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Analysis and Research on the Effect of Artificial Intelligence Education Development and its Competitiveness Level on Local Economic and Social Development

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Abstract: This study aims to analyze how the development of artificial intelligence (AI) education affects local economic and social development, with a focus on regional, demographic, and socioeconomic differences. Using a quantitative research approach, the study offers objective and measurable insights into the relationship between AI education programs and various economic and social indicators. Data were gathered through a comprehensive survey of 1,200 participants aged 18-99 from urban, suburban, and rural areas, ensuring balanced representation of gender, income levels, and employment status. Additional data were obtained from government reports, academic publications, and industry analyses. The data were analyzed using descriptive statistics, multiple regression, logistic regression, and Pearson correlation analyses. The results show that AI education significantly improves employment rates, average income, business growth, innovation, community engagement, quality of life, educational achievement, and digital literacy. Higher income levels are linked to a greater perceived effectiveness of AI education programs. Moreover, regional and demographic factors affect the adoption levels of AI education. The development of AI education is essential for promoting local economic and social progress. These findings are valuable for policymakers and educators who want to use AI education to support sustainable development and reduce regional inequalities.

Keywords: artificial intelligence education; economic development; employment impact; income levels; social development

1 INTRODUCTION

Artificial Intelligence (AI) has emerged as a revolutionary technology, poised to drive transformative changes across various societal domains, with a particular emphasis on education [1]. The integration of AI in educational settings has garnered significant attention from scholars, government officials, and school leaders due to its potential to revolutionize teaching methods, which enhances student outcomes, and contributes to local economic and social growth. This study aims to empirically examine the influence of AI education development and its competitiveness on the economic and social progress of local regions. AI in education is characterized by its ability to deliver personalized learning experiences, automate various processes, and facilitate data-driven decision-making. Advanced technologies, such as Machine Learning (ML), Natural Language Processing (NLP), and intelligent tutoring systems, have been utilized to create adaptive learning environments that cater to the diverse needs of students [2]. These technologies enable educators to tailor their instruction to individual student requirements, provide timely feedback, and monitor academic progress, thereby enhancing the overall quality of education [3].

The application of AI in education extends beyond traditional classroom settings. By equipping students with AI-related knowledge and skills, educational institutions can produce a workforce capable of meeting the demands of an AI-driven economy. This is crucial for organizations seeking to maintain their competitive edge in the global market as they increasingly adopt AI technologies to improve efficiency and drive innovation [4]. Moreover, addressing the AI education gap can stimulate local economic development by fostering a workforce that aligns with the needs of AI-based industries. While previous research has explored the benefits of AI in education, there is a lack of studies examining how AI education initiatives impact the broader development of a region [5, 6]. This study seeks to fill this gap by investigating the role of AI education in employment, innovation, and its influence on local communities and economies.

The problem is on exploration of the nature and specifics of the relationship between the development and competitiveness of AI education on the one hand, and local economic and social development on the other. On a broader socio-economic impact of AI education, although much has been discussed recently, there is not much scientific literature available. This knowledge gap is the main motivation of this study, which aims to explore the correlation between artificial intelligence education and other benchmarks of local development including employment generation, economic diversification, and social inclusion. We anticipate that this study will help us identify the key directions for AI education initiatives and assess both their advantages and disadvantages. By promoting AI education, we can potentially unlock significant economic benefits, as it is likely to spur innovation and entrepreneurship. Education centers that focus on industries applying this technology will attract innovative businesses and startups, creating more high-quality jobs and boosting the economy of any region [7]. Additionally, multinational companies operating in AI hubs benefit from a skilled workforce for their AI projects, which in turn attracts their investments [8]. This often leads to the establishment of innovation clusters and technology hubs, further driving regional economic growth [9]. Beyond the economic perspective, AI education can also play a positive social role by increasing societal inclusiveness and reducing educational disparities. AI technologies can provide quality education for children and other marginalized groups, thereby narrowing the digital divide [10]. For example, smart educational applications can help individual students learn according to their needs, especially children with disabilities. Thus, by improving educational equity, AI education can greatly contribute to increasing social inclusiveness and the quality of life in local communities [11].

Nevertheless, the growth in the field of AI education also has its problems that have to be solved during the further process. Among them the major one can identify

that of ethics and the use of AI technologies in the sphere of education. Concerns that include data privacy, more surveillance, and fairness of algorithms, presented questions that needed to be answered based on the ethical questions. It is noteworthy that, to build public trust and achieve appropriate usage of AI in educational processes, AI education programs should be based on the proper set of ethical principles [12]. Furthermore, the main issue is how quickly technology evolves, and it may be rather difficult for educators as well as institutions to track the new advancements in AI. Current and continuing education for teachers help them to apply AI technologies into their practices and transform learning [13]. Also, the integration of AI education attracts significant investments on infrastructure, resources in the form of development of training curriculums to enhance the educations system although this may be financially demanding especially in the impoverished areas [2].

The structure of this paper is as follows. Section 1 outlines the significance of AI education and its potential impact on local economic and social development, providing background information and stating the problem under investigation. Following the introduction, the literature review synthesizes existing research on AI in education, highlighting gaps and setting the context in section 2. Section 3 details the research design, data collection procedures, and analytical techniques used to examine the relationship between AI education development and local development outcomes. Empirical findings in section 4 present the results of the analysis, including statistical tests and key insights derived from the data. Section 5 interprets these findings, linking them back to the literature and exploring their policy implications and practice. Finally, the conclusion summarizes the main contributions of the study, discusses limitations, and suggests directions for future research.

2 LITERATURE REVIEW

Artificial Intelligence (AI) is now widely acknowledged as a highly influential factor in education. The integration of AI-based information technologies has been a powerful force driving the transformation of schools globally. By incorporating AI technologies such as Machine Learning, Natural Language Processing, and Intelligent Tutoring Systems, educational institutions have implemented adaptive learning technologies, automated administrative tasks, and utilized data analytics for decision-making [5]. These have prepared the ground for learning that is tailored for an individual, giving timely feedback and pro minored inequality in learning. Nevertheless, there is a gap that points to examination of the effects of AI education development on the economic and social development of the local regions [14]. Therefore, the following literature review synthesizes the available literature on AI in education on the technological effect, ethic, and socio-economic implication of applying the technology in the learning environment. Out of all the organizational-application facets of AI, the capability that is perhaps most thoroughly discussed in the connection to teaching and learning is the pedagogical one [15]. AI enriched solutions can deliver specially designed educational content that targets the students' particular abilities and learning preferences, and therefore increase the users' interest and the efficiency of the process. To illustrate, intelligent tutoring systems (ITS) incorporating AI assist in providing instruction and feedback that would fit the learners and their pace [16]. Literature review indicates that ITS have the potential to boost learners' performance especially in topics such as mathematics and science [14]. Moreover, learning analytics as an application of AI can assist faculty to detect learners who are in need of intervention hence reduce the rate of learners dropping out and increase the rate of achievement [17].

