AI & Education Scoping Project:
FINAL REPORT

for Alberta Teachers' Association (ATA) and
Kule Institute for Advanced Study (KIAS)

Submitted by
Cathy Adams and Gillian Lemermeyer
University of Alberta
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> Many of the attributes that make good teachers great are the very things that AI or other technology fail to emulate: inspiring students, building positive school and class climates, resolving conflicts, creating connection and belonging, seeing the world from the perspective of individual students, and mentoring and coaching students. These things represent the heart of a teacher's work and cannot—and should not—be automated.
> (Bryant, Heitz, Sanghvi & Wagle, 2020)

Background

The Alberta Teachers' Association (ATA), the Kule Institute for Advanced Study (KIAS) and the Faculty of Education, University of Alberta engaged in a partnership to organize a research and policy scoping initiative that would report on the expected impact of artificial intelligence (AI) in Education and the key ethical and policy issues that need attention. The goal was to survey the opportunities and issues regarding the applications of AI to education so as to guide the development of policy and research. Supported by funds from the ATA and KIAS[1], the scoping project was imagined as an ongoing dialogue between partners to explore ethical and policy implications of AI in Education (AIEdK-12), through the particular lens of teachers' work.

Purpose

The purpose of the scoping project was to collaboratively develop an understanding of:

- Important issues emerging from the literature on applications of AI to education.
- Potential scenarios (how might teaching and learning be different with AI).
- Key businesses developing AI systems for education and their claims for those systems.
- Research needs in this area including ethics, data privacy issues, and policy research needs.
- Policy recommendations that could be developed to usefully guide the introduction of AI in the education sector.

Process and Outputs

[1] This project was also *partially* funded via a CMASTE grant (Nov 2020 - Dec 2020) and Vargo Teaching Chair grant (June 2021)

With the support of KIAS, one hour project meetings were set up with the project team; the project team consisted of 3 members of the ATA, 2 University of Alberta Faculty members and 1 graduate research assistant (See Appendix A). An initial meeting was held in November 2020, after which the team met six times monthly until June 2021. The work of the project team consisted of three main activities and outputs: 1) an exploration of AI and automated applications used in K-12 education, including an inventory of applications and a manuscript currently being prepared for submission, *Artificial Intelligence and the Changing Face of Teachers' Work*; 2) a targeted literature review of ethical guidelines for AI use in K-12 education; and 3) a summary of monthly discussions with a focus on concrete examples of AI use in K-12 education and the possible ethical issues at play.

1. Applications of Artificial Intelligence to Education and Teachers' Work

Our first conversations centred on issues emerging from the academic and popular literature on applications of AI to K-12 education. A summary table was developed to inventory the growing host of AI applications being experimented with and increasingly adopted in schools today. In order to provide a view of the different ways that AI is affecting teachers' professional work, Adams and Lemermeyer separated the different AI applications according to four main categories, specifically, how different AIs are being used (1) by teachers ("Teachers teaching with AI"), (2) by learners ("Learners learning with AI)", (3) by school administrators ("Systems level impacts"), as well as (4) how curriculum is changing in response to the need to educate learners about AI (Curricular level impacts). Each of these main categories were further differentiated into specific tasks or relevant sub-categories. For example, the category "Teachers teaching with AI" identified multiple tasks that teachers perform everyday such as lesson planning, teaching and facilitating student learning, assessment, etc. and matched these with AI applications. More work is needed here as the sub-categories did not satisfactorily capture the complexity of teachers' work. Nonetheless, the table provided our working group a general grasp of the breadth and depth of AI use in the schools today, and an understanding of the future potential across all teachers and learner activities.

One objective of the project was to track the main businesses invested in AI; many of these are noted in the Table. One of the complications was that many educational software companies now use AI as part of their application, but it is only part of the offering. Early on, our project team noted that some of the ethical issues that are now being raised about AI have in fact been on-going issues with educational software more generally for years, for example, student data privacy. The technologies found in the last column are all examples of existing and available products made by corporations and directed at least in part, to augment or replace tasks normally performed by teachers in the classroom.

The table evolved over the course of the project and our discussions, and the *Artificial Intelligence and Teachers' Work* table below (Table 1.) represents the most current version of this AIEdK-12 applications summary.

