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Artificial intelligence and automation in the migration governance of international students: An accidental ethnography

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ABSTRACT

Artificial intelligence (AI) and automation are newly impacting the governance of international students, a temporary resident category significant for both direct economic contributions and the formation of a 'pool' of potential future immigrants in many immigrant-dependent countries. This paper focuses on tensions within Canada's education-migration ('edugration') system as new technologies intersect with migration regimes, which in turn relate to broader issues of security, administrative burdens, migration governance, and border imperialism. Using an Accidental Ethnography (AccE) approach drawing from practitioner-based legal research, we discuss three themes: (1) 'bots at the gate' and the guise of AI's objectivity; (2) a murky international edu-tech industry; and (3) the administrative burdens of digitalized application systems. We suggest that researchers, particularly in education, can benefit from the insights of immigration practitioners who often become aware of potential trends before those less embedded in the everyday negotiation of migration governance.

Keywords: accidental ethnography, artificial intelligence, border imperialism, economic immigration, edugration, international student mobility, international students, migration governance

Canada boasts one of the world's highest net migration rates (United Nations Department of Economic and Social Affairs, 2022), with immigration accounting for almost 100% of labour force growth and 75% of population growth

(Immigration, Refugees and Citizenship Canada [IRCC], 2023b). Because Canada's approach to immigrant selection is seen internationally as a "model for highly skilled migration policies" (Favel et al., 2016, p. 23; Organisation for Economic Co-operation and Development [OECD], 2019), its economic immigration system is globally influential. Increasingly important to this approach is the recruitment and retention of international students, defined here as post-secondary study permit holders.

Canada currently has one of the highest proportions and total numbers of international students globally (United Nations Educational, Scientific and Cultural Organization Institute for Statistics, 2022), and international students are positioned in the Canadian policy discourse as 'ideal immigrants' for both their economic contributions and formation of a pool of potential future immigrants (Brunner, 2022b; Global Affairs Canada, 2019; Schinnerl & Ellermann, 2023; Scott et al., 2015). Many international students in Canada qualify for a post-graduation work permit (PGWP) for up to three years, providing access to the Canadian labour market and, pending qualifying work experience, targeted permanent resident (PR) pathways. Among all immigrants admitted to Canada from 2016 to 2021, 15.6% previously held study permits (Statistics Canada, 2022); this proportion goes up significantly among economic immigrants specifically (Crossman et al., 2022).

This multi-step education-migration pathway, or *edugration*, is a growing trend across the OECD (OECD, 2022; Sabzalieva et al., 2022), presenting new ethical considerations for education and migration scholars alike (Brunner, 2017; 2022a). One key concern is the extended period of time student-migrants are compelled to spend as temporary residents – first as students, then as temporary foreign workers (TFWs) holding PGWPs – with eventual PR status far from guaranteed (Brunner, 2022a). This prolonged precarity is part of a broader 'two-step' migration trend in which immigrants are recruited from a domestic pool of TFWs rather than directly from abroad, allowing governments "the opportunity to 'try out' potential migrants before allowing them to stay permanently" (Crossman et al., 2020, p. 2). The discrimination, exploitation, and/or uncertainty many TFWs experience during this 'trial' period has become a key feature of Canadian immigration as the proportion of new immigrants with Canadian work experience, as well as the number of TFWs overall, have risen dramatically over the past two decades (Crossman et al., 2020; Statistics Canada, 2022).

Among TFWs, international students who pursue *edugration* spend a relatively long time moving through the 'chutes and ladders'¹ of a system "crafted by state desires for the flexible accumulation of labour...creat[ing] staggered pathways to belonging and gradations of citizenship" (Robertson, 2013, p. 159-160; Goldring & Landolt, 2012; Rajkumar et al., 2012). Navigating these 'chutes and ladders' necessitates ongoing interpretations of dynamic immigration policies and interactions with immigration application systems, as international students

¹ A board game also known as 'snakes and ladders.'

are required to repeatedly extend their immigration documents and change from one temporary status to another (Goldring & Landolt, 2012; Nakache, 2022). This burden itself is notable and understudied; however, technological developments in migration governance are adding additional and unique ‘hoops’ for international students to jump through in an already circuitous ‘game.’