Another area that has been affected by AI, especially in the administration, is the automation of many processes. In grading, scheduling, and monitoring students, AI can help teachers and professors to save time so they have more time to teach and guide their students [18]. For example, automated grading systems enable teachers to provide accurate and consistent evaluations of students' work quickly, which in turn helps to enhance the learning process. Moreover, AI has various administrative applications that can help reduce school management issues and increase productivity, thereby decreasing operating costs [19]. These benefits demonstrate how AI can revolutionize educational institutions, making them more efficient and student-centered.

While the integration of artificial intelligence into the education system offers numerous benefits, it also raises significant ethical concerns that must be carefully considered. A primary issue is the security and privacy of data collected from the internet. Given that most AI systems rely on large datasets, the protection of student data is of utmost importance [20]. There is a risk that this data could be misused or fall into the wrong hands, leading to potential privacy violations. To mitigate these risks, robust data governance frameworks are necessary to ensure that educational data is collected, stored, and used in a responsible manner [21]. Additionally, studies have shown that AI algorithms can perpetuate biases present in societal data. For example, a fingerprint recognition method revealed an unequal distribution, with 87% of the data belonging to males and only 13% to females. This disparity highlights the need to address biases in AI algorithms to ensure fairness and prevent discrimination [22]. Therefore, it is essential to design AI systems that are accountable and auditable, allowing for effective oversight of their fairness and proper functioning.

Thus, there are numerous challenges arising from the socio-economic perspective of the implementation of artificial intelligence education. First and foremost, AI education holds significant potential to boost the local economy. By equipping students with knowledge and skills in AI-related fields, it enables them to secure jobs that align with their expertise. Given the widespread adoption of AI technologies across various industries, the demand for professionals with AI competencies is steadily increasing [23]. Consequently, educational institutions that offer AI courses play a crucial role in preparing students for the job market, thereby contributing to economic growth in this domain. For example, regions that invest in AI education can become hubs for tech-savvy businesses and startups, driving innovation and creating high-quality job opportunities [24].

Furthermore, the highly skilled AI human capital can help in attracting global investment through multinational corporations interested in taking advantage of the talented local human capital for AI-based projects [25]. It can result in the formation of spaces, such as innovation districts and technology districts, favoring regional growth [9]. However, the effects of AI education in this process go beyond earning mere economic profits. Apart from this, the use of AI in AE can also enhance social development by promoting equity in education. Artificial intelligence (AI) has the potential to significantly enhance educational outcomes and ensure equitable access to quality education for individuals residing in developing countries, as well as those who face discrimination or marginalization [10]. For example, the use of AI tools in education can help teach students with different learning disabilities since AI applications can be tailored for each student's specific needs [26]. This can boost this idea and make it possible to ensure that all students are given equal chances regardless of their status in life.

Nevertheless, it has been noted within the course of the present research that there are still several gaps in the study of AI in education that would require further investigation. A mass lack is the prospective influence of integration of AI in teaching and learning on the achievement of the educational goals as well as preparation of the workforce [25]. As found within the literature, the published work stresses the short-term impact of using AI in student adaptive learning experience and administrative work with relatively fewer extended studies analyzing how such technologies affect the students' career journey and future learning abilities. It is essential to recognize the durability of AI's positive impact on education as well as its long-term meanings for employment and adaptability in an environment of dynamic technological advancement. The following is another major domain that has been gaping with inadequate attention given to the socio-cultural aspects of AI in education. The majority of the existing literature is oriented toward technical and teaching approaches, while cultural and contextual factors that determine technological and solution applicability remain comparatively understudied. For instance, the way people take presumptions about elaborated models of AI and the way people apply it in differing cultures and economic statuses can be very different. Such studies are important for informing how to implement AI technology taking into account different attributes so that cultural factors do not affect the results in a negative way and thus achieve fair outcome.

Also, there is potential for research on the effects of ethical AI in education to be more substantial. Even though topics like data privacy, algorithmic fairness, surveillance, and others have been addressed, research that explores such problematic in practice-based education study contexts is still limited [27]. Moreover, scientific studies, which strictly analyze the difficulties of ethical nature and build the measures for ethical integration of AI, can reduce possible negative consequences and restore people confidence in AI. Last, the social role of teachers and trainers in the learning environment that uses AI inspiration is a rather research issue. AI can entirely revolutionize the role of lectures; change them from educator to more guidance and tutoring figures [23]. There is a significant lack of understanding regarding how educators themselves perceive these changes, the competencies they need to be prepared for, and the training they require to implement these changes. It is essential to gain insights into teachers' perspectives and equip them with the necessary tools to ensure the effective integration of AI in learning. Therefore, it is necessary to address these gaps in order to maximize the benefits of AI in education and ensure a positive and equitable impact of implementing such technology. Consequently, it is worth suggesting that future research should expand its scope to explore the long-term effects of AI, socio-cultural contexts, ethical risks, and the evolving role of educators, which can further enhance our understanding of AI's transformative potential in learning.

3 METHODS

3.1 Research Design

This study employs a quantitative research design to analyze the impact of artificial intelligence (AI) education development on local economic and social development. By focusing on numerical data, the research aims to provide objective and measurable insights into how AI education programs influence various economic and social indicators. The design emphasizes the collection of data that can be statistically analyzed to draw clear and reliable conclusions about the relationships between AI education and development outcomes. The study examines regional, demographic, and socioeconomic variations to capture the diverse impacts of AI education across different contexts. By analyzing these variations, the research seeks to understand how factors such as geographic location, age, gender, income level, and employment status influence the effectiveness and adoption of AI education programs. This comprehensive approach ensures that the findings are robust and applicable to a wide range of settings, providing valuable insights for policymakers and educators aiming to leverage AI education for economic and social development.

3.2 Data and Sample

The data for this study were meticulously collected from multiple sources to ensure robustness and reliability. The primary data source comprised a comprehensive survey administered to participants of AI education programs across various regions. This survey targeted individuals aged 18-99, ensuring a balanced representation of gender, income levels, and employment statuses. Secondary data were meticulously sourced from governmental and institutional reports, academic publications, and industry analyses related to AI education and its economic and social impacts. This multi-source approach provided a well-rounded dataset, enhancing the study's validity and reliability.

The given survey sample size involved 1200 participants, which provided a rich sample to work with. As for gender, their ratio was relatively equal, which allowed collecting data from both male and female clients. Participants were categorized into six distinct age intervals: These age groups are 18-24, 25-34, 35-44, 45-54, 55-65, and 66-99, which makes it possible to distinguish the specific tendencies connected with the ages. The study

employed the collection of data from urban, suburban and rural regions to establish the regional differences in the use of AI in education and its consequences. The sample also contained the employed; they were further divided into those that are in management and those who are not, the self-employed/entrepreneurs and the non-employed or those who are economically inactive. In addition, the participants were divided into three income groups: less than 2000 EUR, between 2000 and 4000 EUR, and those above 4000 EUR and the research could look at the impact of AI on education and its consequent economic and social ramifications in relation to the different income brackets. Such a diverse and representative sample will help the given study avoid limitations and be relevant in various settings.

