as one way to try to close this income-achievement gap. Experiences like field trips or museum visits – costly and rare for lower-income districts – could take place virtually for students, so they are still exposed to rich and varied ideas and cultures (Sato, 2018). AI-driven technology has also opened up "global classrooms" with an automatic translation that enables anyone's participation (Marr, 2018). VR- and AI-enabled classrooms could also improve access for those with disabilities or illnesses and allow students to take classes that otherwise aren't offered in their brick-and-mortar school (Marr, 2018).

Yet, when school systems invest in Edtech, technology is not always widely adopted by individual educators or learners (Stanhope & Rectanus, 2016). Where does this resistance come from? Perceptions of technology may play a role. As school districts and governments (and ultimately, taxpayers) invest so heavily in the next "revolution" in education (Roll & Wylie, 2016), designers, developers, innovators, creative designers, educational researchers need to better understand the public's view of these technologies and how they might encourage adoption. Procurement is one thing, but for a successful implementation, Edtech needs buy-in not just from investors and administrators but from the end-users as well: teachers, students, and their communities. The flood of investment in Edtech indicates real promise for its diffusion. Yet, less is known about the public's view of technology's role in education, which can be important information for system designers, program planners, and policymakers. This study, therefore, explores public perceptions of emerging technology – AI and VR, specifically – in education.

Perspective on Edtech: Uses emerge

AI in education

A review of research shows several trends for AI as applied to education. AI is taking on more roles and accomplishing more tasks in education; AI is expanding the scenarios of teaching, tutoring, and learning; it is making education more accessible, mitigating barriers of distance, language, cost, and physical limitations providing solutions to special needs; it is covering more domains and disciplines, all proven a certain degree of effectiveness; and it leads to more customized, personalized, and individualized learning process. It is not yet clear what AIED's trajectory is. Roll and Wylie (2016) suggest that AIED could either evolve gradually, as it is carefully integrated into the existing teaching-learning system, or it could take a revolutionary approach and drastically transform the current landscape of education in its implementation. Public opinion, in the form of both stakeholders and the larger public, may have an influence on this process, though current research is primarily focused on AIED application and improvement.

VR in education

The conceptualization of Virtual Reality (VR) technology has changed throughout its history; what has remained consistent is the aim for experiences that transcend time, place, and physical limitations. The term "virtual reality" was first mentioned in the 60s (Freina & Ott, 2015) and has continued to evolve. With the advance of supporting hardware, VR technologies currently can be classified into immersive, semi-immersive and non-immersive, based on the degree of immersion a specific VR technology can provide (Martín-Gutiérrez, Mora, Añorbe-Díaz & González-Marrero, 2017).

VR can take many technological forms, and most studies on VR in education remain focused on specific technologies, examining them type-by-type or in some combination. Few studies have explored public opinion about employing VR in educational settings, which we also found with studies in AI in education. Thus, for both emerging technologies, which are examples of Edtech's present and future instantiations, less is known about how the public perceives or understands these technologies. Widely adopting such technologies in classrooms could lead to vastly divided or even opposite opinions on the topics that are currently being discussed and examined, mostly within confined, experimental settings.

Perspective on Edtech: Uses emerge

Given the substantial investments required for Edtech, the importance of local control of school policies and budgets in the US and the crucial role of parental involvement in education, the public's perspectives may be influential if not decisive in the ultimate trajectory of AI and VR in the classroom. Based on these and the above considerations, this study is a step in understanding how Edtech may be perceived on a broader, general level and also generating relevant research questions:

- RQ1: What are public perceptions of Virtual Reality (a) and Artificial Intelligence (b) in education?
- RQ2: What individual factors contribute to perceptions of VR and AI in education?

Method

Design and sample

This study employed an online questionnaire administered through the professional survey company Qualtrics in March - April 2019. To ensure the sample (N = 2,254) reflected U.S. census distributions, quotas were specified for gender (52.6% female), age (M = 46.5, SD = 16.44), race/ethnicity (63.2% White/Caucasian), income (61.7% made $75,000 or less), and education (44.8% had some college or less). We also included quality checks at a few points to ensure valid and reliable responses.

