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# Enhancing Education with Artificial Intelligence: The Effectiveness of AI in Inclusive Education

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**Abstracts:**
To gauge a country's progress on the global stage, the concepts of development and growth are becoming increasingly important. Most nations are pursuing sustainable development, which artificial intelligence is assisting with in conjunction with human endeavours. The purpose of this research is to examine the applicability of AI technologies in the field of education, particularly as they relate to student use. Due to its ability to assist people overcome learning challenges and succeed in their profession, the use of AI in education has the potential to increase the number of people who connect with education.

**Keywords:**
Sustainable Development Goals, Artificial Intelligence, Inclusive education.

## 1. Introduction

The United Nations (U.N.) created the 17 Sustainable Development Goals (SDGs) with the intention of changing the globe, eventually enhancing people's lives and distributing wealth across a healthy planet. Fundamentally, these SDGs represent an urgent call to action for all nations, both developed and developing, to work together in a global partnership. The Sustainable Development Goals (SDGs) of the UN are greatly aided by artificial intelligence (AI), which improves decision-making, scalability, and efficiency in a variety of industries. Artificial intelligence (AI) is the theory and development of computer systems that can do tasks like speech recognition, decision-making, and pattern recognition that have traditionally needed human intelligence.

AI enhances healthcare, combats climate change, boosts economic growth, improves education, supports sustainable agriculture, and reduces poverty, making it a powerful tool for advancing global sustainability initiatives.

Goal 4 of the 17 sustainable development goals focuses on inclusive, equitable and qualitative education for all. It acknowledges the need for quality education for vulnerable populations, including poor children, rural children, disabled individuals, indigenous people, and refugee children. This goal is crucial for sustainable development and socioeconomic mobility. AI can contribute to this goal by ensuring effective learning for diverse abilities and backgrounds. Speech-to-text and translation tools support students with disabilities and language barriers, making education more inclusive. AI chatbots and virtual tutors provide instant assistance, improving engagement and learning outcomes. Additionally, AI helps educators by automating administrative tasks, allowing them to focus more on teaching. By bridging educational gaps and expanding access to quality learning, AI plays a key role in making education equitable and inclusive for all.

## 2. Review of literature

A research paper titled **"Artificial Intelligence and Its Role in Education"** aims to study the role of AI in education, its potential solutions to educational challenges, and its potential benefits. This study observed that AIA is addressing academic and administrative difficulties in education by providing automatic solutions for various tasks. It assists not only academic staff but also addresses academic difficulties of the students. It assesses students' history, interests, and level of intelligence, allowing them to learn according to their level. AI also benefits education in other ways, such as providing practical experience in virtual environments, addressing health and safety issues, and conducting experiments without human loss. In the medical field, AI systems create animations and virtual images, helping students learn about human body functions and organs. The adoption and application of AIA in an educational setting is strongly supported by this study.

A research paper titled **"Vision, challenges, roles and research issues of Artificial Intelligence in Education"** studied the framework and role of AIED along with its challenges. The study has described the role of AI in education into four including, Intelligent tutor, Intelligent tutee, Intelligent learning tool and Policy-making advisor. According to the findings of the study, AI's potential in educational settings is expanding due to emerging technologies.

An article titled **"Artificial Intelligence in Education: A Review"** sought to investigate, how Artificial Intelligence's (AI) effects on education. The study concluded that artificial intelligence (AI) has been widely embraced and applied in education, especially by educational institutions, in a variety of ways. AI in education has moved from computers to web-based platforms, making it possible to use chatbots and robots to teach. The effectiveness of teachers and the calibre of instruction have increased as a result. Because AI makes it possible to customize learning materials, it has also enhanced the educational experience for students. In the field of education, AI has been widely embraced and applied, especially in educational institutions.