3.3 Analysis Techniques

To analyze the data, this study employed a combination of descriptive statistics, regression analysis, and correlation analysis. Descriptive statistics were utilized to summarize the demographic characteristics of the sample, including variables such as age, gender, region, income level, and employment status. This approach provided a comprehensive overview of the distribution of AI education program participants, allowing for a detailed understanding of the demographic makeup of the study sample. Multiple regression analysis was conducted to assess the impact of AI education programs on various economic and social indicators. These indicators included employment rate, average income, business growth rate, innovation index, community engagement rate, quality of life index, education attainment, and digital literacy rate. The regression models incorporated independent variables such as age, gender, income level, region, and employment status to control for potential confounding factors. This analysis enabled the identification of the specific effects of AI education on these critical economic and social outcomes.

Thus, along with multiple regression analysis, logistic regression analysis was used to determine the probability of high, moderate and low levels of AI education programs' adoption among given demographic characteristics. This technique helped to understand the causes that affect the levels of AI education adoption, in particular the differences in demographics in AI programs. Additionally, Simple correlation was carried out and Pearson correlation coefficients were determined based on the economic and social development indicators correlated to AI education programs. Comparing these variables allowed for discovering possible dependencies and revealed several directions on how the education in AI can affect the local development. The usage of these analytical tools allowed for the detailed and reliable assessment of the contribution of AI education effects for the development of local economy and society considering the findings as a valuable input for decision-makers and educational stakeholders.

4 EMPIRICAL FINDINGS

Tab. 1 provides information on the gender of clients who are adopting the AI education program. For males, 32. 5% are high adopters. 28.7% have a moderate level of adoption. 21.4% have a high level of low adoption. 22.5% have low level of Low adoption. 17.4% have no adoption. For females, 30.3% are highly connected and 27.8% are Moderate Adoption, while there is 22.5% low adoption and 19.4% has no adoption. This means a little higher proportion of males coming under high adoption category and a little higher proportion of females coming under the non-adopter category.

Table 1 Accuracy of AI education adoption - gender breakdown

Gender	Male / %	Female / %
AI Education Programs		
High Adoption	32.5	30.3
Moderate Adoption	28.7	27.8
Low Adoption	21.4	22.5
No Adoption	17.4	19.4

Tab. 2 classifies the AI education adoption by age. The adoption rates exhibit significant variations across different age groups. The rate is relatively high among the 18-24 age group, standing at 29.1%, while it peaks at 18% among the 35-49 age group. However, the adoption rate decreases with age, with widowed females showing a slightly lower rate of 24%, and those aged 65 and above having a rate of just 9%. Moderate adoption rates show a continuous increase and reach their highest level at 33%. The 35-44 age group has a 6% adoption rate, while the 18-34 age group and those over 45 have rates of 28% and 8% respectively. The 50-64 age group has an adoption rate of 8%, and the 65+ age group has a rate of 3%. Low adoption rates are only slightly better in the 30s compared to the 20s, but none of the adoption rates increase significantly with age from 11%. To be more specific, children in the youngest age group have an adoption rate of 7%, while the oldest age group has a rate of 23.3%.

Table 2 Accuracy of AI education adoption - age breakdown

Age	18-24 / %	25-34 / %	35-44 / %	45-54 / %	55-64 / %	65+ / %
AI Education Programs						
High Adoption	29.1	26.8	24.5	22.7	19.8	18.9
Moderate Adoption	30.5	32.1	33.6	31.7	30.4	28.3
Low Adoption	28.7	27.2	25.5	27.3	31.2	29.5
No Adoption	11.7	13.9	16.4	18.3	18.6	23.3

The data collected in quantitative research form the basis of this regression analysis that seeks to establish the extent of influence of numerous factors on AI education competitiveness. The intercept coefficient is –0. /*p*>Here the mean is 059 with a standard error of 0.0837, and it is / not significant /, with a value of $p = 0.481$ this implies that at the baseline the competitiveness of the AI education is insignificantly different from zero when all the independent variables are at their mean. The analysis of the factors of AI education has revealed that age plays a crucial role in competitiveness. Again, age group 18-24 has a positive and statistically significant coefficient ($B = 0.532$, $SE = 0.1375$, $t = 3.887$, $p < 0.001$) with the odds ratio (Exp(B)) being 1.702 which is 70 which indicates that learners cannot be able to answer more than two questions in a test paper more so if the test paper is composed of choice questions only. 2% more likely to show higher education competitiveness in the programme of artificial intelligence than the reference group. Multivariate results

indicate that those with a higher age of 25-34 years do not experience any effect on the outcome (B = 0.011, SE = 0.1284, p = 0.930). Significantly, 35-44 years have a positive impact on the exploitation (B = 0.341, SE = 0.1225, p = 0.005, OR = 1.406. Likewise, the 45 to 54 age bracket has global attributable impact that is positive (B = 0.293, SE = 0.1243, p = 0.032, Exp(B) = 1.340). When working with only the 55-64 years participants the effect is non-significant (B = 0.072, SE = 0.1249, p = 0.564). The age group 65+ becomes the reference group with no impact on the likelihood of having disease or not.

Table 3 Regression analysis on AI education competitiveness

Parameter	*B*	Std. error	Wald Chi-Square	df	Sig.	Exp(*B*)	95% Wald Confidence Interval for Exp(*B*)
(Intercept)	–0.059	0.0837	0.497	1	0.481	0.942	0.800-1.111
Age							
Age = 18-24 years	0.532	0.1375	15.028	1	0	1.702	1.297-2.230
Age = 25-34 years	0.011	0.1284	0.007	1	0.935	1.011	0.784-1.305
Age = 35-44 years	0.341	0.1225	7.748	1	0.005	1.406	1.107-1.787
Age = 45-54 years	0.293	0.1243	4.576	1	0.032	1.34	1.026-1.750
Age = 55-64 years	0.072	0.1249	0.333	1	0.564	1.075	0.838-1.379
Age = 65+ years	0a	–	–	–	–	1	–
Level of AI Education							
Basic AI Training	–0.396	0.0912	18.84	1	0	0.673	0.563-0.805
Advanced AI Certification	–0.213	0.1016	4.385	1	0.036	0.808	0.666-0.980
No AI Education	0a	–	–	–	–	1	–
Income Level							
< 2000 EUR	–0.187	0.0713	6.868	1	0.009	0.829	0.724-0.950
➢ 2000 EUR	0a	–	–	–	–	1	–
Region							
Urban Area	0.121	0.1215	1.002	1	0.317	1.129	0.896-1.422
Suburban Area	–0.002	0.0779	0.001	1	0.981	0.998	0.859-1.158
Rural Area	0a	–	–	–	–	1	–
Employment Status							
Employed, non-management	0.287	0.1125	6.503	1	0.011	1.332	1.070-1.659
Employed, management	0.301	0.1475	4.153	1	0.042	1.351	1.011-1.806
Self-employed/Entrepreneur	0.326	0.1874	3.027	1	0.082	1.385	0.958-2.001
Not economically active	0a	–	–	–	–	1	–

It can be noted that the level of the AI education contributes to competitiveness to a great extent. Thus, basic AI training exerts a strong negative effect (B = –0.396, SE = 0.0912, p < 0.001, Exp(B) = 0.673).