Table 1. Artificial Intelligence and Teachers' Work

Category	Tasks	AIEd Technologies
Teachers Teaching with AI AI technologies that augment, extend or otherwise affect the work of teachers with their students.	*Preparation / Lesson Planning*	- AI-powered presentation software (e.g., Beautiful AI) - Generating lesson plans (e.g., McCreary, 2020)
	Administrative tasks	- facial recognition for attendance role calling - automated exam proctoring/invigilation (e.g., ProctorU)
	Teaching and Facilitating; Tutoring (one-on-one) and responding to questions	- tutor software, also called Intelligent Tutoring Systems (eg. Thinkster Math for K-8; - voice assistants (e.g., with spelling and reading, foreign languages, resource searching, reference checking, respond to students' questions); - Virtual learning Assistant Cognii Virtual Learning Assistant ; Amira reading for K-3) - teacherbots (Bayne, 2015, Breines & Gallagher, 2020) - Google and other search engines
	Student Behavior monitoring; Behavioral-, social-, emotional skill development	- AI-based learner behavior monitoring and brain-wave trackers (see: https://www.wsj.com/video/under-ais-watchful-eye-china-wants-to-raise-smarter-students/C4294BAB-A76B-4569-8D09-32E9F2B62D19.html - emotional and movement monitoring to gauge students' facial expressions
	Assessment	- automated essay scoring (e.g., Intellimetric) - AI-based grade prediction (e.g., used by IB program during COVID)
	Diagnosis	- Automated data analytics and cognitive insight (e.g. IBM Watson AI-based collaborative educational project). - AI-based diagnosis tools to detect special needs such as dyslexia, dyscalculia, spelling difficulties or Attention Deficit Hyperactivity Disorder (ADHD) (Drigas and Ioannidou, 2013).
Learners Learning with AI Learner outcomes, influences on	*Assistive/Inclusive technologies & UDL*	- Accessibility/assistive technologies: autocorrect, auto-fill, text prediction, grammar correction, speech-to-text (STT) and text-to-speech (TTS); (e.g., Grammarly,otter.ai Natural Reader, Read&Write - IWBs that help students find correct answers, converting handwriting to text

learning, changes in the way we think about and frame classrooms, schools, districts, systems	*Writing ("Literacy")*	- NLP (Natural Language Processing) software like GPT-3 technologies for (essay, poem, etc.) writing: Sudowrite, OpenAI, https://talktotransformer.com/ , Semantris, Handwriting with a Neural Net
	Mathematics including Ccalculating/ computation ("Numeracy"); Problem Solving	- Wolfram Alpha; Mathematica
	Researching and searching	- AI-based Search Engines (Google)
	Personalized learning and tutoring	- virtual teaching assistants, chatbots, intelligent help systems - adaptive (personalized) learning (students are provided with one-to-one tutoring based on analysis of tests). e.g., Mindspark, Teach to One (ML) MATHiaU, Squirrel AI (China) - personalized learning - Automated data analytics and cognitive insight; to identify individual students' interests, strengths and weaknesses, learning pace modulation (e.g., IBM Watson AI-based collaborative educational project)
	Social, emotional and moral development (Wellness)	- social robots to help children with ASD (robot using ML reinforcement learning algorithm): see https://www.frontiersin.org/articles/10.3389/frobt.2019.00107/full See Pakkar et al, 2020 for examples - 4 Little Trees is AI Learning Software meant to help teachers identity learning gaps in students: "Emotion detection; intervene instantly"
	Art	Autodraw, (Quick Draw), GANbreeder (Artbreeder), Generative Art RunwayML Magenta, Processing, ml5.js, Autodraw, Cartoonify, Sketch-RNN Demos, Quick, Draw!, AI Painter
	Music	AIDuet, NSynth Sound Maker, MuseNet, Magenta studio
	PhysEd	Strava
	Science	Wolfram Alpha;
	Social Studies	

Curricular Level Impacts Additions to the curriculum, new literacies (and therefore also suggests teacher PD needs)	*Digital Citizenship*	- additions to Digital Citizenship curriculum: e.g., deepfakes (using Generative Adversarial Networks: GANs); algorithmic bias (assessing critically the social effects of computing on various groups, including women, visible minorities, people with disabilities, and Indigenous peoples.); Faceswap web app
	Computational & Data Literacy	- addition to Computer science and computational thinking curricula (e.g., Pan-Canadian K-12 CS framework**: Assess how human biases are embedded within technical systems and artificial intelligence;** Explain how machines learn. Discuss specific ethical challenges with machine learning and AI.**)**
Systems Level Impacts Policies and other higher-level activities affecting teachers' work, e.g. school, district, government level decision-making	*Predicting enrolment, school dropout*	- Predictive Analytics: - "predictive and diagnosis models to support decisions and generate feedback at the establishment (school, university, etc.) or education system level (district, region, country, etc.)." ; Social Solutions's Case Management Software
	Teacher evaluation	- Teacher assessment tools (e.g., IMPACT was used by a district to fire all teachers' whose scores put them in the bottom 2%, but inadvertently fired teachers who should not have been fired (See O'Neil, 2016, *Weapons of Math Destruction* (see Introduction)) - big data, algorithms, affecting individual teachers