A research paper titled **"Artificial intelligence in education: The three paradigms"** outlined three AIEd paradigms-AI-directed (learner-as-recipient), AI-supported, (learner-as-collaborator), and AI-empowered (learner-as-leader) to methodically encapsulate the ways in which AI approaches are applied to learning and instructional challenges in the classroom. The development of instructional and learning sciences might be greatly stimulated and advanced by AI methodologies, which would then present evidence-based prospects for AI technology development. Furthermore, it is imperative to stress that AIED is a combination of educational, social, cultural, and economic aspects throughout the technological application processes, not just the adoption of AI technology. Learner-cantered, data-driven, personalized learning in the present knowledge age must evolve iteratively as the AIED area develops further.

In a research paper titled **"role of artificial intelligence in higher education",** The authors examined and critically analysed the application of AI in higher education while keeping in mind the study domain's outlook. The study observed that, Due of the substantial financial investment and the need for educators to persuade others, AI's potential in education is neglected. Computer scientists need a theory of learning to create AI models. The roles that teachers play is changing because of developments in deep and machine learning. But

institutions must weigh the advantages and disadvantages of integrating AI into teaching and learning because it is not yet ready to replace instructors.

## 3. Research gap

According to previous study, a significant amount of work has been done on the application of AI in education, particularly for administrative and teaching staff. Less research has been done on the use of AI by students, particularly those who struggle with learning and have trouble understanding the language. As a result, they are often left out of the learning process. This study attempts to close that gap.

## 4. Objectives of the study

1. To observe the use and frequency of use of AI tools by the students.
2. To study the use of AI tools by the students with language barriers.
3. To measure the effectiveness of AI in overcoming the learning difficulties of the students.

## 5. Hypothesis statements

1. H0 = There is no significant use of AI tools by the students
2. H0 = AI tools have no significant relevance for the students with language barriers
3. H0 = AI tools have no significant effect in overcoming learning difficulties of the students

## 6. Research methodology

**6.1 Type of Research:** The present study is descriptive research, trying to find out the use of AI tools by the students and how it is proving effective in the process of learning.

**6.2 Area of the Study:**

The study is conducted in Kalyan district of Maharashtra state.

**6.3 Sampling Technique**

Using convenient sampling method, the data is collected.

**6.4 Target Population & Sample Size:**

The targeted population for this study was college students having either Marathi or English as a medium of instruction. The sample size is 100 students.

**6.5 Type and Source of the Data:**

This study has employed both primary and secondary data. Primary data was gathered through the structured questionnaire, while secondary data was gathered from online resources, reference books, journals, and reports.

**6.6 Statistical tools used:**

Data is arranged using graphs to make it easier to grasp. Chi-Square test is employed to test hypotheses.

## 7. Limitations

1. The current study used a small sample size of 100. Depending on the size of the sample, the outcome could change.
2. College students from the Mumbai suburbs make up the responders. Students from rural locations may have different outcomes.

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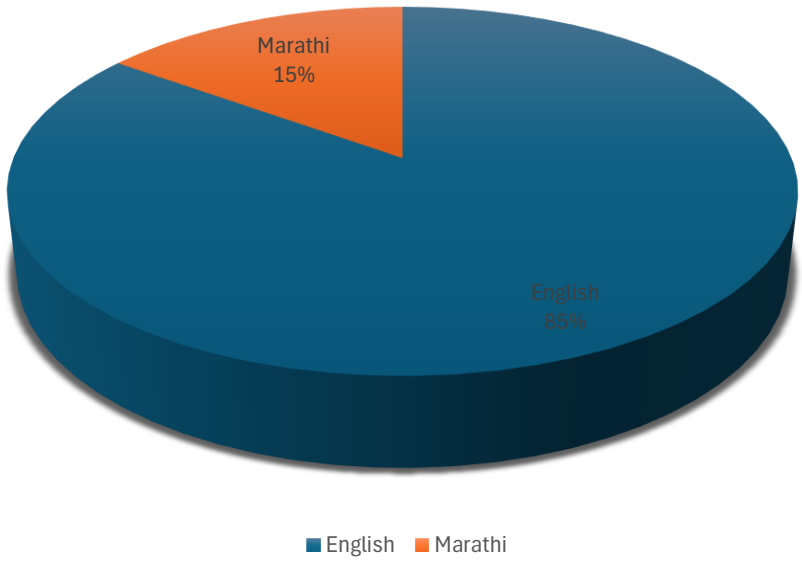
## 8. DATA ANALYSIS AND FINDINGS OF THE STUDY