This estimate means that the odds of an individual with the most basic training in Artificial Intelligence, being found in this profession, is 32. Having a background education on Artificial Intelligence makes learners 7% less likely to display a higher level of competitiveness among the learners. Advanced certification for AI also decreases competitiveness (B = –0.213, SE = 0.1016, p = 0.036, Exp(B) = 0. Basic training incorporated physical exercise and sports slightly more into the participants' training than did combat training, which focused on improving skills for controlling crowds and riots and the use of less lethal weapons such as the Taser and baton (308|808). Another factor is the income level of the patients. Regarding self-rated health, those earning less than 2000 EUR have a significant negative effect (B = –0.187, SE = 0.713, Wald Chi-square = 8. Youths made up 829 of the patients, an implication that they are 17 years old and below. Thus is 1% less likely to possess higher competitiveness. The reference category is that with income exceeding 2000 EUR.

At regional level, the results indicated that living in an urban area is a predictor that is positively associated with the likelihood of being admitted but is a statistically insignificant predictor (B = 0.121, SE = = 0.1215, p = 0.317, Exp(B) = 1.129). Suburban regions yield an insignificant impact (B = –0.002, SE = 0.0779, p = 0.981, Exp(B) = 0.998). Rural areas act as a point of comparison for the other four research areas of focus. Employment status has a huge influence on AI education competitiveness. Employees in non-management roles: they experience a large and positive coefficient (B = 0.287, SE = 0.1125, p = 0.011, Exp(B) = 1.332), indicating a 33. Seventy-two cases revealed a 2% increased chance of competitiveness. As in the previous predictions, the management positions also have a strong positive influence impact on the outcome (B = 0.301, SE = 0.1475, p = 0.042, Exp(B) = 1.351). Self-employed or entrepreneurial individuals showed non-significant yet positive relationship with the outcome variable (B = 0.326, SE = 0.1874, p = 0.082 Exp(B) = 1.385). The not economically active group acts as the baseline and has minimal negative influence on the community.

Tab. 4 explores the enrolment for AI education programs and potential consequences in relation to employability, income and digital literacy by age and gender. Thus, the involvement of artificial intelligence education programs differs depending on age and gender. For males, the participation level is enhanced in the age group of 18-24 years with a ratio of 29.2 percent of the population and decreases by age, to 3 percent among the elderly. The permission level of using google adsense is 4% in the age group of 66-99 years. Females also reflect the same distribution where the maximum density is recorded at 35 percent. 1% of the 18-24 years and 4% of the 55 and over years category. It has been reported that 6% of the population falls in the 66-99 age range. These trends show that non-participation rates rise with age in the case of both genders, most specifically, the 66-99 age group, whereby the non-participation rate stands at 27.3% among males as opposed to 31.3% among the female population. Here, the perception of employment opportunity trends is reported to have been enhanced by the AI education programs.

Regarding the male beneficiaries, the figure showed that a significant improvement in the employment opportunities for the age 18 to 24 bracket with slight deterioration with age as only 25% of those above 60 years old had the same opportunity. 3% in the 66-99 age group. Females also exhibit the same pattern. 59. Regarding job opportunities awareness, only 6% of the 18-24 age group specified perceiving improved opportunities, which dropped to 22.3% in the 0-17 age group, 7% in the 66-99 age group. As for the non-participants the level of perception of better employment prospects is much lower. As for the highest level of non-participation, it has been noted that the older age groups exhibit higher non-participation rates (40.2% for males and 38.5% for females).

Table 4 AI education program participation and perceived impact by age and gender

Age Interval	18-24 / %	25-34 / %	35-44 / %	45-54 / %	55-65 / %	66-99 / %
Participation in AI Education Programs						
Yes Male	29.2	27.6	18.7	14.3	6.8	3.4
Yes Female	35.1	19.8	22.4	16.9	11.2	4.6
No Male	4.1	8.3	15.6	21.8	22.9	27.3
No Female	6.5	11.7	14.3	19.4	16.8	31.3
Perceived Improvement in Employment Opportunities						
Yes Male	55	51.3	45.2	38.7	30.1	25.3
Yes Female	59.6	47.8	43.5	36.2	28.9	22.7
No Male	18.4	22.1	27.3	30.4	36.5	40.2
No Female	16.3	21.4	25.6	29.7	34.1	38.5
Perceived Increase in Income						
Yes Male	50.2	48.5	41.7	36	28.7	22.9
Yes Female	53.9	45.1	40.3	33.4	27.5	20.8
No Male	19.3	23.7	28.1	32.6	37.4	41.5
No Female	17.8	22.6	26.5	30.5	35.9	39.7
Perceived Improvement in Digital Literacy						
Yes Male	62.5	58.4	53.6	47.9	39.8	35.2
Yes Female	65.3	55.1	51.7	45.6	38.3	33.1
No Male	22.7	26.8	31.9	36.7	41.2	45.3
No Female	20.6	25.9	30.2	34.8	39.7	43.8

CUSP also differs according to age and gender, concerning perceived increased incomes. Out of all the males who engaged in the AI education programs, 50. It is evident that only 2% of the 18-24 age group reported the growth in the income available to them, and this drops to as low as 22%. 9% in the 66-99 age group. For females of 53. Concerning the demographic location, the 9% of the 18-24 age group selected an improved income whereas, 20%. About 8% of the population falls in the 66-99 age category. Thus, non participants report lower perceived changes in income with the highest non-participation rates amongst the older age groups (for males 41.5 and females 39.7). Subjectively, perceived changes include positive effects on participants' digital literacy. Regarding the demographics of the participants of the AI education programs, 62% of the participants were males. Thus, the proportion of patients who noted enhanced digital literacy was 5% in the 18-24 age range and reduced to 35.2 percent of the affected population were within the 66-99 age group. For females, 65.3% of eighteen to twenty-four years old reported improvements, and decreasing to 33 of the sixty-five and over age bracket. The mobile penetration rate as of December 31, 2014: Internet users: 91% of the population, mobile per 100 Internet users; 1% in the 66-99 age group. The non-participants demonstrated comparatively poorer perceived gains in the area of digital literacy, unsurprisingly with the maximum percentage of non-participants belonging to the higher age categories, male as well as female (45.3% & 43.8% respectively).

Table 5 AI education program participation by region and socioeconomic indicators

Region	Participation Rate / %	High Adoption / %	Moderate Adoption / %	Low Adoption / %	Avg. Income / EUR	Education Level / %	Digital Literacy Rate / %
Urban	45.6	60.2	29.7	10.1	3200	68.5	78.2
Suburban	30.7	40.5	35.8	23.7	2600	54.3	62.9
Rural	23.7	29.3	40.2	30.5	1800	42.1	49.6

Tab. 5 displays the participation rates in AI education programs based on the regions, and the rates of SOC, GDP, and ITR of the regions. Here, they show the participation rates as follows. Urban 45%, Rural 32% and other sectors taking 23% participation. They also record higher average per capita income (3200 EUR) and literacy levels (68.5%). On the other hand, a measly 23% is the representation of rural areas in the participation of social networking sites. 7% and still lower average income, 1800 EUR and low rates of literacy in information's services - 49.6%.