Within this context, we offer a high-level overview of select ways artificial intelligence (AI) and AI-adjacent technologies (e.g., the automation of processes and systems supporting administrative decision-making) are newly impacting Canada’s governance of international students. More specifically, we showcase implications resulting from changes in government and private/third-party immigration application management systems. These impacts are crucial to understand for two reasons. First, they speak to the increasing complexity of international student migration governance in an era of *edugration*, not just in Canada but across the OECD. Second, they demonstrate the need to bridge critical discussions of ethics and AI/AI-adjacent technologies in both higher education (Zembylas, 2023) and migration management (Molnar, 2019; Nalbandian, 2022) as the two increasingly intersect.

As co-authors, we leverage our shared position as immigration scholar-practitioners to shed light on these incremental and understudied changes. Utilizing an incipient method of inquiry known as Accidental Ethnography (AccE), we also highlight the importance of practice-imbedded research and data sources when researching the governance of international students.

AI AND AUTOMATION IN THE CANADIAN IMMIGRATION CONTEXT

In 2017, Canada became the first country to implement an official national AI strategy (Canadian Institute for Advanced Research, n.d.). However, discussions of AI and AI-adjacent technology experimentation for Canadian immigration purposes dates back to at least 2014 (“How artificial intelligence could change,” 2018; Molnar & Gill, 2018). Because Canada’s immigration system has long been mired by backlogs – and the majority of federal court cases in recent years are immigration-related, in part due to long application processing times and delays – IRCC was an ideal department for testing and implementing new tools in an effort to speed up application processing (Bergevin-Estable & Bélanger, 2022; IRCC, 2023a). Notably, the escalating volume of study permit applications contributed significantly to IRCC’s backlogs. Canada is on track to receive more than double the number of study permit applications in 2023 compared to 2019, resulting in “unsustainable application volumes [which] undermine program integrity and contribute to processing backlogs in all IRCC business lines” (IRCC, 2023c, slide 7). In IRCC’s words, the department has more generally been “undergoing a profound transformation” and now identifies automation technology as “one viable avenue to keep pace and still maintain quality” (2021b, p. 2).

AI and AI-related terms are used and defined inconsistently within the Canadian government and popular press (Molnar & Gill, 2018). Internally, IRCC

defines AI as “encompassing a broad range of technologies and approaches...dedicated to solving cognitive problems commonly associated with human intelligence, such as learning, problem solving, and pattern recognition” (2021b, p. 55). This broad definition differs from the more specific concept of an automated decision support system, defined as “any information technology designed to directly support a human decision-maker on an administrative decision (for example, by providing a recommendation), and/or designed to make an administrative decision in lieu of a human decision-maker” (p. 55). IRCC specifically contrasts automated decision support, which is “reserved for activities involving some degree of judgment” (p. 56), with process automation, which “is the use of digital technology to perform routine business processes in a workflow” and refers only “to straightforward administrative tasks” (p. 56). However, in practice, such “definitional boundaries are regularly contested even by experts” (Molnar & Gill, 2018, p. 8).

As is the case in many countries, limited information is known publicly regarding the Canadian government’s use of AI and AI-adjacent technologies, making it difficult to conclusively determine the scope of their functions. One topic of intense scrutiny and speculation has been IRCC’s introduction of the Microsoft Excel-based tool Chinook, which was piloted in 2018 and officially launched in 2019 (IRCC, 2022c). Chinook was developed by IRCC in-house to process certain temporary resident visa (TRV), work permit, and study permit applicants; in its current iteration, it is also used to process family-class spousal sponsorships and refugee cases. Chinook synthesizes elements of application information, presumably runs algorithms to search for flags, and generates generic language for visa officers to utilize as justifications for refusals. According to IRCC, a 2020 internal study showed “an 18-30% gain in efficiency” among overseas migration officers using Chinook (2022c, para. 2).