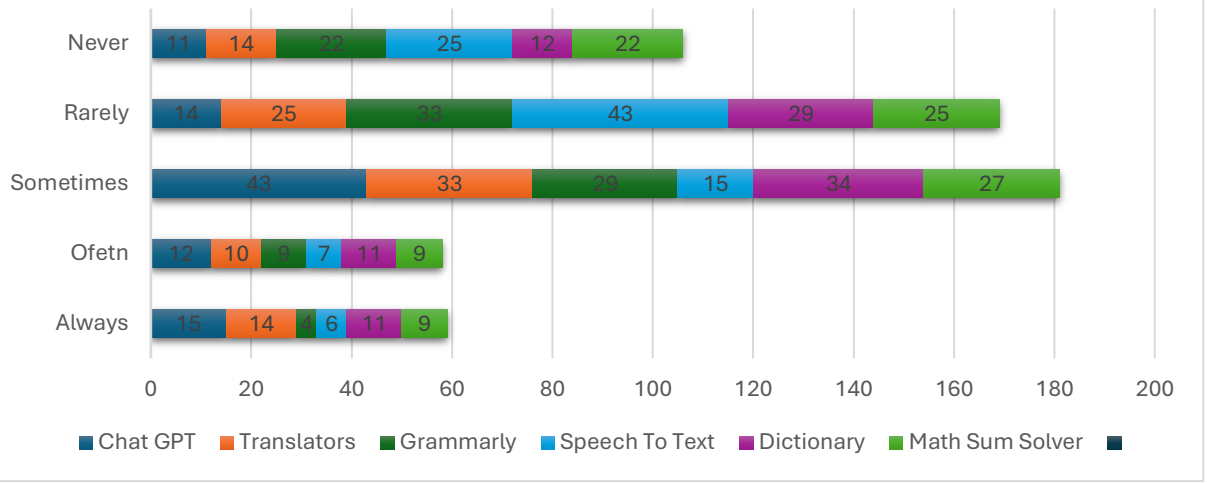
**Fig. 8.1 Medium of instruction of the respondents**




Source: Primary Data

The above graph represents the medium of instruction of the respondents. 15% of the respondents' medium of instruction is Marathi while rest 85% students opted of English as a medium of instruction.

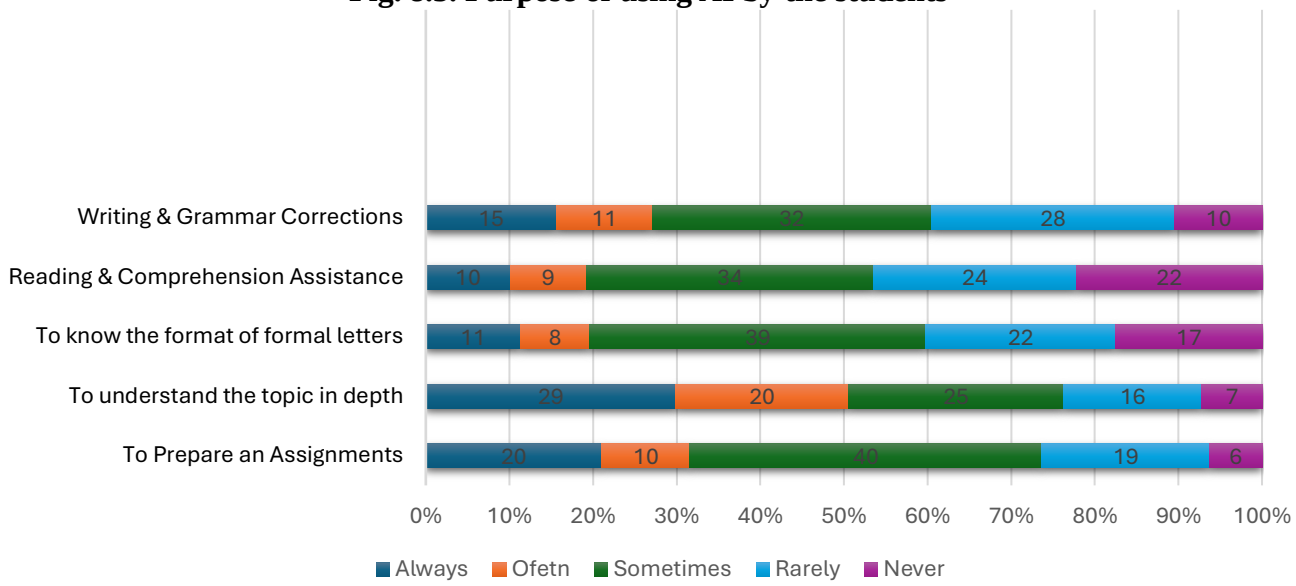
**Fig. 8.2 the use of AI tools by the respondents with the frequency of use**




