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AI Agents as Policy Instruments in Education: Reducing School Abandonment through Adaptive Governance 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

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economic development and social resilience (Rumberger, 2011; OECD, 2019; UNESCO, 2020; Burlacu et al., 2023; Rădulescu et al., 2023)

Conventional policy strategies aimed at mitigating early school dropout rates have predominantly depended on retrospective monitoring frameworks utilizing administrative statistics, standardized assessments, and regular institutional reporting (Burlacu et al., 2022; Burlacu et al., 2024). These tools can help us learn more about how well students are doing in school, but they often only find problems after students have already stopped learning. In numerous instances, intervention mechanisms are initiated too late, resulting in a markedly reduced likelihood of re-engagement. Additionally, the occurrence of school abandonment seldom results from a singular factor; instead, it arises from intricate interactions among socio-economic conditions, institutional frameworks, and individual circumstances. Poverty, family instability, regional economic disparities, and institutional rigidity often interact in ways that are hard to see with normal administrative monitoring systems. As a result, policymakers in education are realizing more and more that they need tools that can find risk patterns earlier and help with faster interventions (Rumberger and Lim, 2008; Ferguson, 2012; European Commission, 2020).

Recent progress in AI and big data analytics has made it possible to change how education systems keep track of students' progress and make policy decisions. In the past few years, AI-driven technologies have become more common in schools through adaptive learning platforms, automated assessment tools, and learning analytics systems. These technologies can handle a lot of educational data, find patterns in how students act, and give teachers information that can help them make better decisions about how to teach. But artificial intelligence can be used for more than just things that happen in the classroom. New types of AI agents, like self-driving or semi-self-driving computers that can look at large datasets, find problems, and make predictions, could be used to directly add predictive intelligence to public governance systems. When incorporated into educational policy frameworks, these agents can enhance early-warning systems, pinpoint systemic weaknesses in educational structures, an offer ongoing feedback to policymakers tasked with formulating and executing national education strategies (Brynjolfsson and McAfee, 2014; Williamson, 2017; Holmes, Bialik, and Fadel, 2019; Rădulescu et al., 2025; Nica et al., 2023).

In this changing world of technology, artificial intelligence can be thought of as more than just an educational tool; it can also be thought of as a tool for policy that is built into governance systems. In this context, AI agents serve as analytical and operational elements within institutional decision-making frameworks, enabling policy formulation, outcome assessment, and the facilitation of adaptive responses to emerging risks. AI agents may help education systems find early signs of disengagement by combining predictive analytics with large amounts of administrative and socio-economic data. This would let institutions step in before students reach critical points of withdrawal from the education system. This transition from retrospective monitoring to predictive governance signifies a substantial evolution in the implementation and assessment of education policy within increasingly intricate social contexts (Selwyn, 2016; Luckin et al., 2016; OECD, 2021; Burlacu et al., 2024)..

This paper examines the function of AI agents as governance tools in national education strategies designed to enhance learning outcomes and diminish early school

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dropout rates. The main point is that AI agents can help move from reactive policy intervention to preventive governance mechanisms if they are built into adaptive governance systems that are open, accountable, and have social safeguards. AI-enabled governance systems may assist policymakers in the early identification of structural drivers of educational inequality and the formulation of more targeted policy responses by facilitating early risk detection, personalized learning pathways, and real-time policy feedback loops. Simultaneously, the incorporation of AI systems into public education presents considerable ethical, institutional, and socio-economic challenges that necessitate meticulous consideration to guarantee that technological advancement enhances rather than diminishes educational equity and social inclusion (Selwyn, 2016; Holmes, Bialik, and Fadel, 2019; OECD, 2021).

1. 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).

Socio-economic inequality is a major reason why students drop out of school early. Students from low-income families often have a hard time staying in school because they don't have access to enough educational resources, their living conditions are unstable, and their parents don't encourage them to do well in school. Economic vulnerability may compel students to prematurely enter the labor market to augment household income, especially in areas with inadequate social protection systems. These dynamics illustrate the profound interconnection between educational outcomes and overarching economic frameworks and social policies (Belfield and Levin, 2007; Rumberger and Lim, 2008; OECD, 2019; Nica et al., 2023; Rădulescu et al., 2022). Consequently, educational systems that seek to mitigate dropout rates solely through internal institutional reforms may neglect the external socio-economic factors that influence students' capacity to remain engaged in their education (Belfield and Levin, 2007; Rumberger and Lim, 2008; OECD, 2019).