Whether Chinook uses AI, automated decision support (or making), advanced analytics, or process automation is debated. According to IRCC’s key messaging developed in response to critiques of Chinook, the tool:

does not utilize [AI], nor advanced analytics for decision-making, and there are no built-in decision-making algorithms...Chinook does not change the way decisions are made; it is always an officer – not the Chinook spreadsheet – that makes final decisions and provides the rationale for them. (2022c, para. 1)

IRCC contends Chinook is a data-visualization tool which merely automates administrative functions, rather than replacing the decision-making function of human visa officers. However, others claim the line between process automation, automated decision-making, and even AI is blurred, with the real issue being “that automation, whether for business function only or to help administer administrative decisions, can have adverse impacts” if unchecked (Tao, 2022a, para. 2). Regardless of its precise scope, Chinook allows visa officers to review hundreds of applications simultaneously, without recording working notes onto applicants’ records.

Less frequently maligned, yet arguably more powerful, is the department's use of "advanced analytics and automation systems operat[ing] independently of Chinook" (IRCC, 2022c, para. 2) to triage applications, including study permits. These systems work by applying machine learning to an applicant's file and, based on historical data sets and risk flags, automating positive eligibility determinations (Treasury Board of Canada Secretariat, 2020). According to IRCC, "routine files can be assessed 87% faster" when using one such system (2022a, para. 3).

Shortly after Chinook was piloted, a 2019 Treasury Board of Canada Directive on Automated Decision-Making policy instrument came into force to "ensure the responsible and ethical use of automated decision systems, including those using [AI]" (Deshaies & Hall, 2021, para. 2). Because "big data and [AI] are exploding, and IRCC is beginning to recognize the potential they bring for new business insights and efficiency gains," IRCC now also uses an internal "Policy Playbook on Automated Support for Decision-making" to resolve "novel questions about privacy, data governance, security, transparency, procedural fairness, and human-machine interaction" (IRCC, 2021b, p. 2).

THEORETICAL FRAMEWORK

Our study is framed within literature on migration governance, defined by the International Organization for Migration as "the combined frameworks of legal norms, laws and regulations, policies and traditions as well as organizational structures (subnational, national, regional and international) and the relevant processes that shape and regulate States' approaches with regard to migration in all its forms" (2019, p. 138). Migration governance is increasingly theorized as a multi-institutional, multi-level, decentralized process involving various subnational and non-state actors (Ambrosini, 2020; Schmidtke, 2019). In the context of AI and automation, this often involves partnerships with non-state immigration actors, particularly in the private technology sector (Low, 2021).

We utilize a critical orientation to migration governance in which control is its central feature, operating through its regulation of global relationships marked by power imbalances and a larger maintenance of inequality (Castles, 2004). This perspective is linked to border imperialism, which refers to the institutions, discourses, and systems entrenching controls against migrants and determining whom the state includes (Walia, 2013). Because borders are inextricable from their "heteropatriarchal, race-oriented, Other-generating, and symbiotic forms, functions, and foundations" (Gahman & Hjalmarson, 2019, p. 111), migration governance is also deeply linked, both historically and in ongoing ways, to colonization and capitalism. From this orientation, uses of data and technology in the context of migration governance can be seen as either reproducing inherited (neo)colonial and capitalist contexts, or as constituting a new form of global resource extraction which marks a distinctive phase of colonialism (Couldry & Mejias, 2023). Zembylas, for example, describes 'digital neocolonialism' as "a form of economic, social, or cultural hegemony that uses digital technologies to control people and communities" (2023, p. 29); similar terms, such as data

colonialism, technocolonialism, and digital colonialism, differ in scope yet share a focus on the ways in which colonial (and, in particular, racialized) inequalities are inherent, rather than incidental, to such data and technology practices (Couldry & Mejias, 2023).

Broadly speaking, the digitalization of migration governance “is driven by security and political concerns” (Low, 2021, p. 1603) and system efficiency goals. Migration governance is thus also connected to surveillance and what Lyon (2007) describes as the ‘safety state,’ where individuals, borders, and biometrics are connected, following “logics of precaution, pre-emption, and prevention” to govern a “mobile threatscape” (Leese & Wittendorp, 2018, p. 174). This necessitates “data-driven and future-oriented” approaches to surveillance (Walsh, 2019, p. 334).

