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AI AGENTS AS POLICY INSTRUMENTS IN EDUCATION: REDUCING SCHOOL ABANDONMENT THROUGH ADAPTIVE GOVERANANCE SYSTEMS

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Abstract:
This paper analyzes the deployment of AI agents within national education strategies aimed at improving learning outcomes and reducing early school abandonment. It conceptualizes AI agents not only as educational technologies, but as policy instruments capable of reshaping governance, resource allocation, and early-warning mechanisms in public education systems. The study focuses on the use of AI agents for student risk detection, personalized learning pathways, administrative burden reduction, and real-time policy feedback loops. Drawing on policy design and socio-economic analysis, the paper highlights how AI agents can identify structural drivers of dropout, such as poverty, regional inequality, and institutional rigidity, earlier and more accurately than traditional administrative tools. At the same time, it examines key risks related to data bias, algorithmic labeling of vulnerable students, and the potential reinforcement of socio-economic stratification. The paper proposes a governance framework for educational AI agents based on transparency, pedagogical alignment, and social safeguards, ensuring that automation complements rather than replaces human judgment. The central argument is that AI agents, when embedded in inclusive and accountable policy architectures, can function as preventive governance mechanisms, shifting education policy from reactive remediation to proactive social investment.

Keywords: Artificial intelligence agents; education policy; school abandonment; early warning systems; personalized learning; public sector digitalization; social inequality

1.Introduction

One of the biggest problems with modern education systems is that kids drop out of school too soon. Many countries still have high rates of early school leaving, especially among students from low-income families, even though they have made changes to their schools and policies over the years to try to make it easier for students to get to school and finish their studies. The effects go far beyond the school system itself; they also hurt the economy, the job market, and long-term social cohesion. People who drop out of school early are more likely to be unemployed, earn less money over their lives, and have fewer chances to move up the social ladder. This makes cycles of inequality last longer. Consequently, diminishing school dropout rates has emerged as a primary goal of national education policies and international institutional frameworks aimed at fostering inclusive economic development and social resilience (Rumberger, 2011; OECD, 2019; UNESCO, 2020; Burlacu et al., 2023; Rădulescu et al., 2023)

2.Early School Abandonment as a Structural Policy Change

Early school abandonment is acknowledged as a complex phenomenon influenced by the interplay of social, economic, institutional, and individual factors. School dropout is not merely the result of individual educational failure; it typically signifies broader structural inequalities entrenched in society and perpetuated within educational systems. Studies consistently indicate that students hailing from economically disadvantaged households, rural areas, or marginalized communities encounter a markedly elevated risk of premature school departure. These patterns underscore the influence of socio-economic context on educational trajectories and indicate that school abandonment cannot be mitigated solely through pedagogical reforms or curriculum modifications. Rather, it necessitates comprehensive policy interventions that acknowledge the overarching structural factors affecting educational participation (Rumberger, 2011; UNESCO, 2020; OECD, 2019; Burlacu et al., 2023; Bran et al., 2023).

3.Artificial Intelligence in Education Governance

The fast growth of digital technologies has changed a lot how schools get, store, and understand information about how students learn and teach. In the last 20 years, schools and colleges have used data-driven tools more and more to collect a lot of information about how students act, do in school, and how well the school does overall. This process has led to the rise of data-driven governance models in which digital analytics, algorithmic evaluation, and predictive modeling are used more and more to help make decisions about education. In this changing world, artificial intelligence is starting to have a bigger impact on how educational systems keep track of performance, distribute resources, and create policy changes to improve learning outcomes (Williamson, 2017; Selwyn, 2016; OECD, 2021; Burlacu et al., 2022; Burlacu et al., 2024).

4.AI Agents as Policy Instruments

The concept of policy instruments occupies a central role in public policy analysis, referring to the mechanisms through which governments translate policy objectives into operational actions. Policy instruments include regulatory frameworks, financial incentives, institutional arrangements, and informational tools that shape the behavior of individuals and organizations within a given policy domain. Traditionally, education policy instruments have taken the form of funding mechanisms, curriculum standards, accountability systems, and regulatory oversight structures designed to influence educational outcomes. However, as governance systems become increasingly data-driven, digital technologies have begun to emerge as a new category of policy instruments capable of influencing how public institutions monitor, evaluate, and adapt policy interventions. In this context, artificial intelligence systems—and particularly AI agents—can be conceptualized as technological instruments embedded within governance architectures that support decision-making, policy monitoring, and institutional coordination (Hood, 1986; Lascoumes and Le Galès, 2007; OECD, 2021; Burlacu et al., 2024).

5.Governace Risks, Socio-Economic Implications, and the Transition Toward Preventive Educational Policy

While artificial intelligence agents offer significant potential for improving the effectiveness of education governance, their deployment within public education systems also introduces a series of institutional, ethical, and socio-economic challenges that must be addressed carefully. Algorithmic systems operate by identifying patterns within historical datasets, and these datasets frequently reflect pre-existing inequalities embedded in society and educational institutions (Selwyn, 2016; Williamson, 2017; OECD, 2021; Bran et al., 2023; Rădulescu et al., 2022). As a result, predictive models designed to detect dropout risk may unintentionally reproduce or amplify existing social disparities if they rely on biased or incomplete data. Students from disadvantaged backgrounds, minority communities, or economically marginalized regions may be disproportionately classified as high-risk, potentially reinforcing institutional expectations that contribute to further educational marginalization. Without adequate oversight mechanisms, algorithmic governance systems risk transforming predictive insights into self-reinforcing cycles of educational stratification (Selwyn, 2016; Williamson, 2017; OECD, 2021).