Regional differences are also a big part of what causes people to lose interest in school. There are big differences between urban and rural schools in many countries when it comes to things like school buildings, teacher availability, digital access, and extracurricular activities. Students in disadvantaged areas may have less access to institutional resources that can help them learn, which makes it more likely that they will lose interest over time. Moreover, educational institutions in economically disadvantaged areas may encounter further challenges concerning funding, administrative capabilities,

and access to specialized support services. These structural imbalances lead to uneven dropout risks across different geographic areas, which makes existing regional inequalities worse and makes it harder for students in less fortunate areas to move up in society (European Commission, 2020; UNESCO, 2020; OECD, 2021).

Institutional elements within educational systems also play a role in school dropout rates. It is more likely that students will lose interest if the curriculum is too strict, there aren't enough ways for students to personalize their learning paths, or there isn't enough help for students who are having trouble with their studies. Standardized teaching methods are often used in traditional schools, but they may not be able to meet the needs of all students. If students keep failing in school and don't get the help they need, they may slowly lose interest in school and eventually drop out. In this context, institutional rigidity can function as a structural impediment that inhibits education systems from accommodating the diversity of student learning profiles (Selwyn, 2016; Holmes, Bialik, and Fadel, 2019; Luckin et al., 2016).

Another major problem with traditional education governance systems is that they don't have good early-warning systems that can find students who are at risk of dropping out before it becomes too late. Most systems for monitoring administration depend on periodic reporting cycles and aggregated statistical indicators, which don't always pick up on early signs of declining engagement. For instance, subtle patterns like less participation, irregular attendance, or a slow drop in grades may not immediately cause institutions to respond in traditional monitoring systems. Consequently, interventions are often executed only subsequent to students attaining advanced levels of disengagement. This reactive governance model greatly weakens the effectiveness of policy responses and makes it harder for education systems to stop students from dropping out instead of just dealing with the problems that come up as a result (Ferguson, 2012; Williamson, 2017; OECD, 2021).

To stop kids from dropping out of school early, we need to move away from reactive policy responses and toward governance models that can find structural weaknesses earlier and help proactive intervention strategies. Education systems need to create ways for policymakers and schools to spot patterns of risk before they lead to students dropping out. This means using more advanced analytical tools that can handle large amounts of data and find small signs of disengagement in large groups of students. In this context, new technological tools, especially those that use artificial intelligence and predictive analytics, can help education governance systems better predict risks and come up with targeted policy solutions (Holmes, Bialik, and Fadel, 2019; OECD, 2021; Brynjolfsson and McAfee, 2014).

2. 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

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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).

The first uses of AI in education were apps that helped with teaching and learning, like adaptive learning platforms, intelligent tutoring systems, and automated assessment tools. These technologies use machine learning algorithms to look at how students interact with educational content and change how they teach based on what they find. Adaptive learning environments can make learning more personal by giving students more resources or different ways to explain things when they have trouble. These kinds of systems have shown that they can make learning more interesting and effective, especially in big classrooms where it might be hard to give each student personalized attention with just traditional teaching methods. Consequently, AI-driven educational technologies have been progressively integrated into both traditional classrooms and digital learning platforms across diverse educational settings (Holmes, Bialik, and Fadel, 2019; Luckin et al., 2016; Ferguson, 2012).

Artificial intelligence is becoming more and more a part of the administrative and management systems of schools and colleges, in addition to being used in the classroom. Schools and colleges now use complicated information systems to keep track of student records, attendance patterns, grades, and other measures of institutional performance. When used with machine learning algorithms, these data infrastructures help administrators find patterns in student performance, predict enrollment trends, and judge how well educational programs are working. When schools use AI-based analytics in their administrative work, they can go from descriptive reporting to predictive analysis help policymakers and administrators better prepare for problems and take steps to fix them (Williamson, 2017; OECD, 2021; Brynjolfsson and McAfee, 2014; Rădulescu et al., 2025). In this way, AI is slowly becoming a key part of running schools and managing institutions (Williamson, 2017; OECD, 2021; Brynjolfsson and McAfee, 2014).