Administrative burdens are also embedded in migration governance. The concept of ‘red tape’ has long been studied in the field of public administration (e.g., Bozeman, 1993). However, the more intentional ‘administrative burden’ is defined as “an individual’s experience of policy implementation as onerous” (Moynihan et al., 2015, p. 45, citing Burden et al., 2012). In other words, administrative burdens are “the costs that individuals experience in their interactions with the state” and are used as both technocratic and political tools to impose a hindrance on individuals and organizations as part of a policy enactment (Moynihan et al., 2015, p. 45; Herd & Moynihan, 2019). The costs of administrative burdens generally fall into three categories: learning costs, compliance costs, and psychological costs (Moynihan et al., 2015).

Regarding immigration policy specifically, Elster (1992) described administrative burdens as proxy policies which achieve their goals through secondary effects, while Heinrich demonstrated the ways such discretionary administration measures related to citizenship documentation can “perpetuate racial discrimination, while simultaneously diminishing the transparency, fairness, and effectiveness of public administration” (2018, p. 211). In a study focusing specifically on Chinook, Bergevin-Estable and Bélanger (2022) discussed the related concept of administrative *borders* in which the border is controlled through administrative procedures. Administrative borders are part of a larger international border policing trend in which migrants are governed not just at traditional territorial border entry-points but also (1) off-shore, before one enters the state, and (2) within the state through practices upheld or enacted by non-state actors, e.g., airlines, employers, and higher education institutions (Brunner, 2023; Weber, 2015; Walsh, 2019).

METHODOLOGICAL APPROACH

Our paper builds upon AccE as proposed by Levitan et al. (2020; see also Poulos, 2009). AccE is a nascent “reflexive, reflective, and praxical method of inquiry in which the researcher examines data that were gathered from day-to-day processes in the workplace” (p. 337). This allows practitioner-researchers “to bridge theory and practice” (p. 340) by utilizing “unforeseen learning” gleaned from practice (p. 339). ‘Accidental’ refers to “post hoc practitioner data and experiences that

can be used as research data not collected within a planned research study” (p. 337). By “reorienting and recasting” (p. 388) traditional ethnographic strategies through new data collection techniques, AccE expands the possibilities of reflective practice methods. In the words of Levitan et al.:

...important research is often ‘accidental’ – but not anecdotal or journalistic. Simply because a research project did not begin with the usual prerequisites, the findings and lessons from deep, reflective, and systematic analysis of data can still be a legitimate, important contribution to knowledge for...other practitioners, and for theory. (p. 340)

We selected AccE because it was through our lived professional experience handling a high volume of temporary resident immigration files that we came to identify, retrospectively, larger migration governance trends and their impacts on international students. International student mobility research lacks many in-depth analyses of the fine-grained elements of immigration application submission processes, even though the ways in which migration is governed through these applications, we argue, have significant implications. AccE allows practitioners to draw longitudinally from encounters with migration governance in real-world scenarios to make linkages with theory.

To ensure rigor, Levitan et al.’s vision of AccE incorporates six (not necessarily sequential) practices: (1) *initiation* (an experience or ‘unsettling moment’ which elicits a connection between practice and theory), (2) *reflection* (on one’s practice), (3) *re-examination* (of literature to consider how one’s practice fits within academic literature), (4) *data collection* (of primarily pre-existing empirical data), (5) *coding* (which is typically emergent and based on emic knowledge), and (6) *recursive consultations* (in which research and reflections are connected back to one’s practice and, ideally, brought into action). As two practitioner-researchers collaborating on a single ethnographic account, we followed a modified version of Levitan et al.’s steps. In the next section, we describe our positionalities and AccE approach.