2. Targeted Literature Review

A search of the literature for documents providing ethical guidance for AI in K-12 education resulted in locating five guidelines directly relevant to children and K-12 education. The earliest policy documents were published in 2019, a good indicator of the relative nascence of this field. One document was a report commissioned by the Government of Australia (Southgate et al, 2019); all others intended global scope. Two documents reflected the early work of a single international workshop (World Economic Forum, 2019) and a conference (UNESCO, 2019). Another guideline document represented a draft version (UNICEF, 2020). The Institute for Ethical AI in Education Ethical Framework (2021a), was the final result of a consultative process and was published with an annex (The Institute for Ethical AI in Education, 2021b). For more, please see Adams et al (2021) and Table 2 below.

The development of AIEdK-12 Ethics guidelines globally is on-going. For example, UNICEF promises to release their final version later this year; and UNESCO is in the process of developing their own version (Holmes, personal communication, June 2021). Our analysis of these five documents showed coherence with more general AI ethics policies (e.g. Transparency, Justice and Fairness, etc.), but with the addition of four new ethical principles relevant to K-12 Education: Pedagogical Appropriateness, Children's Rights, AI Literacy and Teacher Well-being.

Table 2. AI K-12 Ethical Guidance Policy Summary

AI Ethics Guideline Document ->	Southgate *et al.* (2019)	World Economic Forum (2019)	UNESCO Beijing (2019)	UNICEF (2020)	IEAIED (2021a; 2021b)
Ethical Principles*/ Constituency	Australia	International	International	International	UK & beyond
Transparency Key words: Transparency, explainability, explicability, understandability, interpretability, communication, disclosure, showing, age-appropriate language	**Transparency; Explainability**	Ensuring algorithmic accountability	**Ensuring ethical, transparent and auditable use of education data and algorithms**	**Provide transparency, explainability, and accountability for children**	**Transparency and Accountability**
Justice & fairness Key words: Justice, fairness, consistency, inclusion, equality, equity, (non-) bias, (non-)discrimination, diversity, plurality, accessibility, reversibility, remedy, redress, challenge, access and distribution	**Fairness**	Accounting for marginalized groups; Ensuring fairness in machine learning	**Promoting equitable and inclusive use of AI in education; Gender-equitable AI and AI for gender equality**	**Ensuring inclusion of and for children; Prioritize fairness & non-discrimination for children**	**Equity**
Non-maleficence Key words: Non-maleficence, security, safety, harm, protection, precaution, prevention, integrity (bodily or mental), non-subversion	(addressed under other categories)	(addressed under other categories)	(addressed under other categories)	**Ensure safety for children**	**Ethical Design**
Responsibility Key words: Responsibility, accountability, liability, acting with integrity	**Accountability**	Consumer Protection	(addressed under other categories)	**Provide transparency, explainability, and accountability for children**	**Transparency and Accountability**
Privacy Key words: Privacy, personal or private information	(addressed under other categories)	Privacy	(addressed under other categories)	**Protecting children's data and privacy**	**Privacy**
Beneficence Key words: Benefits, beneficence, well-being,	Beneficience	Recognizing developmental science in	(addressed under other categories)	**Support children's development**	**Achieving Educational Goals**