Source: Primary Data

The above chart represents the name of the AI tool that students use as well as frequency of using that tool. The graph reveals that majority of the students do use AI tools in their learning routine. Chat GPT & Translators are most frequently used tools among all. Dictionary and Grammarly are another highly used tools, showing the relevance in English language learning.

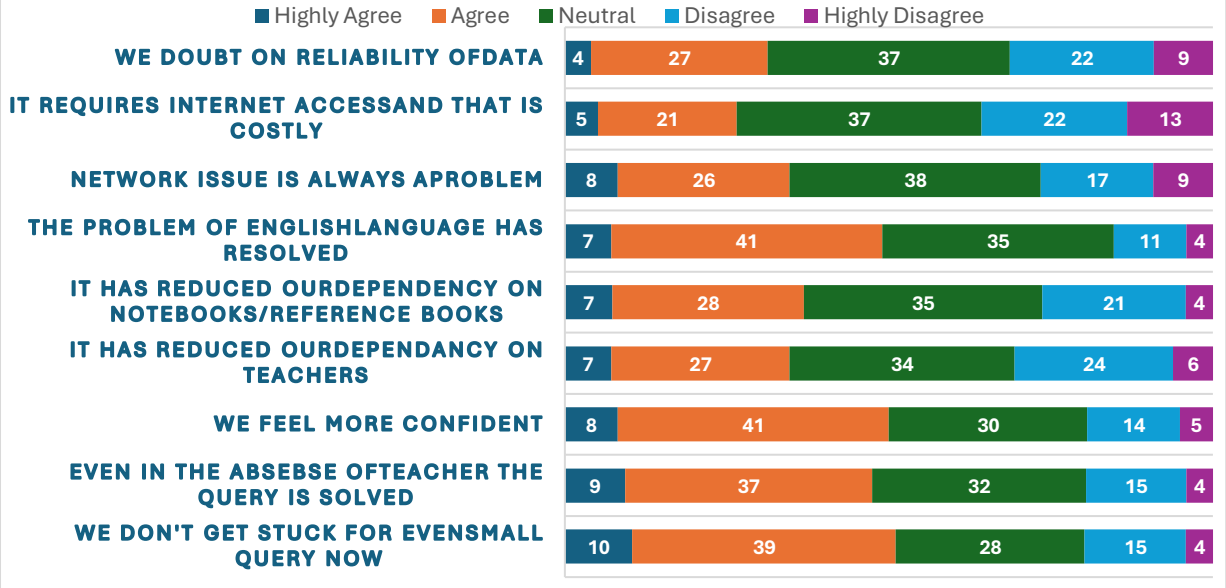
**Fig. 8.3. Purpose of using AI by the students**




Source: Primary Data

The above chart represents the purpose for which students use AI tools in their learning process. Among all AI tool users, around 29% of students always use them for in depth understanding of the topic. Only 6% of the students never used AI tools to prepare an assignment. Compared to other reasons, for reading and & comprehension purpose the use of AI tools is lesser.

