

## Enhancing AI digital literacy among South African youth: A model for inclusive participation

Amahle Brilliant Flatela<sup>1\*</sup>

<sup>1</sup>Department of Information System, University of Fort Hare East London, South Africa, [202112426@ufh.ac.za](mailto:202112426@ufh.ac.za)

Vusumzi Funda<sup>2</sup>

<sup>2</sup>Department of Information System, University of Fort Hare, East London, South Africa, [yfunda@ufh.ac.za](mailto:yfunda@ufh.ac.za),

 <https://orcid.org/0000-0001-9185-8237>

\*Corresponding author

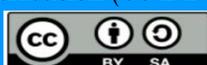
**Abstract:** With the rapid integration of AI now revolutionizing industries all over the world, AI and digital literacy are major skills identified with key future employability and creativity. The demand has never been higher for a digitally literate workforce as AI becomes an integral part of manufacturing, banking, health, education, and other industries. With these changes around the world, some of the major challenges that inhibit the participation of students in AI digital education in South Africa are socioeconomic inequality, inadequate infrastructure, and a shortage of teachers with appropriate training. These challenges narrow access to AI digital literacy, which is an enabler for social and economic inclusion. This paper applies the 1991 Icek Ajzen's TPB framework which provides an in-depth skeleton that is aimed at enhancing AI digital literacy among South Africa's youth. The paper discusses, identifies, and addresses various psychological and social elements of attitudes, subjective norms, and perceived control that influence the youth's involvement in AI digital education. It is a proposed framework that aims at an environment that would encourage AI digital literacy to thrive through definite interventions such as curricular integration, community involvement, teacher training, public-private partnerships, and government policy. Changes in the curriculum can ascertain the inclusion of AI from a tender age into the system, and public-private partnerships offer essential resources and technological access. While teacher training is meant to ensure the quality of AI and digital education, community engagement programs try to change social beliefs toward creating an enabling environment that fosters AI digital learning.

**Keywords:** AI digital literacy, South African youth, Theory of Planned Behavior

### Introduction

Artificial Intelligence (AI) is changing how we interact, live, and work. By facilitating quicker and more precise decision-making through data processing and machine learning algorithms, AI is revolutionizing the healthcare, education, finance, and manufacturing industries (Bohr, 2020). Digital literacy in AI is becoming a crucial skill for people to engage in the global economy in an increasingly AI-driven environment. Significant economic and societal advantages await nations who make investments in AI education and incorporate these competencies into their curricula. However, those who fall behind in acquiring AI digital literacy run the risk of escalating already-existing disparities and becoming even more disadvantaged in the digital era (Funda & Piderit, 2024).

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One important group that could propel future economic growth in South Africa is the country's young population. However, several socioeconomic obstacles prevent many of the nation's youth from receiving AI education. The digital divide makes South Africa's youth unemployment rate, which is among the highest in the world, even worse (Alao, 2020). Youth in underprivileged and rural areas frequently do not have access to computers and the internet which are required for AI education (Moonasamy & Naidoo, 2022). Furthermore, incorporating AI into the national curriculum is difficult for the South African education system, and many schools lack the tools and qualified teachers needed to teach AI-related courses (Adam, 2022). The digital divide not only affects access to technology but also limits career prospects for the youth.

As a result, this inability of South African youth to acquire AI skills creates an extreme disadvantage in the global labor pool in a world fast making AI an integral part of nearly every multi-national business. Besides acting as a deterrent to innovation and technical improvement within their country, low AI and digital literacy tend to make it worse for South Africa to compete globally in AI-driven industries. Previous studies have shown that low AI and digital literacy is not only a barrier to innovation and technical improvement within their country but also makes it difficult to find a place in AI-driven industries. This article tries to address these issues by proffering a strategy that would improve AI digital literacy amongst the youth in South Africa. This study explores attitude, subjective norms, and perceived behavioral control as contributors to the participation of youths in AI digital literacy programs, drawing on Icek Ajzen's Theory of Planned Behavior (TPB). TPB is highly relevant when trying to figure out which obstacles deter youth from engaging in AI education; thus, it provides an implementable tool for the understanding of social and psychological elements of behavior. This framework seeks to foster a more inclusive and equitable AI education system in South Africa by focusing on interventions around curricular integration, community participation, teacher training, public-private partnerships, and government policy. This is required not only in terms of skills development but also as part of a more wide-ranging initiative with regard to socioeconomic differences. By providing its youth with AI skills, South Africa can enable its youth to seize digital economic opportunities and spur national innovation.