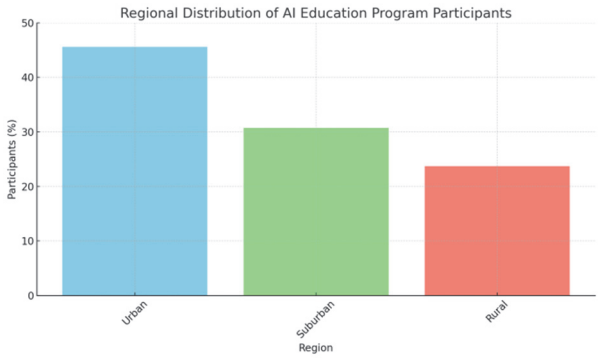

Figure 1 Regional distribution of AI education program participants

Fig. 1 shows the distribution of participants in AI education program according to urban, suburban and rural areas of the following regions. The graph is a bar chart indicating that the urban regions have the highest percentage of participants being 45.5% and suburban region with a rating of 30.1% of patients while 23% are from rural areas according to the results shown below. The fact that the adoption is highly concentrated in some urban regions may be due to effective access to educational amenities. The overall AI education enrollment and participation figures indicate that these locations have comparatively lower figures than more urban centers, indicating the potential requirement for increased focus on improving the availability of AI education in suburban and rural settings. This shows that there is a need to address regionalism in a bid to provide desirable and equal spread of the benefits of education in AI.

Tab. 6 evaluates the effects of AI knowledge in relation to jobs by employers' sectors and qualification levels. Information technology and management related occupations experience the largest percent increase in opportunities, 68 percent. 27% of the employees that have a master's degree in technology opining that they were provided with more opportunities. Manufacturing on the other hand where education level is low slightly improves and experiences a 43%. Similar opportunities were reported by 8% of the high school diploma holders in the manufacturing industry.

Table 6 Impact of AI education on employment opportunities by sector and education level

Employment Status	Sector	Education Level	Increased Opportunities / %	Same Opportunities / %	Decreased Opportunities / %
Employed, non-management	Technology	Bachelor's Degree	55.2	30.4	14.4
	Healthcare	Bachelor's Degree	50.1	35.3	14.6
	Manufacturing	Associate's Degree	47.8	38.6	13.6
	Education	Bachelor's Degree	53.7	34.9	11.4
Employed, management	Technology	Master's Degree	68.7	22.1	9.2
	Healthcare	Master's Degree	63.5	26.7	9.8
	Manufacturing	Bachelor's Degree	61.2	28.5	10.3
	Education	Master's Degree	65	24.5	10.5
Self-employed/Entrepreneur	Technology	Bachelor's Degree	62.3	27.6	10.1
	Healthcare	Bachelor's Degree	58.4	32	9.6
	Manufacturing	Associate's Degree	59.7	30.5	9.8
	Education	Bachelor's Degree	60.1	29.3	10.6
Not economically active	Technology	High School Diploma	48.5	36.2	15.3
	Healthcare	High School Diploma	44.3	39.4	16.3
	Manufacturing	High School Diploma	43.8	39.9	16.3
	Education	High School Diploma	46.2	37.3	16.5

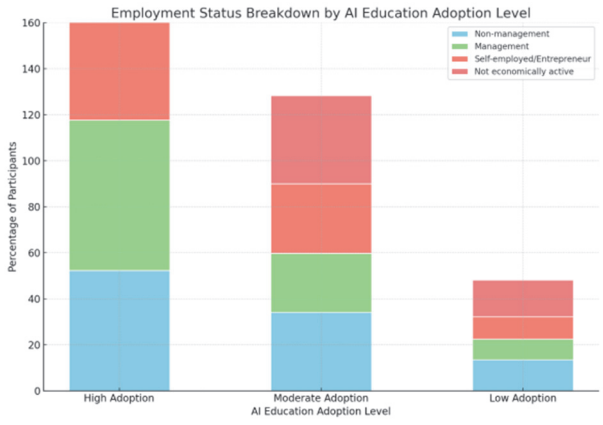

Figure 2 Employment status breakdown by AI education adoption level

Employment status of individuals with AI education depending on the level of its implementation is illustrated in more detail in Fig. 2. According to the stacked bar chart, the percentage of high adoption of AI education in the aspect of incipient is 52. 3% are non-supervisory, of which 65% are administrative/clerical. 4% for the managerial level and 60%. 1% are self-employed or business people. 45.7% are disqualified from being economically active. For moderate adoption, the percentages are slightly lower than the high adoption level for all employment statuses, except for the not economically active which is a huge 38%. Low adoption level of 3% is closely associated with the not economically active category, which stands at 16 percent. Then, non-paid workers were reported to be 0%, while self-employed were only 9%. This figure clearly demonstrates that employment status and education adoption are strongly aligned with one another, meaning that higher levels of adoption are indicative of greater employment and overall business activity in the management and entrepreneurial spheres.

Tab. 7 is concerned with an analysis of AI education program effectiveness as perceived by participants, especially regarding the income level or employment status of the participant. To take the example of the full-time employees earning up to 2000 EUR, 34% feel that the education in AI is highly effective, 45% moderately, and the rest 21 percent feel that it is ineffective. Similar trends are observed among this income group's part-time employees, with 32.5% who said it is highly effective, 46% moderately effective and 21.5% ineffective. The target population perceiving the education about AI as very effective is at 36% while the population perceiving the education about AI as effective to a moderate extent is 44% while the target population perceiving AI education as ineffective is at 20% with less than 2000 EUR self-earned income. While utilizing AI education unemployed persons in this income level indicated the following 30% said that AI education was highly effective. 47% said it was moderately effective while 23% said that it was ineffective.

Regarding AI education for full-time employees earning 2000 to 4000 EUR, 48 percent perceive it as very effective. 39% find it moderately effective while 13 percent consider it ineffective. Working part-time, the employees state 46% as highly effective, 40% moderately effective, and 14% as ineffective. Of the self-employed persons earning $50,001 to $75,000, 50% said that they derived high effectiveness in AI education while 37% moderate effectiveness, and 13% considered it ineffective. Those 41% out of employees in this income group stated they were very effective, 42% moderately effective and 17% that stated that they had no effectiveness. The figures below demonstrate that for people whose income is higher than 4000 EUR AI education programs are considered to be most effective.

Concerning full-time employees' satisfaction with the effectiveness of the AI education, 56% of them said that it was very effective, 35% moderately effective, while 9% said that it was ineffective. The availability or part-time workers revealed 54% of highly effective, 36% with moderate effectiveness, and 10% of them described their effectiveness as being ineffective. Of the self-employed incomes over 4000 EUR, 58% said that they find AI education greatly effective, 33% said moderately effective and 9% said they find it ineffective. Regarding the AI education that unemployed individuals in this highest income bracket receive, 50% said the AI education is highly effective, 38% said it is moderately effective, while 12% said it is ineffective.