peace, social good, common good		policy		**and well-being**	
Freedom & autonomy Key words: Freedom, autonomy, consent, **assent**, choice, self-determination, liberty, empowerment	**Awareness**	Agency	(addressed under other categories)	**Ensure safety for children**	**Autonomy; Informed Participation**
Pedagogical appropriateness Keywords: Appropriate use, educational research-based, evidence-based, alignment with learner needs, child-centred AI, developmentally appropriate	Learning with AI	Algorithms for Children; Assessment and Evaluation	**AI for learning and learning assessment; Monitoring, evaluation and research**	**Create an enabling environment for child-centred AI**	**Achieving Educational Goals; Forms of Assessment**
Children's rights Keywords: Children's or child rights	Human rights	**Child Rights**	In preamble, aligned with *Universal Declaration of Human Rights*	**Empower governments and businesses with knowledge of AI & children's rights**	(addressed under other categories)
AI literacy Keywords: AI literacy, formal and informal AI education, Present and Future Preparedness; AI education; Responsible AI	Learning about AI	Public education	**Development of values and skills for life and work in the AI era**	**Prepare children for present and future developments in AI**	**Informed Participation**
Teachers' well-being Keywords: Teacher well-being; teacher workload; teacher empowerment	(addressed under other categories)	-	**AI to empower teaching and teachers**	-	**Administration and Workload**
Table Legend:	**Major Category**				
	Subcategory				
	Principle addressed under other sub/categories				

3. Summary of Scenarios

Starting in February 2021, each meeting was structured thematically around a "scenario" reflecting a particular use of AI technology in schools plus a scholarly article to provide context or a framework for

discussion. These scenarios are summarized in Table 3. below. The project team scenario discussions were otherwise unstructured and open with the intention of uncovering multiple possible ethical issues arising and policy questions.

Table 3. AIEducation K-12 Scenarios for Discussion

Scenario Summary	Discussion Summary
February 26, 2021 meeting What Happens When AI is Used to Set Grades? This year Covid-19 locked down millions of high school seniors and governments around the world canceled year-end graduation exams, forcing examining boards everywhere to consider other ways of setting the final grades that would largely determine the future of the class of 2020. One of these Boards, the International Baccalaureate Organization (IBO), opted for using artificial intelligence (AI) to help set overall scores for high-school graduates based on students' past work and other historic data. The experiment was not a success, and thousands of unhappy students and parents have since launched a serious protest campaign.	● Raises issues of appeal ○ If AI yields a result that seems unfair, who is at fault? ○ What is the appeal process? ○ Seems "predestined", lack of hope. ○ How should parents and children be involved? ● Since AI is always learning (by design), difficult to know exactly what is being done. ○ Lack of transparency as to how marks were determined. ● Seems teacher intuition is missing, no weight to given to teacherly wisdom ○ Could become "classist" if some people can afford "personal intuition" of teachers, that is, pay for in-person teaching and assessment. ○ Balance between regulation and innovation. ● POLICY question: What advice might be given to province/district/school re: assessments of contracts with AI providers.
Academic Resource: Bostrom, N., & Yudkowsky, E. (2014). The ethics of artificial intelligence. In K. Frankish, & W. M. Ramsey (eds.), *The Cambridge Handbook of Artificial Intelligence (pp.* 316-334). https://doi.org/10.1017/CBO9781139046855	
March 24, 2021 meeting **AI-based learner emotion monitoring & brain-wave tracking** ● https://www.youtube.com/watch?v=3BXCkJO58Bk Set in Nigeria, this video is about improving education using behaviour monitoring via deep learning-powered	● Issue of consent/assent raised ○ Any way to withdraw or refuse? ● Explainability value affected here ○ How can this be truly informed consent? ● Will children learn to "game" the system by managing their facial expressions?

cameras. The cameras in a classroom can assist teachers to recognize and assess their pupils' engagement levels and behavioural patterns. The AI algorithm assesses the student's facial expressions, classroom activities and demonstrated level of interest. (Presented in an advertisement, unclear if technology is in use). ● https://www.wsj.com/video/under-ais-watchful-eye-china-wants-to-raise-smarter-students/C4294BAB-A76B-4569-8D09-32E9F2B62D19.html Set in China, this video is about AI cameras and brainwave trackers that measure levels of concentration of students in classrooms. This info is immediately sent to the teacher and parents. The technology was easily accepted by parents. Some children reported being punished when parents see results they do not like, e.g. low attention scores. Children are also monitored by cameras for phone use, etc. Data can also go to the government. Parents were not aware of where the data was going. Tech giants, start-ups are all partners. Theodore Zanto, neuroscientist, warns of inaccuracy due to artifact and lack of privacy. If the point is individual assessment, cannot anonymize data.	○ Beyond gaming the system to actually learning how to control our faces that in turn trains our emotions and our reactions, etc. ○ *First mention of "habits of mind, habits of body" could be influenced and changed. ● Premise here is flawed - emotion and social AI; there is no evidence to suggest "reading" another's face for emotion even by another human is accurate. ● What are the rights of the child in a situation like this? ● Ended by asking: Is this pedagogically appropriate? ● POLICY question may be how to determine pedagogical appropriateness? ● POLICY question may be how to assess AI before it comes to classrooms?
Academic Resource: McStay, A. (2020). Emotional AI and EdTech: serving the public good? *Learning, Media and Technology, 45*(3), 270-283. https://doi.org/10.1080/17439884.2020.1686016 ● McStay casts doubt on the possibility of determining emotions from facial gestures, whether by AI or other humans. Current science indicates using facial gestures to identify emotions is not accurate.	
April 26, 2021 meeting **AI as Cognitive Extenders and Pedagogical Appropriateness** Anecdote from Western Canadian urban junior high school, consider use of Google Read&Write. *My grade 7 English Language Learners were*	● Raises issue of teacher agency ○ "Techno-progressive" - an attitude that assumes everything is always getting better ○ McLuhan's Tetrad: is the teacher's agency being obsolesced by AI?