As part of this bigger change in how education is run, the idea of AI agents has become an important technological advance. AI agents are either fully autonomous or partially autonomous computer systems that can keep an eye on complicated data environments, find patterns, make predictions, and give advice on what to do next. AI agents work all the time in digital systems, automatically finding unusual patterns or trends that may need the attention of the institution. This is different from traditional analytics tools, which need people to process and interpret the data. In the realm of education governance, these agents can oversee extensive datasets that include details on student attendance, academic advancement, socio-economic metrics, and behavioral indicators, enabling institutions to identify potential risks significantly earlier than traditional administrative monitoring systems (Russell and Norvig, 2021; Holmes, Bialik, and Fadel, 2019; Williamson, 2017).

The incorporation of AI agents into educational governance frameworks generates novel opportunities for adaptive policy management. Traditional ways of evaluating policies often use periodic reports and looking back at past statistics, which can slow down how quickly institutions respond to new problems in education. On the other hand, AI-powered governance systems can create real-time feedback loops between schools and

government officials. These feedback systems make it possible to keep an eye on educational outcomes all the time and let policymakers change policy tools on the fly in response to new trends in the education system. For instance, if predictive models show that certain schools or areas are at a higher risk of students dropping out, policy responses like targeted support programs, more money, or changes to how teachers teach can be put in place more quickly. This ability to change policies all the time is a big step forward for how public education systems can deal with complicated social problems (OECD, 2021; Brynjolfsson and McAfee, 2014; Selwyn, 2016).

The increasing dependence on artificial intelligence in public education governance simultaneously prompts significant inquiries concerning transparency, accountability, and institutional oversight. AI systems often use complicated algorithmic models that are hard for people who aren't experts to understand. Because of this, it's important to make sure that decision-making processes are clear and easy for teachers, administrators, and policymakers to understand. Algorithmic systems may unintentionally replicate prevailing social biases present in training datasets or generate recommendations that contradict educational objectives in the absence of sufficient governance frameworks. The incorporation of AI agents into educational governance necessitates not only technological proficiency but also resilient institutional frameworks aimed at maintaining the alignment of algorithmic decision-support tools with educational principles and standards of public accountability (Selwyn, 2016; Williamson, 2017; OECD, 2021).

In this context, artificial intelligence should not be perceived as a substitute for human decision-making in educational systems. AI agents are not meant to replace teachers and policymakers; instead, they are meant to help them understand complicated data environments and deal with new problems more effectively. When used correctly, these systems can help policymakers make decisions based on facts, make better use of educational resources, and help schools deal with structural inequalities that affect student outcomes. The current challenge for education systems is not whether to incorporate artificial intelligence into governance processes, but rather how to design such integration to enhance educational equity, institutional transparency, and democratic accountability (Holmes, Bialik, and Fadel, 2019; OECD, 2021; Russell and Norvig, 2021).

3. 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

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thatsupport decision-making, policy monitoring, and institutional coordination (Hood, 1986; Lascoumes and Le Galès, 2007; OECD, 2021; Burlacu et al., 2024).

Understanding AI agents as policy instruments requires moving beyond the view of artificial intelligence as merely a technological tool used in classrooms or administrative processes. Instead, AI agents can function as governance components capable of shaping how policies are implemented and evaluated across complex institutional systems. These agents operate by continuously processing large datasets generated within education systems, including attendance records, academic performance indicators, behavioral signals, and socio-economic information. Through machine learning models and predictive analytics, AI agents can identify patterns that indicate potential risks or emerging institutional challenges. When integrated into education governance structures, such agents allow policymakers to monitor policy outcomes in real time, enabling faster responses to emerging issues such as rising dropout rates or declining academic engagement (Williamson, 2017; Holmes, Bialik and Fadel, 2019; Russell and Norvig, 2021).