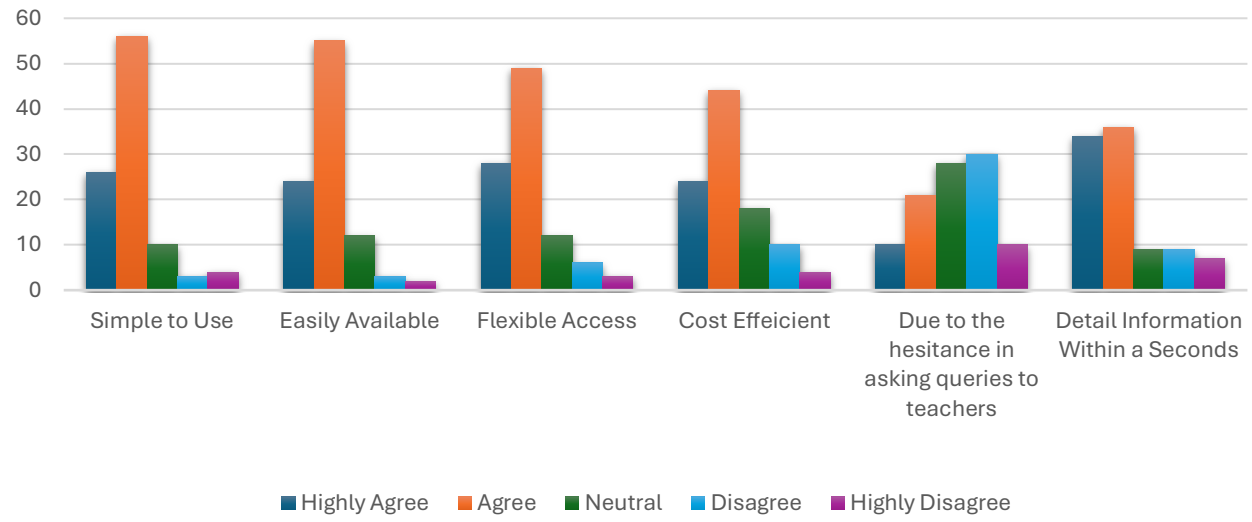
**Fig. 8.4. Students opinion on using AI tools**




Source: Primary Data

Above chart depicts the opinion of the students on using AI tools in learning process. More agreement is seen on the problem of English language has resolved and confidence among the students has boosted. The disagreement on point of network and cost issue shows that 13% of students have no problem with the network connections and its cost.

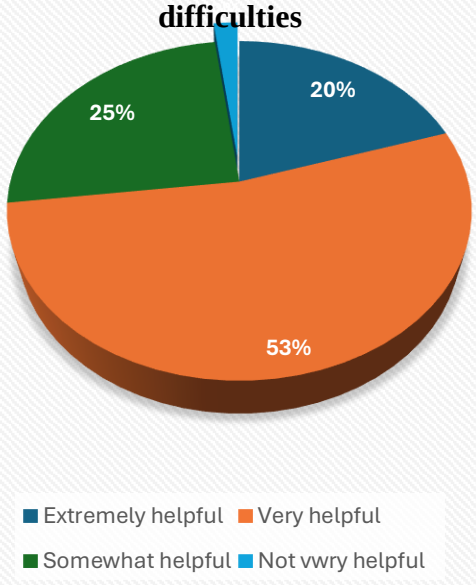
**Fig. 8.5. Reason Behind Using AI Tools by the Students**




Source: Primary Data

The above chart represents the various reasons for which students are using AI tools. Students are highly agreed on that, AI tools are simple, flexible, easily available and cost efficient. Majority of the students disagreed upon the argument that they are using AI tools due to hesitance in asking to teachers, marking the relevance of traditional teaching methods in the AI era.

**Fig. 8.6. Extent to which AI tools proved helpful in overcoming student's learning difficulties**




Source: Primary Data

The pie chart in figure 8.6 presents the effectiveness of AI tools in overcoming the learning problems of the students. Given chart depicts that, except 2% of the respondents, all other respondents have benefitted from AI in their learning process. For 25% of the students, it has been proven extremely helpful and for around 53% it has proven helpful. The current chart shows the high level of effectiveness of AI tools for the students.