Researcher Positionality

We co-authors met through our shared professional network. The first author (Brunner) provided immigration advice to international students at one of Canada’s largest universities for over a decade as an International Student Advisor and a Regulated Canadian Immigration Consultant. She is a white settler who immigrated to Canada from the United States through an *edugration* pathway and is now an interdisciplinary scholar-practitioner who researches and teaches in the areas of education and international migration. The second author (Tao) is a Canadian-born settler who is an immigration and refugee lawyer as well as a policy researcher. His focus on international students was largely influenced by (1) his late father, who pursued post-graduation studies in Canada as an international student, and (2) his spouse, a former Canadian international student. We are both involved in national discussions and consultations related to

international student policy; Tao, for example, has testified in front of the Parliamentary Committee on Citizenship and Immigration. *Edugration* is thus intertwined with our academic, professional, and personal lives.

Initiation, Reflection, and Re-examination

As gradual shifts in Canadian immigration policies and practices emerged in our work, we both developed an interest in the intersection of technology and migration governance, and, in particular, the impact of these shifts on the international students we advised. These shifts showed up our practices in unsettling ways, such as the growing number of international students reporting adverse study permit application complications seemingly related to IRCC's use of AI and automation. We thus independently recognized the need for a broader discussion beyond our immediate community of practice.

Tao connected practice and theory by writing public-facing analyses of AI and automation on his blog, while Brunner presented and wrote about the connections she observed between her PhD dissertation research and her international student advising work. Brunner decided to write an academic paper on the topic to reach the international student academic research community. After conducting an initial literature review and developing a draft study, Brunner reached out to Tao to expand the study's scope by incorporating Tao's ongoing praxis through a collaborative AccE study. This spurred new cycles of reflection and re-examination.

Research Sites and Data Collection

A key feature of AccE is its focus "on past information and experience that was not collected as part of a pre-designed study" (Levitan et al., 2020, p. 338). AccE data collection is thus non-linear, and the recognition of pre-existing data involves a reflexive, memory-based process. While identifying what constitutes relevant data in an AccE study is often difficult, it is partially mitigated by researchers' intimate knowledge of the data (Levitan et al., 2020).

For our study, a major source of pre-existing empirical data was collected while providing case-specific legal advice to international students. This data included our observations of international students' interactions with Canadian immigration policies and application procedures, as well as our own responses – both affective and practice-oriented – to these interactions, policies, and procedures. Brunner interacted directly with approximately 3,500 international student cases from 2012 to 2023, typically answering questions in a relatively limited capacity within a fast-paced university student services office. Tao interacted directly with approximately 1,000 international student cases from 2015 to 2023, often in a more in-depth capacity in his private legal practice.

To provide this advice, we also regularly engaged with texts, including legislation, regulations, case law, policy documents, instructional manuals, government websites, and gray literature. In order to support international students whose applications were, or had the potential be, refused or assessed

incorrectly as a result of technological developments, we additionally engaged in research-driven data collection practices to understand (1) what occurred in each case, and (2) what might occur in future cases. This aspect of our work involved a dynamic process of recording and assessing international students' experiences, participating in case consults with peers, filing application reconsideration requests, making hundreds of Access to Information requests, and requesting and accessing dozens of government datasets. Tao additionally engaged in judicial reviews.

Extant data was also collected during more general practitioner tasks required to competently perform our work. As regulated professionals, we are required to engage in ongoing formal continuing professional development. We also engage in our respective communities of practice by attending and presenting at professional conferences, interacting with colleagues on message boards and listservs, writing briefs, participating in stakeholder consultations, conducting media interviews, and advocating for more transparent policies and systems.

Through an AccE lens, these all became data sources. Our study also involved newly collected empirical data in that the initiation of the AccE research triggered new, more theoretical retrospective reflections of our work.

Coding and data analysis

As suggested by Levitan et al. (2020), our coding was emergent and based on emic knowledge. We independently identified initial themes, a process informed in part by our existing portfolios of professional writing, presentations, and briefs in which we had already identified key technological trends as part of our work. The process of managing our respective practices and maintaining compliance with competent practice standards also contributed to our coding process, as it inherently involved a form of coding when recording case information. We followed this interpretive process with discussions, in which we found our themes largely congruent.