working on their biography assignment online. As I walked around the classroom, Ahmed turned to me and asked, "Ms. L., how do you spell 'professional'"? Just as I began to answer, he turned back to his Chromebook and said loudly, "Pro-FESH-un-al" I intervened, saying wait, and invited him to "sound it out" hoping he would be able to decode at least some of it phonetically. But I was too late, Google Read&Write had already--immediately and correctly--spelled it out for him.	○ With Google R&W, this may seem insignificant, but eventually, the child may preferentially asks Google over the teacher for everything. ● Shifting nature of relationship between teacher, student and assistive technology: opportunity for relationship may be missed ○ This isn't new conversation; new iteration with every technology, however, is there an interdependency with AI that is different? ○ The Phaedrus and learning to write: Socrates' point was there was something about invention of writing and then legislator decide when and where technology is used ○ Is the teacher the legislator? Often not - probably not asked about using speech to write, here for example. ● There are a variety of technologies that teachers have no choice about using. ○ Whose responsibility should this be - could it be more like a distributed system? ○ Canadian group looking at AI policy: complex technologies come into classrooms untested, without benefits and risk assessment. ○ For example, children graduate proficient with Google R&W, but without basically illiterate - whose fault? ● What protections need to be in place for teachers? ● Few years ago conversation changed from accountability to assurance - better way to understand these issues. ● POLICY question may be how/who decides when and how much a particular technology should be used. Further, what is the criteria for these decisions, e.g pedagogical appropriateness, budget, parent preference, teacher competence?

Academic Resource:
Hernández-Orallo, J. & Vold, K. (January 2019). AI extenders: The ethical and societal implications of humans cognitively extended by AI. *Proceedings of AAAI/ACM Conference on Artificial Intelligence, Ethics and Society.* 507-513. https://doi.org/10.1145/3306618.3314238

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June 2, 2021 meeting
AI as Author
Read: Marche, S. (2021). The Computers Are Getting Better at Writing. *The New Yorker*. https://www.newyorker.com/culture/cultural-comment/the-computers-are-getting-better-at-writing

Sudowrite: GPT-3 technology discussed in the New Yorker article.
Consider Plato's Phaedrus, and more specifically, AI as a kind of pharmakon that can "act"on learner's cognitive ecosystems in *both* positive and negative ways.

To perform this analysis, first read:

Geoffrey's notes on the key "pharmakon passage in the Phaedrus.
Pages of 230 - 232 in Adams (2017).

You may also wish to experiment with another AI-based text generating app called Talk to Transformer: https://talktotransformer.com/ and reflect on the possibilities.

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Raises questions such as Who is doing the writing? What does plagiarism mean in this context?
Can this be brought to classrooms and treated similarly to analyzing advertisements, to teach students? Counterpoint: This is so hidden, how can we teach it when it is unclear/transparent as to what is happening?
Could consider these technologies as assistants to learner
Where are the ethics, considered with essay marking AI: If we are using AI to mark essays, why can the students not write/buy essays?
Is there a role for the honour code here?
Maybe we have to teach students to use these tools as they come.
Teachers and professionals must weigh in on these conversations so it is not happening without them.
Policy question may be to consider how Sudowrite and other writing technologies can be taught and discussed with students.