6.Conclusions, Limitations and Future Pathways

The increasing complexity of contemporary education systems has intensified the need for governance mechanisms capable of addressing structural challenges such as early school abandonment in a more adaptive and proactive manner. This paper has argued that artificial intelligence agents can function not merely as technological tools within educational environments but as policy instruments embedded within governance systems that support early detection, targeted intervention, and dynamic policy feedback. By integrating predictive analytics, large-scale educational data, and socio-economic indicators, AI agents have the potential to significantly enhance the capacity of policymakers and educational institutions to identify early signals of student disengagement and implement preventive interventions before these signals evolve into irreversible dropout outcomes. In this sense, the integration of AI agents into education governance can contribute to shifting education policy from reactive remediation toward preventive governance models that prioritize long-term social investment and educational resilience (OECD, 2021; Holmes, Bialik and Fadel, 2019; Brynjolfsson and McAfee, 2014; Burlacu et al., 2023; Rădulescu et al., 2025)..

The analysis also highlights that AI-enabled governance systems can generate new forms of policy intelligence capable of identifying structural drivers of educational inequality that may remain invisible within traditional administrative monitoring frameworks. By analyzing large-scale datasets across institutional, behavioral, and socio-economic dimensions, AI systems can help policymakers detect patterns related to regional disparities, economic vulnerability, and institutional rigidity that contribute to school abandonment. Such insights can support more targeted and evidence-based policy interventions, allowing governments to design integrated strategies that connect education policy with broader social and economic development policies. However, realizing this potential requires ensuring that AI-driven governance mechanisms remain aligned with the normative objectives of education systems, particularly those related to equity, inclusion, and social mobility (Williamson, 2017; Selwyn, 2016; UNESCO, 2020).

Despite these opportunities, the deployment of AI agents within education governance also presents significant institutional and ethical challenges. Algorithmic systems rely heavily on historical data that may reflect existing social inequalities, creating the risk that predictive models reproduce or amplify structural biases present within educational systems. Moreover, the use of predictive analytics to classify students according to dropout risk introduces concerns related to stigmatization, algorithmic determinism, and the potential erosion of pedagogical autonomy. These risks underline the importance of designing governance frameworks that ensure transparency, accountability, and human oversight in the development and deployment of AI systems in education. Without such safeguards, technological innovation may unintentionally undermine the very policy objectives it seeks to support (Selwyn, 2016; Williamson, 2017; OECD, 2021).

Several limitations must be acknowledged in relation to the present study. First, the analysis presented in this paper is primarily conceptual and policy-oriented, focusing on the theoretical potential of AI agents within educational governance rather than on empirical implementation within specific national education systems. As a result, the practical effectiveness of AI-driven governance mechanisms may vary depending on institutional capacity, digital infrastructure, and regulatory frameworks across different countries. Second, the integration of AI agents into education systems depends heavily on the availability and quality of educational data infrastructures, which remain unevenly developed across many regions. Third, ethical and legal considerations regarding data protection, algorithmic transparency, and institutional accountability may significantly influence the pace and scope of AI adoption in education policy (OECD, 2021; Holmes, Bialik and Fadel, 2019; Williamson, 2017).

Future research should therefore focus on empirical investigations of AI-enabled governance mechanisms within real-world educational contexts. Comparative studies across different national education systems could provide valuable insights into how institutional structures, regulatory frameworks, and socio-economic conditions influence the effectiveness of AI-driven policy instruments. Additionally, pilot programs integrating AI agents into early-warning systems for school abandonment could generate important evidence regarding the practical benefits and limitations of predictive governance approaches. Interdisciplinary research combining education policy, data science, and public governance will be particularly important for understanding how technological innovation can be integrated responsibly within public education systems (Holmes, Bialik and Fadel, 2019; OECD, 2021; Russell and Norvig, 2021).

Beyond empirical evaluation, future research should also explore the development of governance frameworks for responsible educational AI, including mechanisms for algorithmic auditing, ethical oversight, and participatory governance involving educators, students, and communities. As AI technologies continue to evolve, education systems must ensure that digital transformation remains aligned with broader social objectives such as equality of opportunity, democratic accountability, and inclusive development. The challenge facing policymakers is therefore not simply the adoption of new technological tools but the creation of institutional architectures capable of integrating these tools within governance systems that prioritize both innovation and social responsibility (Selwyn, 2016; Williamson, 2017; UNESCO, 2020).

In conclusion, artificial intelligence agents represent a promising avenue for strengthening the capacity of education systems to address early school abandonment through more adaptive and data-informed governance mechanisms. When embedded within transparent and accountable policy frameworks, AI agents can help transform education policy into a proactive instrument capable of identifying structural vulnerabilities, supporting early intervention, and improving the long-term resilience of education systems. The future of educational governance will therefore depend not only on technological progress but also on the ability of institutions to integrate artificial intelligence within policy architectures that remain fundamentally committed to equity, human judgment, and the public value of education (OECD, 2021; Holmes, Bialik and Fadel, 2019; Brynjolfsson and McAfee, 2014).