Recursive Consultations and Trustworthiness

According to Levitan et al. (2020), the purpose of recursive consultations in an AccE study is to connect research and reflections back to one's practice. Given that our study was jointly conducted by two scholar-practitioners, we were able to make these connections not only to our own practices but also with each other in a co-creation of meaning. We additionally reflected on recursive consultations with a range of stakeholders in both our practices – e.g., through participation in policy-related consultative committees and meetings – which helped position our individual observations of international student experiences within broader trends. These consultative processes added a triangulation component to the AccE and allowed us to refine our findings, strengthening the trustworthiness of our study. In what follows, we discuss our findings.

AI AND AUTOMATION IN CANADA'S INTERNATIONAL STUDENT MIGRATION GOVERNANCE

Through our work with thousands of international students, we suggest that the use of AI and automation in the assessment of study permit applications is of concern due to the (1) complex and subjective decision-making involved, and (2) consequence of error. The majority of students we advise apply to study in Canada as part of a long-term, expensive, and often multi-generational gamble in hopes of successfully utilizing Canada's *edugration* policies to immigrate permanently to Canada. As a result, a study permit is almost always a high-stakes application.

AI and automation are not inherently 'bad'; after all, they are ultimately based on inherently biased human-controlled inputs and can, hypothetically, be used to mitigate both explicit and implicit bias by reducing the reliance on prejudiced human decision making. However, two key concerns arise. The first is the potential for new, or more deeply entrenched, forms of systemic racism and discrimination (Nalbandian, 2020), surveillance, and/or border imperialism, which become justified and legitimized by a false sense of neutrality and/or consistency. Secondly, the cost of errors is likely to be borne disproportionately by non-citizen temporary residents with limited recourse. For example, in the UK, the use of voice recognition technology to assess potential cheating among international students on language proficiency testing was found to have likely been flawed, resulting in the deportation of students on erroneous information ("Students 'may have been unfairly deported'," 2019).

In response to these concerns, we present three themes which emerged from our practitioner-based data: (1) 'bots at the gate' and the guise of objectivity, (2) a murky international edu-tech industry, and (3) the administrative burdens of digitalized application systems.

'Bots at the gate' and the guise of objectivity

Borrowing from Molnar and Gill's 2018 human rights-based analysis of automated decision-making in Canada's immigration and refugee system (2018), the term 'bots at the gate' refers to the gatekeeping function AI and automation play in entrenching administrative borders. While such technology is often legitimized by an assumption of objectivity, its algorithms can "amplify race, class, gender, and other inequalities of the past" (Deshaies & Hall, 2021, para. 5) – just as humans can and do. In immigration decision-making, AI and automation rely on the codification of historical data as the starting point for application assessments, reinforcing biases which are then often hidden behind black-box algorithms and rules. AI can also suffer from a lack of explainability in administrative decisions so that "one cannot explain how the system arrived at its predictions or classification" (Deshaies & Hall, 2021, para. 6).

It was immigration practitioners who first recognized a documented pattern of overseas study permit and TRV application refusals with entirely templated justification language, uncovering the federal government's behind-the-scenes efforts to utilize technology to automate decision-making and render bulk

decisions (Tao, 2022a; Ziaie, 2021). Based on our observations, the negative impacts of these processes appear to be borne by racialized applicants from high-volume, Global South visa offices. This has necessitated a change in our approach to advising international students; we can now predict when study permit applicants are likely to be either refused (based on generic, automated justifications) or experience abnormally long delays (as a result of being pulled out of automated-triaging systems) based on often unchangeable facts, such as one's citizenship, age, and/or marital status.

More broadly, this has the potential to exacerbate the inequities of what has become a two-tier system, especially given the documented "racial biases in the application of [IRCC's] programs, policies and client service" and "administrative practices that introduce biases or the potential for bias" (IRCC, 2021a, p. 7). Because Canada relies on multi-step immigration in which PRs are selected from TFWs – many of whom first come to Canada as international students – "Chinook and its successors will effectively act as gatekeepers for immigration to Canada by selecting the future pool of potential immigrants" (Ziaie 2021, para. 10). Based on our practitioner-based case research, we know that IRCC's use of advanced analytics and Chinook already help facilitate a larger big-data strategy to identify patterns amongst immigration applications, which plays into its overall bordering and surveillance strategy (IRCC, 2022b; Canada Border Services Agency, 2022) as well as its international student compliance regime more specifically (Brunner, 2023).