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Academic Resource:
Adams, C. (2017). Technology's hidden curriculum and the new digital pharmakon. In j.j. jagodinski (ed.), *The Precarious Future of Education, Education, Psychoanalysis, and Social Transformation*. DOI 10.1057/978-1-137-48691-2_10

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Summary of Possible Policy Questions from Scenarios

- What guidance should be given to province/district/school re: assessments of contracts with AI providers?
- When decisions are made using AI, who is accountable? What is the appeal process?
- How is the pedagogical appropriateness of an AI application assessed?
- What is the process to assess AI before it comes to classrooms?
- What is the criteria for deciding usage of a particular technology, e.g pedagogical appropriateness, budget, parent preference, teacher competence?
- How AI-based writing technologies (e.g. Sudowrite) be taught and discussed with students (e.g. in terms of its ethical and academic implications)?

Other AIEdK-12 Ethical Issues Identified and/or Discussed during our Monthly Meetings

1. ***Technological Unemployment*** in teaching work refers to the replacement, to a greater or lesser degree, of teachers in education, with artificially intelligent technologies.
   Resource: Peters, Jandrić & Means, 2019; Shen & Shu, 2020.

2. ***Algorithm Development*** in AI must be attended to thoughtfully, not only to avoid bias, but also to be transparent and predictable.
   Resources: Bostrom & Yudkowsky, 2014; O'Neil, 2016; Smith, 2020.
   Inappropriate use of AI in hiring and firing of teachers (O'Neil, 2016)
3. ***Atrophy of cognitive abilities*** through the use of too many cognitive extenders. Cognitive extenders become tightly coupled with biological cognition and may be inextricable. While the cognitive ability of humans are extended via these technologies, is it also the case that the individual's own cognitive ability can atrophy?
   Resource: Hernández-Orallo & Vold, 2019; Gandhi, 2020.
4. ***Data Privatization, Data Security and AI Surveillance*** were noted in all of our discussions around technologies. It was emphasized repeatedly that the privacy, integrity and safety of K-12 age children must be forefront as a matter of the child's rights in discussions around integrating technologies into classrooms.
   Resource: Bettina, Littlejohn & Blakemore, 2020.
5. ***The Digital Divide***, or inequality in access to technology occurs between communities with regional differences, such as socio-economic groups (Tustin, 2010). The digital divide may be seen between community groups made up of schools, as well as within the schools, based on the socio-economic status of families.
   Resource: Kormos, 2018 (see their lit review).
6. ***Moral passivity / interpassivity*** describes the impulse of humans to rely on AI and robots to such a degree that they no longer have interest or motivation to express their own moral agency.
   Resources: Chan, 2020; Danaher, 2019.
7. ***AI and Indigenous Knowledge*** practices offer possibilities for designing and creating ethical AI that centers Indigenous concerns.
   Resource: Lewis, 2020.

Knowledge Dissemination

Peer-Reviewed Presentations

1. Adams C., Pente P., Rockwell G. & Lemermeyer G. (April 21, 2021). AI Ethical Principles for K-12 Education: Pedagogical Appropriateness, Children's Rights, AI Literacy and Teacher Wellness. *10th Annual Symposium on Ethics in the Age of Smart Systems*, Loyola University Chicago, USA (online).
2. Adams C., Pente P., Lemermeyer G., & Rockwell G. (June 17, 2021). Artificial Intelligence ethics guidelines for K-12 education: A review of the global landscape. *22nd International Conference on Artificial Intelligence in Education*, Utrecht, Netherlands (online)

Peer-Reviewed Publications

1. Adams C., Pente P., Lemermeyer G., & Rockwell, G. (2021). Artificial Intelligence ethics guidelines for K-12 education: A review of the global landscape. *Lecture Notes in Computer Science, 12749*, 24-28. Springer. https://doi.org/10.1007/978-3-030-78270-2_4

   Abstract: To scope the global landscape of ethical issues involving the use of AI in K-12 education, we identified relevant ethics guidance documents, and then compared and contrasted concerns raised and principles applied. We found that while AIEdK-12 ethics guidelines employed many principles common

to non-AIEd policy statements (e.g., transparency), new ethical principles were being engaged including pedagogical appropriateness, children's rights, AI literacy and teaching well-being.

2. Adams C., Pente P., Lemermeyer G., & Rockwell, G. (abstract submitted to IRIE, manuscript in preparation). Artificial Intelligence and the Changing Face of Teachers' Work.