One of the most significant policy functions of AI agents in education governance lies in their capacity to support early detection of dropout risk. Traditional monitoring mechanisms typically rely on periodic reporting systems that identify educational problems only after significant deterioration in student performance or attendance has occurred. By contrast, AI agents can analyze multiple indicators simultaneously and detect subtle patterns associated with early stages of disengagement. For instance, predictive models may identify correlations between declining participation in classroom activities, irregular attendance, and socio-economic vulnerability that signal an increased probability of school abandonment. By identifying these signals earlier, educational institutions can implement targeted interventions—such as mentoring programs, academic support, or social assistance—before students reach critical thresholds of disengagement. This capacity transforms policy implementation from reactive remediation toward preventive intervention (Ferguson, 2012; Holmes, Bialik and Fadel, 2019; OECD, 2021).

AI agents can also function as policy instruments by supporting the development of personalized learning pathways within public education systems. Traditional educational models often rely on standardized curricula and instructional approaches that may not adequately address the diversity of student learning profiles. AI-driven systems can analyze learning patterns and recommend individualized learning trajectories designed to support students experiencing academic difficulties. By adjusting the pace, content, or format of instruction, such systems can help maintain student engagement and reduce the likelihood that academic challenges evolve into long-term disengagement. From a policy perspective, the ability to personalize learning at scale allows governments to address structural inequalities within education systems more effectively, particularly when vulnerable students receive tailored educational support that responds to their specific needs (Luckin et al., 2016; Holmes, Bialik and Fadel, 2019; Selwyn, 2016).

A further policy dimension of AI agents concerns the reduction of administrative burdens within educational institutions. Teachers and school administrators often dedicate significant time to administrative reporting, data management, and performance monitoring activities that may reduce the time available for pedagogical engagement with students. AI agents can automate many of these routine tasks by continuously collecting, organizing, and interpreting institutional data. Automated data processing systems can

generate reports, identify anomalies in performance indicators, and provide decision-support insights to educators and administrators. By reducing administrative workload, AI agents allow educators to focus more directly on teaching and student support, thereby strengthening the pedagogical core of educational institutions while improving institutional efficiency (Brynjolfsson and McAfee, 2014; Williamson, 2017; OECD, 2021).

Perhaps the most transformative role of AI agents as policy instruments lies in their ability to create real-time policy feedback loops within education governance systems. Traditional policy evaluation processes often rely on annual or multi-year reporting cycles that limit the ability of governments to respond quickly to emerging challenges. AI-driven governance architectures can continuously monitor educational data streams and provide policymakers with near real-time insights into policy outcomes. For example, if predictive models detect rising dropout risk in particular regions, policymakers may adjust resource allocation, deploy additional support programs, or implement targeted interventions before structural problems escalate. This capacity for continuous feedback transforms education governance from a static policy implementation model into a dynamic system capable of adapting to changing socio-economic conditions (OECD, 2021; Lascoumes and Le Galès, 2007; Williamson, 2017).

Despite these advantages, conceptualizing AI agents as policy instruments also requires acknowledging that their effectiveness depends heavily on institutional design and governance frameworks. The integration of algorithmic systems into public policy processes must ensure that technological tools remain aligned with educational objectives and democratic accountability standards. If poorly designed, algorithmic decision-support systems may reinforce existing institutional biases or generate recommendations that conflict with pedagogical priorities. Consequently, the deployment of AI agents within education policy must be accompanied by robust oversight mechanisms, transparent decision-making procedures, and institutional safeguards capable of ensuring that algorithmic systems enhance rather than distort public policy goals (Selwyn, 2016; OECD, 2021; Russell and Norvig, 2021).

In this sense, AI agents should be understood not as autonomous policy actors but as institutional instruments embedded within governance frameworks that remain ultimately accountable to human decision-makers. Their value lies in enhancing the analytical capacity of education systems, allowing policymakers and educators to interpret complex data environments and design interventions that address the structural causes of educational disengagement. When embedded within transparent and inclusive governance architectures, AI agents have the potential to become powerful tools for strengthening educational resilience, improving policy responsiveness, and reducing early school abandonment through more proactive and evidence-based policy design (Holmes, Bialik and Fadel, 2019; OECD, 2021; Williamson, 2017).