## 9. HYPOTHESIS TESTING

### 9.1. H0 = There is no significant use of AI tools by the students

**Table: 9.1 Frequency of use of AI tools by the students**

| Frequency | Chat GPT | Translators | Grammarly | Speech To Text | Dictionary | Math Sum Solver |
|---|---|---|---|---|---|---|
| **Always** | 15 | 14 | 4 | 6 | 11 | 9 |
| **Often** | 12 | 10 | 9 | 7 | 11 | 9 |
| **Sometimes** | 43 | 33 | 29 | 15 | 34 | 27 |
| **Rarely** | 14 | 25 | 33 | 43 | 29 | 25 |
| **Never** | 11 | 14 | 22 | 25 | 12 | 22 |

After applying a chi-square statistic to check if the observed usage of AI tools significantly deviates from expected values,
Chi-Square Statistic ($\chi^2$) = 51.94
Degrees of Freedom (df) = 20
p-value = 0.00012
The null hypothesis ($H_0$) is rejected since the p-value (0.00012) is much less than 0.05, indicating that students' use of AI tools varies significantly and that they have diverse preferences for different AI applications.

### 9.2. H0 = AI tools have no significant relevance for the students with language barriers

**Table: 9.2 Use of AI tools by Marathi medium students**

| Frequency | Use of AI for reading and comprehension assistance | Translation and multilingual support |
|---|---|---|
| **Always** | 7 | 10 |
| **Often** | 3 | 3 |
| **Sometimes** | 3 | 1 |
| **Rarely** | 1 | 1 |
| **Never** | 1 | 0 |

By performing a Chi-Square Test for Independence to determine a significant relationship between the two categories.
Chi-Square Statistic ($\chi^2$) = 2.53
Degrees of Freedom (df) = 4
p-value = 0.6394
Since the p-value (0.6394) is much greater than 0.05, we fail to reject the null hypothesis ($H_0$). This means there is no significant difference in the use of AI tools for reading & comprehension assistance versus translation & multilingual support.
In other words, AI tools do not show a significant pattern of relevance for students with language barriers based on this dataset.

**9.3. H0 = AI tools have no significant effect in overcoming learning difficulties of the students**

**Table 9.3. (Q) To what extent AI tools helped you in overcoming learning difficulties?**

| Level of Helpfulness | Observed Frequency |
|---|---|
| Extremely helpful | 20 |
| Very helpful | 53 |
| Somewhat helpful | 25 |
| Not very helpful | 2 |
| Total Responses | 100 |

Expected frequency per category = Total responses / 4 = 100 / 4 = 25
By performing the chi-square test
Chi-Square Test: $\chi 2=\sum E(O-E)2$
Where O = observed frequency and E = expected frequency
Chi-Square Statistic ($\chi^2$) = 53.52
p-value = $1.42 \times 10^{-11}$ (very small)
Since the p-value is much smaller than 0.05, we reject the null hypothesis ($H_0$). This means that there is a significant impact of AI tools on overcoming students' learning difficulties—the distribution of responses is not due to random chance. AI tools are significantly helpful in addressing students' learning challenges.

## 10. Conclusion

Most students use AI tools, with Chat GPT, Translators, and Dictionary and grammar correctors being the most frequently used. Around 29% use AI tools for in-depth understanding of topics, while only 6% use them for assignments. AI tools are simple, flexible, easily available, and cost-efficient. However, students disagree on the use of AI tools due to hesitance to ask teachers, indicating the relevance of traditional teaching methods in the AI era. The use of AI tools varies significantly. AI tools significantly help address students' learning challenges, contributing to inclusive, equitable, and qualitative education for all. Speech-to-text and translation tools support students with disabilities and language barriers, while AI chatbots and virtual tutors improve engagement and learning outcomes. With the flexibility and convenience characteristics AI is getting more popular among learners. Not only the student with language barriers but also the students with disabilities can benefitted from AI. Therefore, AI has huge scope to include more learners in the education system who were excluded earlier which ultimately help nations to achieve the sustainable goal of inclusive education.

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