Abstract: Advances in Artificial Intelligence are providing teachers with a wealth of new technologies and smart services to assist them in their work. Largely thought to be immune from automation, the teaching profession is now being challenged on multiple fronts by new digital infrastructures and smart software that are enhancing pedagogical decision-making and expanding teaching activities, while also augmenting and enhancing their students' learning. The meteoric rise of machine learning, algorithmic governmentality and the cyborganization of education have some scholars predicting that technological unemployment for teachers is imminent. To better understand this emerging situation, we begin by identifying and cataloguing AI technologies that have already been deployed in some of today's K-12 classrooms (AIEdK12). We organize these AIEdK12 technologies according to a broad range of teachers' professional activities where AI has been integrated to support, enhance and/or automate their work. We also identify: AI-powered technologies being used by learners to facilitate their learning and development; additions to K-12 curricula about AI literacy; and AI being used by schools, districts and ministries of education to inform decisions that affect teachers. Our intent in compiling this AIEdK12 inventory is to provide a more robust picture of how AI may already be changing the face of teachers' work, and to better anticipate possible futures.

We then take a theoretical turn to consider how posthumanism can shed new light on the ethical implications of widespread deployment of AIEdK12. Posthumanism shows that the once secure borders separating humans from nonhuman beings are becoming increasingly complicated by AI. Further, the Cartesian dichotomies (e.g., subject/object, male/female, living/nonliving, etc.) that have anchored much of Western humanist thinking are ill-equipped to grapple critically with the fluid entanglements increasingly convened between humans and the digital. Networked, digital technologies are extending and intermeshing with human beings cognitively, affectively, corporeally, spatially, temporally, socially and politically. From a posthuman perspective, technology is not simply a tool taken up for instrumental purposes by agential teachers (and learners). Rather, the digital participates in co-constituting complex human-technology hybrids that necessarily mobilize new actions, transform knowledge frameworks and inaugurate novel ways of being in the world. Once integrated into teachers' professional practices (and learners' learning), the AIEdK12 technology often falls into the background where it quietly interacts with, powerfully frames and inevitably translates teacher (and learner) agency.

Finally, we explore the deployment of an AIEdK12 technology from a posthuman perspective by "interviewing" a GPT-3 application (Adams & Thompson, 2016). Our intent is to uncover some of the new complications and conundrums being introduced to teachers' professional practices and to how learners "learn." A posthuman view of the hybridic relation of human and AI systems represents a radical shift in understanding teachers' work, and shows that the digital will increasingly confront teachers with new ethical obligations.

Conclusions and Next Steps

In our last meeting in June 2021, we discussed the possible next steps. We all agreed that there is much work to do! The following represents some possible projects to pursue in the coming months:

- VPRI office fund for signature areas for mobilization grant-writing to aim for tri-council funding (GR)
- Play with generative AI, GR's student gave a workshop at Congress 2021. GR could arrange for version of workshop for our group
- Start to talk to teachers about this, specialist councils (JT)
- Develop a symposium for teachers (LE)

- Extend the AT grant, not this fall but in 2022 (PM); KIAS and AI4S would be interested in partnering (GR)
- Get some publications out to have something to point to in other work. CA to send email to ATA about ideas for research projects for possible funding

References

Adams, C. (2017). Technology's hidden curriculum and the new digital pharmakon. In j. j. jagodinski (ed.), *The Precarious Future of Education* (pp. 225-240). Palgrave Macmillan. https://doi.org/10.1057/978-1-137-48691-2_10

Adams C., Pente P., Lemermeyer G., & Rockwell G. (2021). Artificial Intelligence ethics guidelines for K-12 education: A review of the global landscape. *Lecture Notes in Computer Science, 12749*, 24-28. Springer. https://doi.org/10.1007/978-3-030-78270-2_4

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Appendix A. Team Members

Joni Turville
Associate Executive Secretary, Alberta Teachers' Association

Philip McRae
Associate Coordinator-Government, Alberta Teachers' Association

Lisa Everitt
Executive Staff Officer-Government, Alberta Teachers' Association

Geoffrey Rockwell
Professor, Faculty of Arts, University of Alberta
Department of Philosophy, Cross-appointed with Humanities Computing MA programme
Director, Kule Institute for Advanced Study
Associate Director, AI for Society

Cathy Adams
Professor, Faculty of Education, University of Alberta
Department of Secondary Education

Gillian Lemermeyer
Graduate Research Assistant, Faculty of Nursing, University of Alberta

Casey Germain
Program Coordinator, Kule Institute for Advanced Study