The paper presents an action plan, in summary, on how these barriers to AI digital literacy can be removed and recommends solutions at the level of community organizations, schools, legislators, and chief business executives.

## **Literature review**

Understanding the theoretical and empirical backgrounds of the problem is important in the creation of a comprehensive framework for raising AI digital literacy among South African youth. This section looks at the state of research in AI digital literacy, and South African educational challenges, and applies relevant theories that can be used to surmount these challenges.

### **Empirical literature review**

In recent years, interest in AI digital literacy has grown dramatically globally, with more countries integrating AI into their curriculum to keep pace with the digital future. For example, AI4K12 in the US makes sure early exposure to AI capabilities starts by introducing the concepts of AI to children in elementary up to high school level education. The Singapore AI Singapore program has a similar focus on Workforce Development and provides AI digital literacy via business partnerships. These examples demonstrate how important it is to have AI digital literacy become part of educational systems early enough. According to Alao and Brink (2023), there is great demand in South Africa for AI digital literacy, emphasizing that with AI, unemployment can be reduced and encourage creativity.

However, according to Molala (2021), the continuing difficulties faced by South African youth are reflected by a limited number of educated and tech-savvy people in rural areas. Digital gap condition interventions are further complicated by the total lack of AI-based curricula and socio-economic limitations which keep the greater majority of youth out of competition in a hi-tech, globalized environment. Empirical studies also support the idea of conducting AI digital literacy training for teachers. Ndung'u and Signe (2020) further reduce the possibility of students receiving quality AI education with evidence that educators lack the skills necessary to teach AI subjects. As AI digital literacy programs have found success in countries around the world, South Africa may be in a position to adapt strategies like these that are tailored toward its specific socio-economic context.

### **Theoretical literature review**

This study applies the Theory of Planned Behavior (TPB). TPB is a psychic theory developed by Icek Ajzen. It explains the ways in which attitudes, subjective norms, and perceived behavioral control centrally influence an individual's behavior. As stipulated, the three elements are the predictors of behavioral intentions, which in turn predict actual behavior. TPB by Ajzen 1991, in this case, sheds light on AI digital literacy. It exposes the variables involved in youths' participation in the facilitation aspects of AI education programs. The attitude elements refer to the beliefs regarding AI digital literacy by the youth would place a lot of importance on how much value they attribute to the persisting with this education, regarding their future job and social importance. According to Alsheeti (2022), positive attitudes towards AI will lead to increased participation in its educational programs.

**Subjective Norms:** Social factors include friends, family, and teachers. They are extremely influential in the youth making a decision to participate or not participate in AI digital literacy initiatives. AI education is sure to be pursued when the communities surrounding them hold technology in high regard.

**Perceived Behavioral Control:** It concerns the degree to which persons perceive that they can enact AI digital literacy programs. In the context of student perceptions of their control of their outcomes concerning being successful in AI classes, this becomes affected by class instruction, AI class availability, and access to technology.

The TPB framework is intensely relevant to this study in the way it systematically presents how educational and socio-economic constraints influence youth engagement in AI digital literacy initiatives. It helps identify important points at which interventions could be offered to provide enhancements in AI digital literacy, focusing on attitudes, norms, and perceived control.