Measurement

The survey contained a range of questions about respondents' opinions about and comfort with Artificial Intelligence and Virtual Reality in various educational settings. We also included individual traits - demographics, personality-based, and experience-based - that might influence these perceptions. Finally, two optional and identically worded open-ended questions followed the section on AI and then the section on VR: "Hearing your opinions is very important. Please use this space to tell us anything you would like to share about the topic just presented."

AI in education

To explore AI's opinions in education, we created a 5-point Likert-type measure that asked about respondents' comfort (very uncomfortable to very comfortable) with an "AI agent" fulfilling certain education roles. First, we provided a definition: "Artificially Intelligent (AI) agents are smart computers that put into action decisions that they make by themselves." Then we asked respondents to "consider AI in educational settings such as a high school, and indicate how comfortable" they would be with an AI agent performing the following tasks: determining the types of classes that schools offer; determining the content of classes in schools; teaching classes in schools; grading students; deciding students' career paths; determining students' class schedules (a = .904, M=2.67, SD=0.98).

VR in education

The measure for opinions about VR in education was phrased differently, given the distinctions in the technological affordances of VR and AI. We again first provided a definition: "Virtual Reality (VR) is the use of computer equipment (for example, a headset or pair of goggles) to create a simulated environment." Then, after asserting that "Some have proposed that VR would be an important way to teach students," we asked the extent to which respondents agreed or disagreed with VR being used to teach the following courses in high school: Science; Math; Foreign languages; Art; Music; American history. Responses were given on a 5-point Likert-type scale (strongly disagree to strongly agree) and was highly reliable (a = .905, M=3.30, SD=0.94).

Opinions about AI and VR.

Attitudes towards AI and VR were measured differently. A scale for "robot phobia" was adapted from Katz & Halpern (2014) to gauge feelings towards AI. We conceived of "robot phobia" as the closest manifestation of AI that approximated the "AI agent" respondents were asked to imagine in different educational settings. More general opinions about and familiarity with VR were measured with two questions. Both presented five statements and asked respondents to select the option that was closest to their view. For general VR opinion, the statements increased in optimism: "VR poses major threats to society and its development should be halted", "The risks of VR are substantial and outweigh its benefits"; "I am uncertain about the risks and benefits of VR"; "The benefits of VR are substantial and outweigh the risks"; "VR offers major benefits to society, and its development should be accelerated" (M=3.31, SD=0.89). The statements for familiarity with VR were: "I am unfamiliar with the term VR"; "I have heard the term VR but only have a vague understanding of it"; "I am familiar with the term virtual reality (VR) but have never used the technology"; "I have tried virtual reality (VR) technology but have only limited experience with it"; "I have used virtual reality (VR) extensively." Those who answered that they were unfamiliar with the term VR (n=199) did not see or answer the rest of the VR-related questions described above.

Individual traits

Demographic variables were included as controls: gender (52.6% female); age (M=46.5, SD=16.44); race (63.2% White/Caucasian); income (61.7% made $75,000 or less), and education (44.8% had some college or less).

Three personality traits were measured. Extraversion and neuroticism, both 5-point Likert-type scales, were adapted from Eysenck, Eysenck, and Barrett (1985). Respondents were asked about the extent to which they agreed or disagreed with 12 statements for both scales. Extraversion (a = 0.922, M = 3.20, SD = 0.80) included items such as "I enjoy meeting new people" and "I tend to keep in the background on social occasions" (reverse-coded). Neuroticism (a = 0.937, M = 2.69, SD = 0.95) included items such as "I would call myself tense or 'highly strung'" and "I worry too much after an embarrassing experience." Rotter's (1966) original 13-item Locus of Control scale was adapted and shortened to a 6-item, 5-point Likert-type scale ("strongly disagree" to "strongly agree"). It included statements such as "When I make plans, I am almost certain I can make them work" and "I do not have enough control over the direction my life is taking" (reverse coded). Higher values corresponded to a higher internal locus of control (a = 0.764, M = 3.54, SD = 0.71).