A murky international edu-tech industry

Compared to IRCC, the third-party edu-tech industry receives considerably less critical attention regarding its use of AI and automation, even as its presence in the study permit application process has become pervasive. For a fee, international students can, for example, interact with large language models to ask questions of 'virtual immigration lawyer' chatbots or generate personalized study permit application materials, such as study plan essays. While most services loosely replicate work previously done by international student recruiters, advisors, and legal practitioners, agent aggregators and verification platforms stand apart in their large-scale impacts on international student governance.

Agent aggregators use AI, machine learning, and other technology to connect international students and post-secondary institutions through recruitment platforms. These aggregators arguably also perform an immigration gatekeeping function in their solicitation of international students on behalf of post-secondary institutions and, by extension, the state. Verification platforms corroborate the authenticity of documents, e.g., post-secondary acceptance letters and language proficiency tests for immigration departments and other clients. These companies are big business; for example, ApplyBoard, which supports both agent aggregation and verification functions, has been consistently ranked amongst the top fastest-growing tech companies in Canada, with a multi-billion-dollar valuation (Waterloo Region Record, 2021).

The private edu-tech industry's use of AI and adjacent technologies means that international students, post-secondary institutions, and governments now rely on proprietary algorithms to facilitate, at least in part, immigration processes. Because such tools are deployed by non-state actors within the private sector, ethical concerns with their technology will be difficult to monitor and challenge until effective AI governance is implemented. This entrenchment also demonstrates the ongoing marketization of both higher education and economic immigration. It can additionally be seen as a reproduction of colonial relations through "the extraction of value from experimentation with new technologies in fragile situations for the benefit of stakeholders, including private companies" (Madianou, 2019, p. 2). For international students, the ability to pay for third-party *edugration*-related services – which facilitate not only immigration support but admission to a higher education institution itself – significantly impacts one's 'life chances' through an AI-mediated 'social-sorting' process (Lyon, 2007).

As practitioners, we see that some international students have come to view private edu-tech companies as the 'face' of Canadian *edugration*. While their websites and advertising material may be more appealing or understandable than those of IRCC, the companies have little accountability to the state and few, if any, authorized immigration practitioners verifying immigration information. For example, an ApplyBoard webpage misleadingly stated that "from January to October 2021, 97.5% of international graduates who applied for permanent residency in Canada were successful," encouraging schools to "be intimately aware of Canada's favourable immigration situation and highlight it in marketing materials" and advising international students that "if immigration is your long-term plan, Canada could be a perfect fit" (ApplyBoard, 2022). Despite calls for quality frameworks and oversight within the higher education sector (e.g., Preece & Nicol, 2021), much appears to go unchecked. We also see that international students will often buy into the misconception that technological advancements and positive data results will improve their chances, or the speed, of study permit approval.

The administrative burdens of digitalized application systems

Finally, international students face new administrative burdens as IRCC enhances the digitalization of application management tools. For most of our professional practice, international students used IRCC's online Secure Account (formerly called MyCIC) to submit applications, which relied primarily on standardized PDF application forms. International student advisors (working on behalf of higher education institutions) and private immigration practitioners have long assisted international students overcome the technical bugs and complexities in IRCC's systems, functioning as a shadow help desk for IRCC. However, the 2021 federal budget allocated 428.9 million CAD over five years for "the delivery of a modern immigration platform...to provide better client service, make operational efficiencies and strengthen program integrity...by leveraging digital capabilities, including strong data management" (Government of Canada, 2021, "Delivering a modern immigration platform"). As part of the move towards an

enterprise-wide digital platform, several new client-facing application management tools were introduced in 2021, including a new IRCC Portal available to users submitting certain applications, such as study permits.