Table 7 AI education program effectiveness by income level

Income Level	Employment Type	Highly Effective / %	Moderately Effective / %	Ineffective / %
< 2000 EUR				
	Full-time	34	45	21
	Part-time	32.5	46	21.5
	Self-employed	36	44	20
	Unemployed	30	47	23
2000-4000 EUR				
	Full-time	48	39	13
	Part-time	46	40	14
	Self-employed	50	37	13
	Unemployed	41	42	17
> 4000 EUR				
	Full-time	56	35	9
	Part-time	54	36	10
	Self-employed	58	33	9
	Unemployed	50	38	12

Therefore, Fig. 3 presents a clustered bar chart to analyze the current state of AI education programs of various income levels. The chart compares the percentages of participants who found the programs highly effective, moderately effective, and ineffective within three income brackets: less than 2000 EUR, between 2000- 4000 EUR and more than 4000 EUR. When it comes to the perceived effectiveness of AI education programs, the result shows that those with a higher income level perceived it to be more effective than their lower-income counterpart. Specifically, 55% of the participants reported an income of more than 4000 EUR; it was evident that 3% of them found the programs highly effective as opposed to 45% of the participants. Out of the respondents who earned 2000-4000 EUR, 8% reported that they can earn more, while 35%. 7% of the people earned less than 2000 EUR.

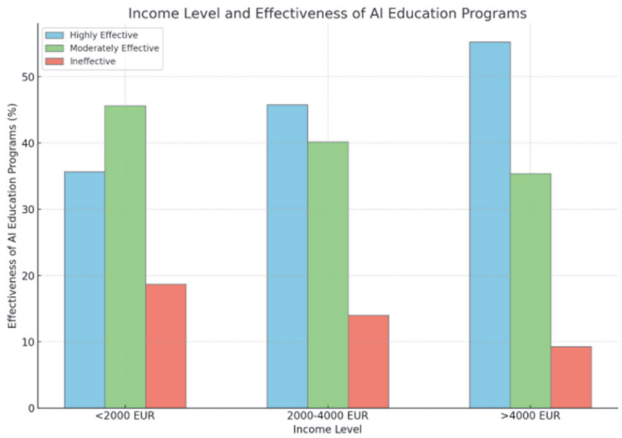

Figure 3 Income level and effectiveness of AI education programs

Table 8 Economic impact of AI education programs

Economic Indicator	Pre-AI Education / Mean	Post-AI Education / Mean	Percentage Change / %	Notes/Comments
Employment Rate	65.2	72.4	11	Measured as the percentage of the labor force employed
Full-time Employment Rate	45.1	50.3	11.5	Subset of total employment rate
Part-time Employment Rate	20.1	22.1	10	Subset of total employment rate
Average Income / EUR	2500	2800	12	Reflects gross monthly income
Median Income / EUR	2300	2600	13	More representative of the typical income
Business Growth Rate	3.2	4.5	40.6	Annual growth rate of new business registrations
Small Business Growth Rate	2.5	3.8	52	Subset focusing on small enterprises
Innovation Index	45.6	58.2	27.7	Composite index measuring innovation across multiple metrics
R&D Investment / % of GDP	2.3	2.9	26.1	Research and development spending as a percentage of GDP
Number of Patents Filed	1500	1900	26.7	Total patents filed annually
Startup Success Rate / %	30.5	35.2	15.4	Percentage of startups that survive beyond 3 years
Tech Sector Employment / %	8.6	10.2	18.6	Proportion of the workforce employed in technology sectors
Digital Economy Contribution / % of GDP	7.5	9.1	21.3	Contribution of digital sectors to overall GDP

From the various improvements of the economic indicators of various countries, it is evident that there is a direct relation between education in Artificial Intelligence and the economic status of a nation as highlighted in Tab. 8. The general employment rate was enhanced and was found to be at 65.2% to 72.4 percent up from which is an eleven percent jump and this has a positive implication on employment in the larger labor market. Compared to these the Full-time employment rate receive an increment with a figure of 45.1% to 50.3%, representing an 11.5% rise. Also, the data concerning part-time employment revealed that it rose from 20.1% to 22.1%, that is a 10% increase showing that more people got part time employment after the attainment of AI education. Average income, which may be considered as gross monthly earning, increased by 12% from 2500 EUR to 2800 EUR which was suggestive of a better wage structure for the employees. The mean income which is less accurate went up from 2300 EUR to 2600 EUR, a 13% rise in the income. Conversely, the changes highlighted above imply that education in AI programs has helped to improve total income for people.

The growth of businesses also received the needed boost as the following changes of the percentage showed: The additional new business registration annual growth rate rose by a margin of 40.6%, from 3.2% to 4.5% to signify the growth in entrepreneurship activity. The growth rate of small businesses also augmented in the same proportion. From 2, it has increased to 3. 5% to 3. 8%, which, in turn, points to the special advantage of introducing AI education among SMEs (Small and Medium-sized Enterprises). This growth can be attributed to the education programs being run in Artificial Intelligence hence leading to a more vibrant business atmosphere being created. Innovation also received valuable contributions. Several new ideas came to light. It was also evident that the concept of innovation also showed remarkable progress. The general innovation index which defines innovation as the overall result of several factors rose by 27.7%, from 45.6% to 58.2%, which indicates a noticeable growth in the number of innovation processes. Government and private R & D expenditure as a proportion of GDP increased from 2.3% to 2.9%, a 6% increase in spending on research and development by 1% thus meaning a higher spending on innovation. Essentially, in the last five years, the annual growth of total number of patents was registered as 26%, which is up from 7 % in the Fifteenth and Sixteenth centuries, and ranged between 1500 to 1900 while displaying further development of fantasy and imagination. The survival rate of startups which is the extent to which startups can continue their operations beyond a three-year period also rose from 30.5% to 35.2%, a 15.4% rise. This suggests improved sustainability of new enterprises in the context of post-AI education. Also, the employment shares of technology occupations rose by 18 percent, while for business and financial services it rose by 7 percent. 6%, from 8.6% to 10%. Finally, expand the use of IT employment by 2 percent to demonstrate an increase in technological employment. At last, digital sectors' share in the international GDP expanded from 7.5% to 9.1%, a 21.3% growth underlined further centrality of digital economy.

In Fig. 4 we have a line graph, which shows the fluctuations of the significant economical parameters before and after the integration of the AI education programs. These are employment rate, average income, the business growth rate and innovation index in the economies. The above graph illustrates that once education on AI has been introduced, the above four parameters have significantly risen. Namely, the employment rate increased from 65.2% to 72.4%, gross average income per capita rose from 2500 EUR to 2800 EUR, business rising rate got better from 3.2% to 4.5% and the innovation index rose from 45.6% to 58.2%. All these trends suggest that AI education programs are beneficial to the economic realm by improving employment status, income levels, business prospect, and the ability to innovate to those within the community.