Experience traits

Also, we included personal experience traits that may influence perceptions of technology and education. Communication apprehension (CA) has been shown to affect people's openness to technology like computers in education (Scott & Rockwell, 1997; Fuller, Vician, & Brown, 2006). Therefore, we adapted McCroskey's (1982) "Personal Report of Communication Apprehension (PRCA)" 24-item scale that comprised four 6-item subscales of communication apprehension in certain contexts: a group setting, a meeting, in a dyad (e.g., interpersonal), and giving a speech (e.g., public speaking). Respondents were asked to respond to statements on a 5-point Likert-type scale from strongly disagree to strongly agree. Group CA (a=0.887, M=2.70, SD=0.94) included the statements "I dislike participating in group discussions" and "Generally, I am comfortable while participating in group discussion" (reverse-coded). Meeting CA (a=0.917, M=2.70, SD=0.99) included statements like "Generally, I am nervous when I have to participate in a meeting" and "I am calm and relaxed when I am called upon to express an opinion at a meeting" (reverse-coded). Interpersonal CA (a=.895, M=2.54, SD=0.89) included the statements "Ordinarily I am very tense and nervous in conversations" and "I have no fear of speaking up in conversations" (reverse-coded). Speech CA (a=0.905, M=2.97, SD=1.03) included statements like "Certain parts of my body feel very tense and rigid while I am giving a speech" and "I face the prospect of giving a speech with confidence" (reverse-coded). Items were recoded so that higher values indicated higher CA.

Some studies have shown that increased familiarity with technology may mitigate the effects of CA as related to computer anxiety (Campbell, 2006). Therefore, perceived technological competence (PTC) was also measured using Katz and Halpern's (2014) 7-item scale, 5-point Likert-type scale. Respondents were asked how much they agreed or disagreed ("strongly disagree" to "strongly agree") with statements such as "I feel like technology, in general, is easy to operate" and "It is easy for me to use my computer to communicate with others" (a=0.868, M=3.59, SD=0.83).

Analysis

We used a mixed-methods approach to explore people's opinions about emerging technologies in education. A quantitative analysis first examined the respondents' opinions about AI and VR in education descriptively. For ease of interpreting the descriptive statistics, responses were reduced from a 5-point scale to three categories: uncomfortable or disagree, neutral, and comfortable or agree. We then ran first-order analyses to explore relationships between the independent and dependent variables. With significant relationships established, we further examined, through a series of hierarchical linear regressions, the factors that might predict different opinions about and comfort levels with these technologies playing a role in education. All statistical analyses were conducted using SPSS (IBM, Armonk, NY). The qualitative analysis drew from responses to the open-ended questions. The comments were culled to extract those specifically about AI or VR in educational settings and then critically interpreted.

Results

Preference for VR over AI in education

In general, respondents were pretty evenly split on these emerging technologies being used in education, with a bit more VR preference over AI. In terms of fulfilling different educational roles, respondents were most comfortable with an AI agent determining class schedules (43% comfortable vs 31% uncomfortable), types of classes (35% comfortable vs 33% uncomfortable), and acting as a grader (37% comfortable vs 36% uncomfortable) (see Figure 1). Respondents were least satisfied with AI as a career counsellor (58% uncomfortable vs 20% satisfied) and AI as a teacher (45% uncomfortable vs 28% comfortable).

The factorability of these six items was examined and found to be appropriate: each item was correlated at least .55 with the other items; the Kaiser-Meyer-Olkin measure of sampling adequacy was .875 (well above the recommended .7 value); and Bartlett's test of sphericity was significant,

$X2(15) = 8204.795$, $p < .001$. A principal components analysis (PCA) was used to determine whether the six items could reasonably be combined and reduced to one factor of "AI comfort in education." A minimum Eigenvalue of 1 was set for the extracted components.