### **Methodology**

This section describes the methods followed in developing the framework for raising AI digital literacy among the youth in South Africa. The study utilizes secondary data analysis by referencing previous studies, papers, and case studies on AI digital literacy, educational obstacles, and effective interventions in the domestic and international contexts respectively as noted by Johnston (Johnston, 2014).

### **Data collection**

Reports obtained from global AI digital literacy campaigns, scholarly journals, and government publications were collected as secondary sources of information relied on the study to identify effective AI digital literacy initiatives around the world, with a focus on those implemented in developing countries. The relevance and applicability of these case studies to South Africa will be determined through analysis.

### **Data Analysis**

Data were identified, examined, and summarized for patterns through analysis using thematic analysis, a qualitative technique of data analysis. Obstacles to AI digital literacy, effective international initiatives, and the role of public-private partnerships in promoting digital skills were the three dominant themes of interest under the theme analysis (Funda & Piderit, 2024). These themes have subsequently been applied to the elements of the Theory of Planned Behavior-that is, attitudes, subjective norms, and perceived behavioral control to develop an all-rounded framework for enhancing AI digital literacy (Ajzen, 1991).

### **Ethical Considerations**

The research was compliant with the ethical standards for the analysis of secondary data, ensuring all sources of data were appropriately referenced and that the data was used in a manner that correlated with the aims of the original researchers. The manuscript only reviewed publicly available data; no new data were collected from individuals. The integrity of the original studies was not interfered with in the process of research. Further, during the process, necessary care was paid to avoid misutilization or wrong interpretation of data.

### **Discussion: Conceptual framework for enhancing AI digital literacy**

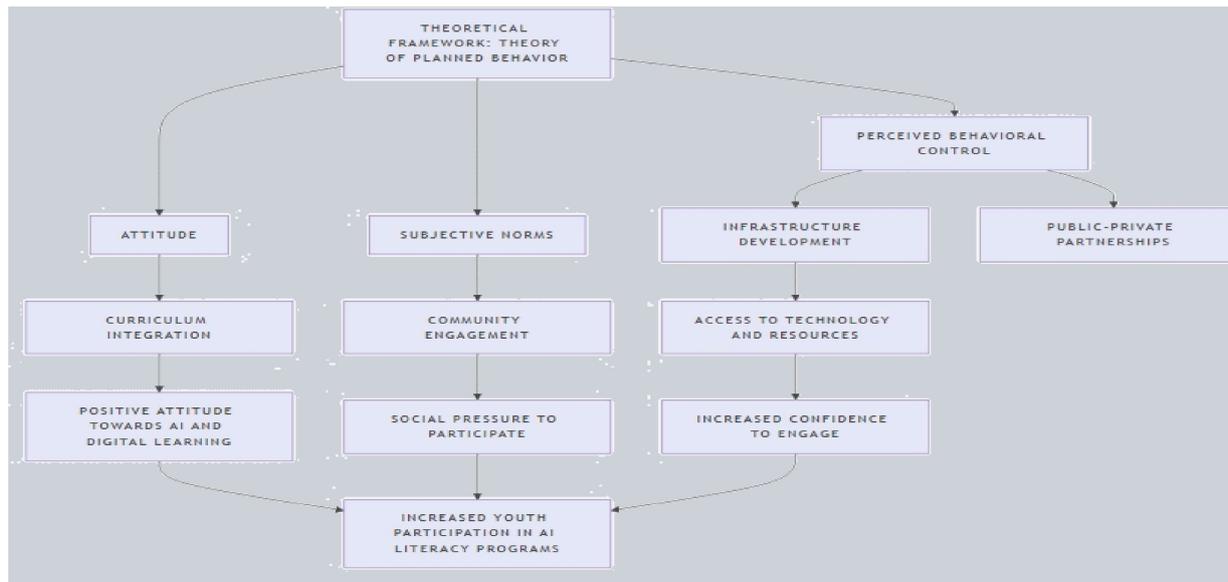
The elements of TPB thus informed the conceptual framework developed in this work to address the challenges of AI digital literacy among South African youth. There are five major constituents of this

framework: public-private partnerships, integration into curriculum, community participation, teacher preparation, and government policy.