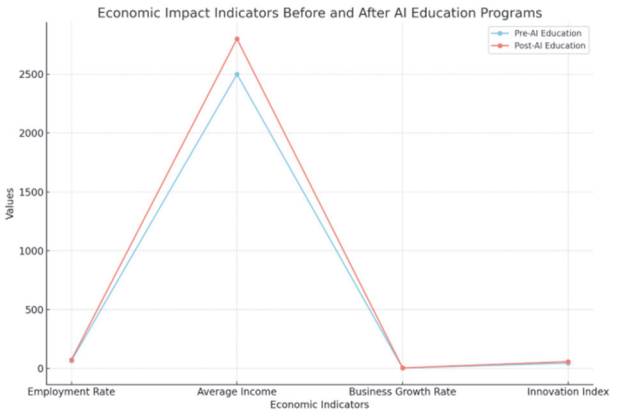

Figure 4 Economic impact indicators before and after AI education programs

Table 9 Social impact of AI education programs

Social Indicator	Pre-AI Education (Mean)	Pre-AI Education (SD)	Post-AI Education (Mean)	Post-AI Education (SD)	Percentage Change / %	95% Confidence Interval for Change / %
Community Engagement Rate	54.3	7.2	63.2	6.8	16.4	[15.2, 17.6]
Quality of Life Index	65.1	5.9	72.5	5.6	11.4	[10.3, 12.5]
Education Attainment	40.7	8.1	50.8	7.4	24.8	[23.1, 26.5]
Digital Literacy Rate	48.9	6.5	61.4	6.2	25.5	[24.0, 27.0]

It is based on the enhancement of the different social indicators which can be perceived as the social effects of the implemented programs of AI education. The community engagement rate that shows the level of participation of the members in community-related activities went up from the pre-AI education mean of 54.3 (SD =7.2) to the post-AI education mean of 63.2 (SD = 6.8). This represents a 16.4% increase with 95% confidence interval for change between 15 and 33. Employee perceptions of the safety climate increased during the study period by 4 percent while the 95 percent confidence interval for the change was between 15%, and 33.2% and 17.6%. This means that the education programs in artificial intelligence have encouraged the enhancement of communions within the society. Other aspects of quality of life such as the quality of life index, which is the

combined rating of overall well being and satisfaction with life also received a boost. It rose from the pre-AI education mean of 65.1 (*SD* = 5.9) to a post-AI education mean of 72.5 (*SD* = 5.6), which indicates an 11.4% rise. The difference that has been obtained as Chi-square = 10 is significant, and the corresponding 95 percent confidence interval is 10% to 19.3% and 12.5%. From that period, there has been a statistically significant upgrade in perceived quality of life value among the participants. The participants' overall level of education which indicates the highest level of education achieved by respondents demonstrated a significant improvement after the completion of the AI education programs. The attrition of the mean educational attainment was confirmed to have increased from 40.7 (*SD* = 8.1) to 50. 8 (*SD* = 7.4), a 24.8% increase. This change is statistically significant with the short description of the 95% confidence interval from 23.1% to 26.5% and therefore acknowledging the overwhelming positive effects of AI in education. The literacy concerning the use of DAC L Technologies advanced dramatically as per records on digital literacy level. The mean of the pre-AI education was 48.9 (*SD* = 6.5), which rose to 61. About 4 (*SD* = 6.2) pursued further education after their AI which is 25.5% growth. The percentage change in online sales with 95 percent confidence interval is ranging from 24.0% and 27% possessing an overall non-digital affinity figure of 0%. This shows that there was a marked improvement of digital skills and literacy as a consequence of AI education programs.

Based on the line graph in Fig. 5, changes in the key social indicators as affected by the implementation of AI education programme have also been determined. Some of the social indicators include Engaged community rate, quality of life index and education level and /or digital literacy rate. The graph demonstrates gains concerning all of the indicators after the institution of AI education. Engagement rate of the community it served rose from 54.3% to 63. A part increased by 2%, quality of life index went up from 65.1 to 72.5, education attainment moved slightly up from 40.7% to 50.7% to 60%, internet users from 41% to 44%, which is from 9% to 61.4%. Such trends imply that AI education programs have a beneficial impact on social consequences: improving presence, quality of life, school achievements, and digital competencies among the communities.

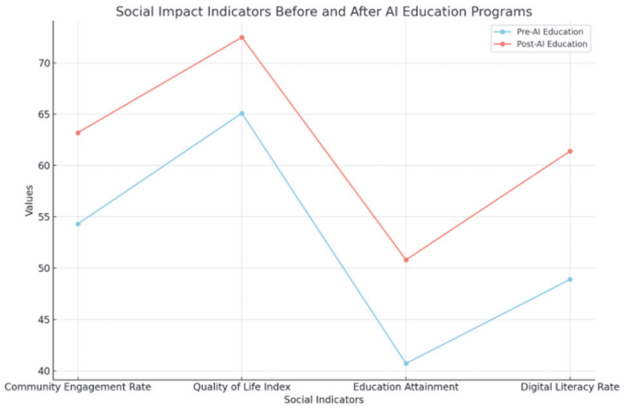

Figure 5 Social impact indicators before and after AI education programs

5 DISCUSSION

The findings of the present research evidence considerable relevance of AI education development for advancing local prospects of economic and social growth. Exploratory findings were noted in relation to gender differences in AI education adoption and non-adoption: while a slightly higher percentage of males had high adoption (32.5%) compared to female (30.3%), a significantly higher percentage of females did not adopt (19.4%) compared to males (17.4%). This is in accordance with previous studies showing that there is a gender divide specifically when it comes to the use of technology information. However, the small difference leading to a high adoption rate has shown that the gap between boys and girls in the area of AI learning is closing, probably due to the more focused activities to encourage girl participation in STEM. Regarding age - related factors, it is evident that younger participants, particularly those aged 18-24, exhibit the highest adoption rate of 29.1%. In contrast, participants in the oldest age group, 65 years and above, have the lowest adoption rate of 18.9%. These findings align with other results presented here, which suggest that younger individuals are more inclined to embrace new technologies. These barriers could include general illiteracy in using ICTs, resistance to change, and outdated systems among the growing elderly population leading to a high non-adoption rate as the population age grows. The regression analysis revealed a significant positive correlation between the age of AI students and their competitiveness, with the youngest age group (18-24 years) showing the greatest potential for enhancement from AI education (Exp(*B*) = 1). Here, an initial examination of the results indicates that basic artificial intelligence training is less efficient than the advanced certification, a statement supported by research highlighting the centrality of higher job-relevant digital competencies. Income level and dwelling place also impacted competitiveness, primarily pointing why the AI education should be enhanced across different income brackets and urban settings. Participants highlighted that they perceived increased employment opportunities, income levels and computer literacy as the major areas of positive change after receiving the AI education. Surprisingly, younger individuals and females expressed more perceived benefits, with more than half of the young females perceiving improved employment prospects. Such perceptions are further echoed by various studies that have established a positive correlation between digital literacy and increased employ ability and wages. The significant improvement in the digital literacy rates concerning the participants also adds to the evidence that supports the effectiveness of AI education programs in preparing citizens for the emerging digital markets.