The PCA revealed that only one factor could be extracted: the initial Eigenvalue was 4.054, explaining 67.57% of the variance, and no other components reached an Eigenvalue above 1.00. The component matrix showed that all items within loadings on the factor were correlated above .790, further suggesting that the items comprised one scale. What can be seen in the factor is a pattern wherein the more mechanistic roles for AI in education (e.g., grading and scheduling) are more generally accepted than the agentic roles (e.g., teaching and advising). This suggests a value-based approach to AI's role that perceives AI as a tool and complementary force that may relieve some of the task load, but that cannot step in to perform the "tasks" fundamental to the human vocation of educating.

Conversely, perceptions of VR in education were more positive than negative. Most respondents (72%) were at least familiar with (but had never used) VR; only 28% had never heard of the term and had only a vague understanding of the technology. A majority of respondents (59%) were uncertain about VR's risks and benefits; of those remaining, more (31%) were optimistic about VR, compared to only 9% who held negative views. In the education realm, respondents were most enthusiastic about VR as a teaching tool in foreign languages (54% agree), Science (53% agree), and American History (52% agree). Math was the least favoured (42% agree), followed by Music (45% agree) and Art (46% agree) (see Figure 2).

There is a significant difference between acceptance of VR in education ($M = 3.30$, $SD = 0.94$) and comfort with AI in education ($M = 2.67$, $SD = 0.98$), $t(2054) = -30.48$, $p < .001$. This distinction supports what the PCA for AI in education shows, which is that overall there is greater acceptance of technology when it serves as a tool to support teaching. VR was described in the survey more as a kind of computer equipment, which connotes a technology aid, rather than an autonomous entity that would take over a classroom or career guidance.

Relationships between Individual traits and AI and VR perceptions

There was a significant difference between men and women's views of the technologies. For AI in education, men ($M=2.73$, $SD=1.02$) were more positive than women ($M=2.61$, $SD=0.93$). Similarly, for VR in education, men ($M=3.34$, $SD=0.97$) were more positive than women ($M=3.24$, $SD=.92$). Age was negatively correlated with both views of AI ($r=-0.150$, $p < .001$) and VR ($r=-0.094$, $p < .001$). Income was positively correlated with perceptions of AI ($r=0.047$, $p < .05$) and education was positively correlated with perceptions of VR ($r=0.065$, $p < .01$). There were no significant differences between race/ethnicity groups.

In terms of personality traits, extraversion was positively and significantly associated with AI ($r=.221$, $p < .001$) and VR ($r=0.203$, $p < .001$) in education, while locus of control was negatively related ($r=-0.181$, $p < .001$) and $r=-.0.071$, $p < .001$, respectively).

Group ($r=-0.086$, .001; $r=-0.123$, .001), Meeting ($r=-0.67$, .01; -0.093, .001), and Speech ($r=-0.097$, .001; -0.079, .001) CA were significantly ($p < .001$) and negatively ($r=-0.067$ -- -0.123) correlated with both views of AI and VR in education, while conversation CA was only significantly and negatively correlated with VR in education. Perceived technology competence was positively correlated with AI ($r=0.319$, $p < .001$)) and VR ($r=0.316$, $p < .001$) in education.

Predictors of perceptions of AI and VR in education

Two hierarchical linear regression models were constructed with three blocks: (1) demographic traits, (2) personality traits, and (3) experience traits (see Table 1). Each block was significant for both models, and overall the models explained 20.7% of the variance in AI perceptions and 21.6% of the variance in VR perceptions. For both the AI and VR outcome variables, demographics explained relatively little of the variance (3.5% and 2.0%, respectively), and among those, age was the only significant predictor for VR perceptions ($\beta = .060$, $p < .05$).

Personality traits were a stronger predictor for AI perceptions (explaining 8.4% of the variance, compared to 4.6% of VR perceptions): those who were more extraverted ($\beta = .197$, $p < .001$), less neurotic ($\beta = -.057$, $p < .05$), and had a lower internal locus of control ($\beta = -.263$, $p < .001$) were more comfortable with AI in education. Extraversion and locus of control were also similarly predictive of VR perceptions: extraversion was positively related ($\beta = .127$, $p < .001$) and internal locus of control was negatively related ($\beta = -.124$, $p < .001$).