The new IRCC Portal replaced PDF application forms with a dynamic text-entry system. The removal of common application forms – and, along with them, common application instruction manuals – was a significant shift. While previously a PDF document could be completed, reviewed, and edited offline before submission, the new IRCC Portal required a consistent internet connection to navigate; posed different questions from one applicant to the next; and offered limited confirmation of receipt. Additionally, the IRCC Portal allowed for only 2MB per file in its supporting document upload section – half the size of the previous system.

In our practices, we have long observed stark contrasts between study permit applicants with reliable internet connections/computer hardware/strong digital literacy skills and those in more precarious positions, the latter of whom face various administrative burdens and associated costs which exacerbate existing inequities. Due to increasingly complex modes required for data entry and completeness, however, the disparity has increased. Many applicants who might have previously relied on paper-based (often hand-written) application submissions felt compelled to pay (often unauthorized) agencies to submit electronically on their behalf. For those who applied independently, we observed high levels of frustration and mistakes, including failure to pay correct fees, missing documents, uploading issues, difficulty compressing and reducing file sizes, and, at times, study permit refusals due solely to technological issues. Despite a greater propensity of system-caused errors, applicants were left with limited recourses to understand, resolve, and challenge errors.

Even if study permit application systems were improved to reduce administrative burdens, an additional concern is the ability for dynamic text entry systems to facilitate extremely fine levels of big-data analysis (Bircan & Korkmaz, 2021). Data submitted into the new portal is likely incorporated, or will soon be incorporated, into IRCC's larger AI, automation, and/or back-end triage plans. While IRCC has not yet completed its enterprise-wide digital platform rollout, the design of the IRCC Portal indicates an intention to link platforms, likely to better identify patterns and predict risk based on past analytics for future applications. This aligns with other IRCC cross-platform data-sharing procedures which, despite being not well understood publicly, indicate a safety-state surveillance approach through big-data synthesis techniques (Brunner, 2023; Lyon, 2007). For this reason, enhancements to digital application management environments in the name of increased efficiency should also be viewed with skepticism and critical analysis rather than a focus on their surface-level usability.

CONCLUSION

As we have shown, developments in AI and AI-adjacent technologies are impacting the migration governance of international students in complex ways. In an effort to manage an increasing volume of study permit applications,

governments are turning to AI and automation tools, such as Chinook in Canada, as solutions to improve efficiency; such tools are rightfully raising transparency and ethical concerns. However, so too should related, less obvious changes, such as the reliance on technological advances in the private sector, the digitalization of application systems, and the use of big-data, all of which mediate segments of many countries' future immigrant pools.

The migration governance of international students also relates to much broader issues of security, administrative burdens, migration governance, and border imperialism, and, as such, requires more scholarly attention. In Canada, the use of advanced technologies is currently a 'selling point' of its immigration system, with developments marked by many, including the Canadian government, as processes which benefit applicants. Success is portrayed as speediness, efficiency, and streamlined procedures. However, the use of AI and automation in bulk processing results in automated eligibility approvals for some, and delays, along with potentially questionable refusals, for many. It also produces complex linkages between migration, higher education, and technology sectors.

AI is predicted to significantly impact migration in the future, from individual rights to long-term international patterns of movement (Beduschi, 2021; Bircan & Korkmaz, 2021; McAuliffe et al., 2021; McCarroll, 2020). As countries move towards 'AI Governance' models, and the public calls for greater transparency on the rules and application of AI and other digital technologies, international education researchers have a role to play, given the immense implications for international students globally. Migration and education researchers alike will need to understand a new vocabulary of terms, such as *advanced/predictive/prescriptive analytics*, *deep learning/neural network*, and *machine learning*, to name just a few (Tao, 2022b).

Finally, given the lack of transparency and delay in which these developments are revealed to the public, knowledge about them may come through 'accidental' means, e.g., through the work of practitioners who trace causation through high volumes of client files. Researchers may benefit from the insights of legal migration practitioners who are typically aware of potential trends before those less embedded in the everyday negotiation of migration governance. As migration and education increasingly intersect through *edugration* policies, the use of AI and automation discussed here is likely to have major down-stream impacts on education systems. In this way, technological advances in migration may govern not just international students but also, to some extent, education systems themselves.

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