4. Governance 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

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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).

Another important concern relates to the potential consequences of algorithmic labeling within educational environments. Predictive systems designed to identify students at risk of early school abandonment may generate classifications that influence how educators, administrators, and institutions perceive student potential. While early identification of vulnerability can support targeted interventions, it may also produce unintended stigmatization if risk categories are interpreted as indicators of inevitable academic failure. Educational environments are particularly sensitive to such labeling effects, as teacher expectations and institutional perceptions play a critical role in shaping student engagement and motivation. Consequently, governance frameworks for AI in education must ensure that predictive analytics function as supportive decision-making tools rather than deterministic classification systems that constrain educational opportunities (Holmes, Bialik and Fadel, 2019; Luckin et al., 2016; Selwyn, 2016).

Beyond ethical considerations, the integration of artificial intelligence into education policy also carries broader socio-economic implications. Education systems represent one of the primary mechanisms through which societies reproduce or challenge structural inequalities across generations. If AI-driven governance systems are designed primarily to optimize efficiency or performance metrics without incorporating social safeguards, they may inadvertently reinforce disparities between institutions, regions, or student populations. For example, algorithmic resource allocation models that prioritize performance indicators could channel additional support toward already successful institutions while neglecting schools facing structural disadvantages. To avoid such outcomes, AI systems must be embedded within governance frameworks that explicitly prioritize educational equity, ensuring that predictive analytics contribute to reducing inequality rather than intensifying it (OECD, 2021; UNESCO, 2020; Brynjolfsson and McAfee, 2014).

At the same time, when appropriately designed and governed, AI-enabled policy architectures can significantly enhance the capacity of education systems to identify structural drivers of dropout and address them proactively. By combining educational data with socio-economic indicators such as household income levels, regional development metrics, or access to social services, AI agents can generate deeper insights into the underlying causes of educational disengagement. These insights allow policymakers to move beyond individual-level explanations of dropout and instead focus on systemic factors that require coordinated policy responses across education, social welfare, and regional development policies. In this sense, AI-driven governance systems may facilitate

a more integrated approach to education policy, linking educational outcomes with broader socio-economic policy objectives (Williamson, 2017; OECD, 2021; Rumberger, 2011).

The most transformative potential of AI agents within education policy lies in their capacity to support the transition from reactive remediation toward preventive governance. Traditional education policies often respond to dropout only after students have already disengaged from the educational system, focusing on remedial programs designed to reintegrate individuals who have already left school. While such programs remain important, they are frequently less effective and more costly than preventive strategies that address risk factors earlier in the educational trajectory. AI-driven monitoring systems enable policymakers and educational institutions to detect early signals of disengagement and intervene before these signals evolve into irreversible dropout outcomes. By supporting early intervention mechanisms, AI agents can help transform education policy into a proactive instrument of long-term social investment (OECD, 2019; Holmes, Bialik and Fadel, 2019; Brynjolfsson and McAfee, 2014).

Achieving this transition, however, requires robust governance frameworks that ensure transparency, accountability, and human oversight in the deployment of algorithmic systems. AI agents must operate within institutional architectures that allow educators, policymakers, and communities to understand how predictive models generate recommendations and how these recommendations influence policy decisions. Transparent governance mechanisms, regular algorithmic audits, and clear ethical guidelines are essential for maintaining public trust in AI-driven educational governance. Moreover, human decision-makers must remain central to the interpretation and implementation of algorithmic insights, ensuring that technological systems complement rather than replace professional judgment within educational institutions (Selwyn, 2016; Williamson, 2017; OECD, 2021).

Ultimately, the integration of AI agents into education governance represents not only a technological transformation but also a broader institutional evolution in how societies approach educational policy. When embedded within inclusive and accountable governance frameworks, AI systems can enhance the capacity of education systems to respond to complex socio-economic challenges, allocate resources more effectively, and support vulnerable students before disengagement occurs. In this context, artificial intelligence becomes a tool for strengthening preventive social policy, enabling education systems to function as engines of long-term social resilience and inclusive economic development (OECD, 2021; UNESCO, 2020; Holmes, Bialik and Fadel, 2019).

5. 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

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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).

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