Experiential traits had the most explanatory power for both models, and particularly for VR perceptions (15.7% of the variance, compared to 9.2% of the variance in AI perceptions). Higher interpersonal communication apprehension was related to more comfort with AI in education ($\beta = .141$, $p < .001$). Those who perceived themselves as more technologically competent were more comfortable with AI in education ($\beta = .228$, $p < .001$) and accepting VR as a teaching tool ($\beta = .192$, $p < .001$). Those with less robot phobia were more comfortable with AI in education ($\beta = -.203$, $p < .001$). Similarly, those with more familiarity ($\beta = .066$, $p < .01$) with and a higher opinion ($\beta = .309$, $p < .001$) of VR were more likely to perceive it as a useful teaching tool.

Qualitative analysis

As mentioned, respondents were also invited to provide open-ended responses with their thoughts on AI and VR in education. As the quantitative results suggest, there was more consensus around VR as a potentially useful educational tool, while comments around AI were more divided around its appropriateness in education. That said, a majority of responses about AI firmly asserted that it could never replace or should never substitute a human teacher in the classroom. Beyond that, the responses revealed two opposing threads about AI in education related to the specific AI traits that were salient for respondents about the technology.

AI in education

Some respondents highlighted how AI lacked human qualities like contextual thinking, nuance, empathy or compassion. Others noted the AI qualities that humans may lack, such as neutrality, objectivity, and being fact-driven. However, respondents' opinions were divided over whether these traits were positive or negative based on their conceptualizations of and values for what constitutes a good educator.

Those who emphasized AI's lack of empathy and human reasoning felt that such flexibility was vital for education because the classroom was not simply a vehicle for knowledge transfer. Rather, they saw education as an important contributor to the whole of human development:

> *I'm not averse to AI, but I think that using it to supplant classroom teachers would be disastrous for students. It seems to make the assumption that education is only about skill and knowledge acquisition. This leaves out the real work of human interaction and empathy that teachers practice with their students. That's just one example, but there is a lot of soft skills work done by educators that a pure replacement with AI would ignore.*

Some respondents also expressed concern about a perceived mechanistic decision-making process on the part of AI, which could thwart the future of individuals who perhaps progressed differently or had non-traditional strengths. An AI program would only be able to process certain kinds of data, which may leave out important signals about individual potential:

> *My husband was relegated to a low level of achievement in his high school, but four years ago, he graduated at the top of his University class. Just because someone's history indicates one thing doesn't mean it is all that clear, and AI would've kept him from college based on past performance.*

Further, as one respondent expressed, part of a teacher's role is to draw out the best in their students, to help them grow and reach their potential: "the right teacher can touch a student's spirit, inspire and motivate them through true, natural empathy."

On the other hand, some respondents spoke more to the ways in which particular human traits actually interfere with teaching and supporting students. In short, an AI teacher would have no "teacher's pet."

What AI lacks in empathy and nuance, it makes up in neutrality, emotionlessness, and even patience. One respondent commented that AI might be better equipped to help children with learning disabilities because it would not "feel the same learning frustrations" from them as a teacher might. A lack of personal bias could limit the extent to which teachers impose their views on students or mitigate "favouritism and discrimination" on school boards. In these remarks, human emotion was characterized negatively as "getting in the way" of the fairest and desirable outcomes.

To that end, AI generally was perceived as being good at generating suggestions and making plans based on data, particularly if it was able to use a lot of rich data from students themselves. There was a concern about too much prescriptive decision-making being left to AI, particularly for students' career paths or schedules – such a system would violate students' own autonomy and independence. An AI's capacity for processing large amounts of data, however, could furnish opportunities for more customized learning plans:

> *Not all students should have to learn the same subject, at the same time and at the same speed. Somehow, AI should tap into the innate qualities of each student and groom them individually for what they can contribute to society.*

Others noted they would only be comfortable with this kind of power if they were assured that AI's programming was based on factual, objective, and apolitical human reasoning.