### **The framework**

A proposed framework Theory of Planned Behavior includes strategic interventions aimed at creating an enabling environment for AI digital literacy. Each element maps to the TPB in either attitude, subjective norms, or perceived behavioral control and focuses on particular barriers highlighted within the study. The interventions include:

- **Public-Private Partnerships:** The most effective approach to tackle AI digital literacy involves active collaboration at multiple levels between the public and business sectors. For instance, companies such as Google and Microsoft have already embarked on initiatives like the Google Africa Developer Scholarship and the "AI for Good" program, respectively, providing free access to AI education and training (Clewlow, 2023). These collaborations make the resources more accessible and, therefore, increase the chances of youth interacting with AI technologies. The TPB posits that such partnerships act to enhance perceived behavior conduct through the provision of tools and training necessary for success in AI education (Roopaei et al., 2021).
- **Inclusion in the Curriculum:** The only way AI education will not lag behind in schools is through inclusion in the national curriculum. Just like programs such as AI4K12 initiated in the US, the concepts of AI need to be taught at an early age within schools (Touretzky & Seehorn, 2022). Schools can develop positive attitudes toward AI digital literacy by showing how integral it will be to the future of their careers by integrating it within computer science and mathematics disciplines.
- **Community Involvement:** Developing subjective standards surrounding AI education requires community involvement. Many people, particularly those in rural areas, may see technology as inaccessible or suspicious. Initiatives can increase awareness of the value of AI digital literacy by including schools, parents, and community leaders. Campaigns like Nal'ibali, which combine digital literacy with storytelling, are examples of how community-based approaches can create a positive environment for learning (Nal'ibali Campaign, 2023).
- **Teacher Training:** It is impossible to overestimate the importance of educators in advancing AI digital literacy. Students' access to high-quality AI education is restricted in South Africa since many teachers lack the abilities and expertise necessary to teach AI topics (Mnguni, 2024). Teachers perceived behavioral control can be enhanced by professional development and training, which will give them the courage to include AI into their lessons. In order to teach difficult AI topics in an approachable way, training programs should emphasize both technical proficiency and pedagogical approaches (Varadarajan, 2024).
- **Governmental Policy:** The effectiveness of AI digital literacy initiatives depends on government funding. Scaling AI digital literacy programs requires national policies that emphasize AI education, finance digital infrastructure, and assist teacher training (Pila, Madzivanyika, & Meso, 2024). The South African Government's National Digital and Future Skills Strategy is a step in the right direction, but more needs to be done to ensure that AI education is accessible to all students, particularly those in underserved areas (South African Department of Basic Education, 2022).



**Figure 1:** illustrates the AI Digital Literacy Framework, highlighting the strategic interventions aligned with the Theory of Planned Behavior (TPB) that address specific barriers to AI digital literacy among South African youth.).

### Application of Theory

Each element of the framework is examined using the Theory of Planned Behavior to clarify how attitudes, subjective norms, and perceived behavioral control affect youth's involvement in AI digital literacy initiatives. **Attitudes:** Public-private partnerships and curriculum integration help shape positive attitudes toward AI digital literacy by demonstrating its practical benefits for future careers. Students are more willing to participate in AI instruction when they perceive how AI relates to their daily life (Alsheeti, 2022).

**Subjective Norms:** Social expectations regarding AI education are significantly shaped by community involvement. Subjective norms can be changed to foster an atmosphere that is more encouraging for the youth to pursue AI knowledge by enlisting parents, teachers, and community leaders in AI digital literacy programs (Hsieh, Rai, & Keil, 2008).

**Perceived Behavioral Control:** Public-private collaboration trains the teachers and provides access to technology, hence providing educators and students with a greater sense of control over their success in AI digital literacy initiatives. These strategies overcome challenges that prevent the youth from engaging in AI education because they provide them with the necessary tools and training (Roopaei et al., 2021).