The study pointed at a high level of discrepancies in the general adoption of AI education and its effects on the social and economic status of different regions. Women also showed the greatest involvement and accumulation in urban regions following higher levels of income and education. This trend aligns with the literature associated with Digital divide whereby aggregated regions are considered to have optimal access to technologies as well as educational equipment's. Thus, the aforementioned

findings highlight the challenges encountered by individuals as they navigate the development process, thereby underscoring the need for policy measures to be implemented to bridge these gaps, particularly in rural areas. With regard to the occupational impact of AI education, it is important to note that the influence varies depending on the chosen industry and the educational level attained by individuals. The information technology and healthcare sectors have been the primary sources of employment opportunities, especially for those with postgraduate education. This is in accordance with other research showing that AI and other innovative technologies have caused massive shifts in these sectors and demand new talent and more skills. The lesser effect in manufacturing or for lower educated people underlines the necessity of continuous learning in the context of the fourth Industrial revolution.

The economic effect of the study highlighted the enhancement of several socially essential quantitative factors, including the employment rate, average income per capita, business growth rate, and innovation index after the beneficiaries received education in artificial intelligence. These findings are consistent with other studies which establish the shift possible when new ideas and digital skills are applied to help spur business development and innovation. Promoting social participation, enhancing the quality of life, improving education levels, and boosting digital literacy are among the other benefits associated with AI education. These advantages are similar to the activation of communities and empowerment through education highlighted by other researchers. In this regard, the present study contributes to the literature by demonstrating how AI education can bolster economies and enhance societal welfare. The research underscores the importance of raising public awareness and encouraging citizen enrollment in AI - related knowledge dissemination, as they need to embrace the market and environment for socio - economic growth. There is a pressing need to expand the reach of AI education, particularly among populations in developing regions and people of color, to ensure that all stakeholders can collectively benefit from technological advancements. Subsequent studies should look into the actual long term effects and other successful educational initiatives to support the development of policies and instructional strategies.

5.1 Practical Implications

Implications of this study for policies, educational organizations, and industries. The analysis of the results of this study has several implications. The fact that AI education adoption reflects the difference in gender in general online usage underlines the future efforts to close the gender gap even more. The overall landscape of adoption rates depicted here indicates that males are slightly more prevalent among non - adopters. However, a smaller proportion of female respondents opted for high adoption. Nonetheless, the overall gender gap is not as pronounced as one might anticipate, given the distribution of non - adopters. In terms of future development regarding the gender - related findings of the study, educational programs should emphasize the significance of embracing diversity and more explicitly addressing the identified needs of female learners. Disparities revealed in the enrolment of AI education in relation to age underlines the need to have differentiated age approaches. The level of familiarity of the people with AI is relatively higher among the younger generation and this is a rationale to develop and utilize AI education programs. On the other hand, older people have challenges such as low literacy in the digital platform as well as their resistance to change. It is critical for educational institutions and policymakers to design programs that would counteract such barriers, for instance, courses for incoming older students, and projects that improve elderly's digital competence along with other ages' populations. Continued upgrading of knowledge can also assist the older people to be products of the modern technological world through the labor market.

Hence, the correlation between education in AI and competitiveness, especially among youth and highly paid employees, shows that the education must be available for all population groups. It is wise for the policy makers to remove existing social economic barriers of AI education, put in place more scholarships and subsidies and make training more affordable. Large population groups demonstrate higher participation rates and benefits expected at the level of socioeconomic development when connected to the Internet with the identified digital divide. This disparity can only be closed through new targeted actions to develop digital structures in rural areas, as well as the use of community-based training initiatives. The attitude toward AI education in relation to employment chances, revenue, and digital knowledge reveals that such programs prove helpful for preparing people for the digitalization process. The curriculum of educational institutions should include AI and digital skills in the course of studying, to be prepared for the existing and future demands for manpower. Thus, the cooperation between industry and educational institutions will guarantee appropriate training of the graduates according to the current demands, increasing their chances to find a job. Also, encouraging people to stay in education or avail development opportunities can assist them in managing CTs (Competitive Technologies) and remaining relevant.

Examining the disparities in the adoption of AI education and its socioeconomic implications across different regions further underscores the significance of place - level strategies. Typically, developed regions exhibit higher participation rates, greater enthusiasm, and more advanced educational infrastructure compared to less developed ones, which are often characterized as rural. To address these regional imbalances, policymakers should consider a range of interventions. These include developing digital technology in rural areas and providing incentives for organizations to establish training centers in relevant regions. Such efforts can play a crucial role in the equitable distribution of the positive outcomes associated with AI education and technological advancements across various territories.

6 CONCLUSION

The research concludes that immediate attention must be focused on the widespread promotion of AI education development and its significant contributions to local economic and social progress. The findings reveal that

gender and age have a substantial impact on the adoption of AI education. It is evident that young people and males are more inclined towards this educational system compared to other demographic groups. These disparities highlight the need for targeted programs designed to boost the participation of underrepresented groups and narrow the existing gaps.

The positive correlation identified between AI education and competitiveness, particularly among the youth and more affluent populations, further emphasizes the growing necessity for equitable access to AI education. Variations in adoption rates and the resulting socioeconomic opportunities across different regions underscore the potential for cross-regional equity and place-based strategies to achieve sustainable development.

Employment opportunities, increased income, and digital skills are emphasized by common AI education programs as crucial perceived values for individuals seeking to integrate into the digital economy and labor market. The study's conclusion also aligns with previous research, highlighting the significant impact of AI and digital skills on high-quality economic growth and development. Moreover, the broader societal implications include enhanced community participation, improved quality of life and well-being, advanced education, and increased digital literacy.

The benefits of AI education are manifold. Therefore, policymakers, educational institutions, and industry stakeholders must consider promoting AI literacy by providing scholarships to less privileged groups in societies and developing countries. This includes the development of age-appropriate and gender-sensitive programs, enhancement of digital infrastructure, and efforts to closely align training with industry demands. Addressing these areas will ensure that the outcomes of AI education are more evenly distributed, thereby contributing to inclusive economic growth and social development.

Limitations and Future Research

Based on the findings of this study, several limitations should be considered when interpreting the impact of AI education on local socio-economic and environmental development (SEEDs). Firstly, the data regarding perceived changes in employment status, income, and digital skills are based on respondents' self-reports, which may be influenced by social desirability bias. Future research should incorporate additional objective employment and income statistics to validate these findings.

Secondly, the cross-sectional nature of the data used in this study provides only a snapshot view of the situation and does not allow for an assessment of changes over time. Longitudinal studies are needed to examine the long-term effects of AI education in economic and sociological contexts. Additionally, the study's focus on specific regions and demographics may limit the generalizability of the results to other populations. Expanding the research to include a broader range of areas and demographic groups would provide a more comprehensive understanding of AI education's impact.

The study also highlights the need for further investigation into the factors influencing the low adoption rates of AI education among different learner groups. Gender and age differences are evident, indicating a need for more research to identify the causes of these disparities and best practices for addressing them. Similarly, regional differences in adoption levels and associated benefits suggest that contextual factors affecting AI education should be further explored to understand why and how adoption patterns vary.

Future research should also examine the effectiveness of various educational initiatives and campaigns in raising awareness of AI. Comparing the outcomes of face-to-face versus online training, short-term boot camps versus traditional academic programs, could shed light on the effectiveness of different training methods for diverse groups. Furthermore, future studies could investigate policy initiatives related to AI education and emerging strategies, such as the use of subsidies to improve access and ensure that participation is not limited by financial constraints.

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