VR in education

VR, in comparison, was mostly considered a relatively familiar and tangible tool, as opposed to an abstract concept or a distant future technology that most people have not already "seen in action." Some respondents had used VR for other purposes and could easily imagine how that experience could apply to educational settings. Most respondents recognized VR as a new and powerful tool that can bring strikingly distinct experiences to users. However, similar to comments about AI, respondents were mostly aware of what VR technology could provide while vastly disagreeing on whether the outcomes would be helpful or harmful.

VR provides experiences that are free from constraints of distance and physicality. Some respondents believed that "using VR would be a safe way for students to discover many things." The technology's ability to deliver vivid and immersive experiences to some had the potential for providing more learning opportunities (like experiencing flight into space) or making learning more engaging ("You're 'right there' and not having to listen to some boring teacher."). It could also introduce more parity for low-income students:

> *In a sense, VR is a good learning tool (i.e. excursions to museums, deep-sea diving, tours to foreign countries, etc.) for those students who cannot afford expensive excursions.*

But others stressed that VR should not replace physically travelling to new places, that students deserve to "see and discover the actual world." A virtual environment could not measure up to experiencing a real, foreign environment. For some, VR was perceived as offering more hands-on experiences, but others emphasized the artificial and inauthentic nature of a VR environment that would cheapen the learning experience:

> *Going to a place in person is so much more than just seeing the place. It's experiencing it: the culture, people, language and food. Certain things in life are learned through experiences.*

Others worried that VR might distract from learning. That the "gimmick" or game aspects of VR would outweigh the educational components. Further, some raised concerns about the costs of actually implementing VR in schools and classrooms. A "true VR" that could supplement meaningful experiential learning experiences would require such sophisticated technology that there were doubts about such an initiative's practicality.

To summarize, respondents largely viewed VR as a useful tool if appropriately implemented in the classroom while disagreeing on most aspects of how, where, who, on what, and to what extent VR should be used in educational settings.

Discussion and Conclusion

This study explored public perceptions of emerging technologies in different educational contexts. AI and VR have already been deployed to varying degrees in Edtech initiatives. Already there are prognostications of the promise of emerging technology in education. But our hopes for the panacea of technology has not always panned out. As we engage in another "revolution" – or just "evolution" – in education (Roll & Wylie, 2016), it's worthwhile to include in our considerations the likely public reaction to some of these technologies. To that end, we examined more generally the extent to which people were comfortable with AI technology in various educational roles like instruction, counselling, curriculum, scheduling, and grading. We also asked for people's perceptions of VR as a teaching tool across a range of subjects. Overall, respondents were more accepting of educational VR than they were comfortable with AI technology taking more prominent roles in young people's education. The quantitative analysis suggests that part of this resistance may be due to anxiety around giving up control to technology.

Specifically, those who had a higher internal locus of control – meaning they felt more strongly like they personally can control their fate – were less comfortable with the technologies. Those who were more extraverted and perceived themselves as more technologically competent were more open to emerging technologies. Significantly, experiential traits (e.g., perceived technology competence and familiarity with or fear of the technology) contributed the most to perceptions of AI and VR. This suggests potentially a different kind of gap that could emerge with further implementation of new technologies in the classroom, giving the more tech-savvy and outgoing people an advantage.

A concern that carried through both AI and VR in education was that the technology would replace humans or real-world experiences. Respondents seemed to be most positive about both with regards to how the technology may supplement human capabilities or, in the case of VR, provide experiences that would otherwise be unreachable for students, such as "going to outer space" or going back in time to see a different era. What respondents valued in particular about educators is their capacity to help young people grow in all aspects of their lives – not just with knowledge accrual but also with socio-emotional skills. This supports recommendations for a kind of blended model, wherein AI acts as a support to alleviate teachers and administrators of their tedious and rote tasks, thus freeing up their time for more impactful efforts (Levesque, 2018). This "human-plus-technology" approach (Christensen, 2019) appears to be what this sample's respondents are most comfortable with.