### Conclusion

For countries like South Africa, rapid technological developments—the majority of which are driven by AI—create an enabling environment; both opportunities and challenges go hand in hand. While AI has opened up hitherto unimaginable avenues with respect to job opportunities, economic growth, and innovation, it also threatens jobs because of increased automation. In the absence of proper AI digital literacy and other digital skills among South Africans, a large portion of the population will not be able to effectively access and participate in the digital economy, thus polarizing the already-present socioeconomic divide in the nation (Funda & Piderit, 2024). In addition to discussing the different barriers that keep the youth away from participating in AI education, this article has considered the other important role of AI digital literacy within the context of youth empowerment and social inclusion.

The current study, underpinning by Icek Ajzen's Theory of Planned Behaviour, has emphasized the need to address major internal and external factors that impact the behaviour of young people towards AI and digital education, such as attitude, subjective norms, and perceived control, in addition to external barriers like access to technology and educational resources (Ajzen, 1991). This proposed framework encompasses a comprehensive approach to improving AI digital literacy through curricular integration, community involvement, teacher preparation, public-private partnerships, and government policy serving as key change agents. Public-private partnerships, however, also play an important role in these cases, especially toward and within those poor and rural areas where access to AI technologies and education is minimal (Clewlow, 2023).

The partnerships ensure increased involvement of the youth with AI by mentoring and training the youngsters while providing the necessary resources.

Other critical components of the framework involve the integration of AI into the national curriculum. South Africa will be equipping the youth for competition in a technological globe by ensuring that the principles of AI are taught from a tender age within schools (Touretzky & Seehorn, 2022). It is also important that this be made available to cater to the needs of students within urban and rural areas inclusively with relevance. So, it first means intensive investment in teaching materials, teacher training, and digital infrastructure is costly (South African Department of Basic Education, 2022).

In order to influence social perceptions and expectations around AI education, community involvement is equally essential. AI digital literacy programs can foster a positive learning environment that inspires the youth to view AI as a useful and feasible skill set by enlisting the help of parents, teachers, community leaders, and neighbourhood organizations (Nal'ibali Campaign, 2023). Campaigns led by the community, like those that use storytelling to promote digital literacy, can increase youth engagement by humanizing AI education and making it more culturally relevant. One of the most pressing issues facing the South African educational system is perhaps teacher training. Even the strongest curriculum improvements would fail without adequate training, as many instructors lack the abilities needed to teach AI effectively. Professional development programs that focus on both technical skills and pedagogical strategies are essential for ensuring that educators can confidently deliver AI content in the classroom (Mnguni, 2024).

Lastly, government policy is crucial to the expansion of AI digital literacy programs. AI education must be given top priority in national policies, which should also provide the infrastructure, funds, and resources required to support educators, students, and schools. The National Digital and Future Skills Strategy, which outlines the South African government's commitment to digital literacy, is a positive move, but more needs to be done to guarantee that AI education reaches all children, especially those in underprivileged regions (Pila, Madzivanyika, & Meso, 2024). To develop a coherent and long-lasting AI education strategy, policymakers must collaborate closely with academic institutions, business executives, and neighbourhood associations.

Ultimately, improving AI digital literacy among South African youth necessitates altering attitudes, norms, and perceptions surrounding AI education in addition to removing technological and educational obstacles. With an emphasis on both systemic and individual-level treatments, the framework offered in this article provides a comprehensive strategy for overcoming these obstacles. South Africa can enable its youth to engage in the digital economy, stimulate creativity, and promote the nation's economic development by creating an atmosphere that is conducive to AI digital literacy. The ability of South Africa's youth to prosper in a rapidly evolving technological environment is crucial to their future, and AI digital literacy is the key to releasing that potential (Scott-Branch, Laws & Terzi, 2023).

## ORCID

Vusumzi Funda <https://orcid.org/0000-0001-9185-8237>

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