Importantly, though, our sample did not focus on the most relevant "stakeholders" for emerging technology in education (e.g., parents of students, teachers), and this is a potential limitation. Through our approach of sampling a nationally representative group, we are only able to glean in broad strokes the public's perception. Those who are currently experiencing today's educational system may have more insight and pertinent concerns. We also asked very broadly about AI and VR in education. Future studies could present more detailed, specific examples of these technologies being implemented to gauge people's perceptions more precisely. Our study suggests that maintaining a kind of human-hierarchy for decision-making and substantive guidance is important to people. Elaborating more on how these technologies would be employed could extract more nuance in people's perceptions.

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Tables and Figures

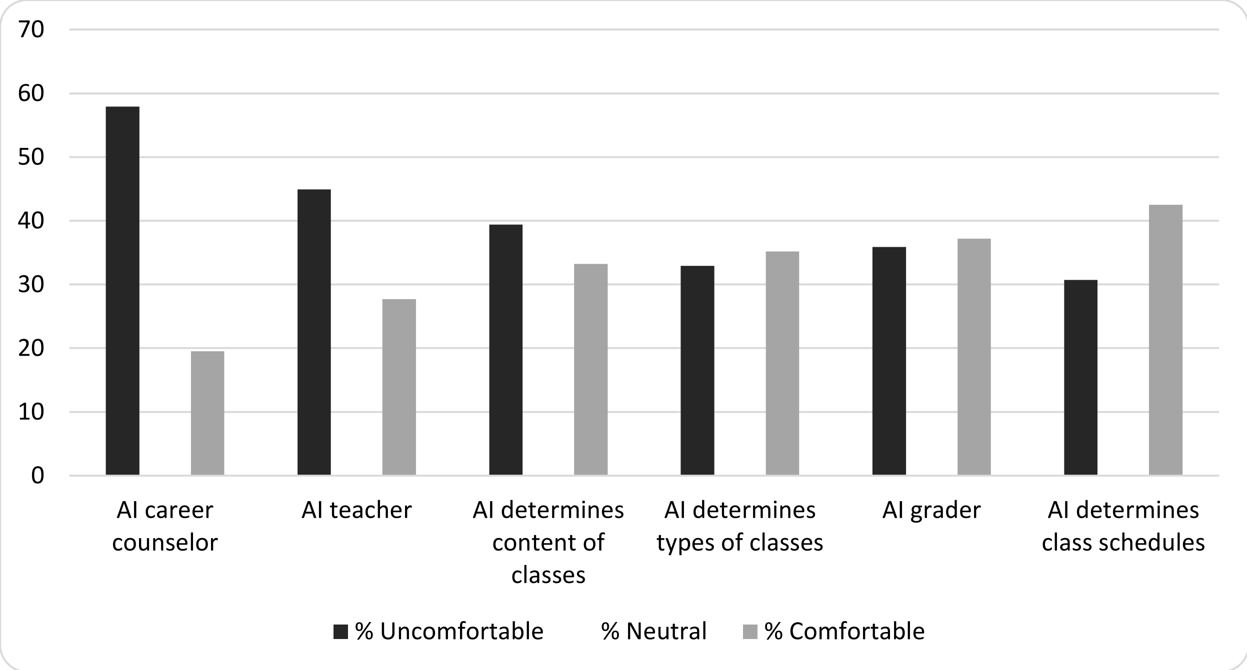

Figure 1. Comfort with AI technology in various educational roles

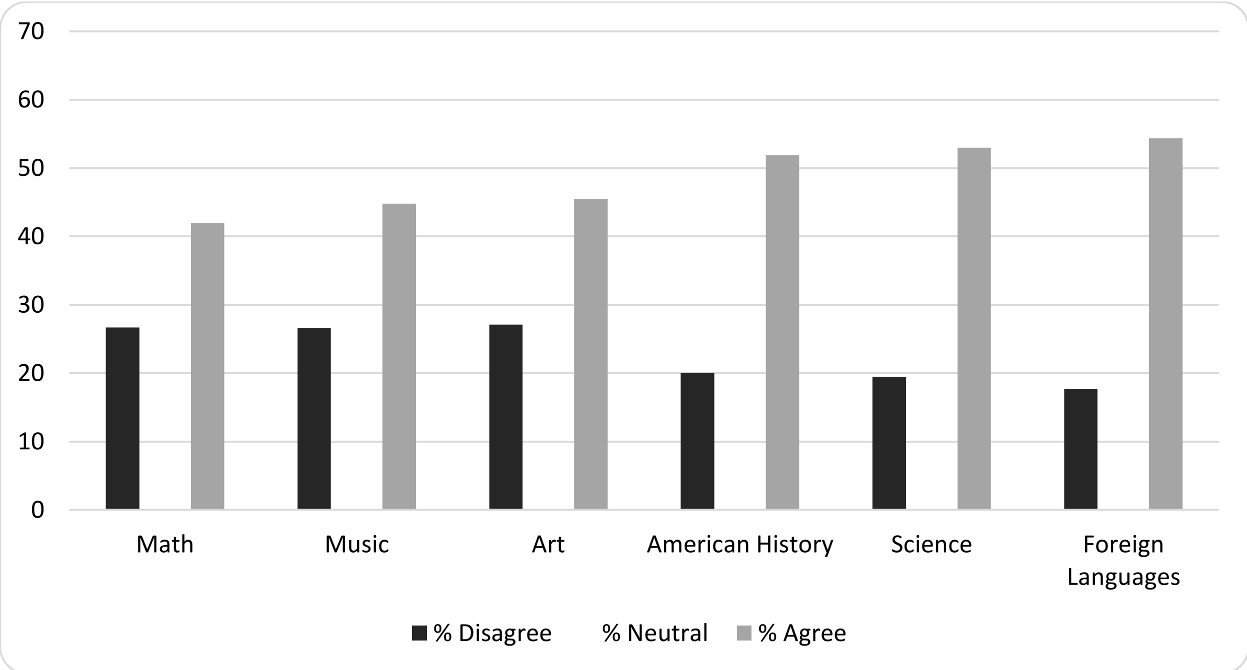

Figure 2. Agreement with VR as teaching tool in various subjects

Table 1. Factors predicting opinion of emerging technology in education

	Virtual Reality		*Artificial Intelligence*	
	B (SE)	β	*B* (SE)	β
Constant	.993 (.289)		3.056 (.282)	
Age	.003 (.001)	.060*	-.001 (.001)	-.010
Gender (1=male, 2=female)	-.022 (.042)	-.012	-.065 (.041)	-.034
Income	-.015 (.014)	-.026	.015 (.013)	.025
Education	.020 (.015)	.030	.015 (.015)	.022
R^2 change*	**2.0%**		**3.5%**	
Extraversion	.149 (.033)	.127***	.240 (.033)	.197***
Neuroticism	.004 (.029)	.004	-.059 (.029)	-.057*
Locus of control	-.165 (.033)	-.124***	-.361 (.033)	-.263***
R^2 change*	**4.6%**		**8.4%**	
Communication apprehension - group	-.042 (.040)	-.042	-.004 (.040)	-.003
Communication apprehension - meeting	-.023 (.045)	-.042	-.003 (.045)	-.003
Communication apprehension – interpersonal	.073 (.041)	.070	.155 (.041)	.141***
Communication apprehension – speech	.042 (.030)	.046	-.057 (.030)	-.059
Perceived technology competence	.223 (.028)	.192***	.269 (.026)	.228***
VR familiarity	.074 (.024)	.066**		
VR opinion	.332 (.023)	.309***		
Robot phobia			-.256 (.025)	-.203***
R^2 change*	**15.7%**		**9.2%**	
Total adjusted R^2	*21.6%*		*20.7%*	

Note: *B* (SE) = unstandardized regression coefficient with the standard error presented in parentheses; β = standardized regression coefficient

*p < .05

**p < .01

***p < .001