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"Mind Meets Machine: The Role of LLMs in Shaping Modern Education"

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ABSTRACT

Large Language Models (LLMs) like ChatGPT, Gemini, and Claude are transforming teaching and learning practices worldwide. These AI systems can generate human-like text, assist in assignments, support research, and produce learning materials. The adoption of LLMs is rapidly increasing among students and teachers, offering numerous advantages such as increased efficiency, personalized learning, and improved understanding.

However, LLMs also present certain challenges such as accuracy issues, misinformation, plagiarism risks, reduced creativity, and over-dependence. Thus, understanding the perceptions of both students and teachers is essential for integrating LLMs responsibly into the education system.

This study examines data from **100 students** and **100 teachers** collected through structured questionnaires. The findings show that students commonly use LLMs for research, writing assignments, coding help, and presentations, whereas teachers primarily use them for idea generation, content development, coding assistance, and personalizing instruction. Both groups express mixed views regarding accuracy and ethical use.

The study concludes that LLMs can significantly enhance education when used with proper guidelines and AI literacy. Recommendations include institutional policies, training programs, and curriculum integration. The study contributes to a balanced understanding of LLM use in academic settings.

INTRODUCTION

Artificial Intelligence (AI) has emerged as one of the most influential technologies of the 21st century. It is transforming various fields, including healthcare, business, communication, and most importantly, **education**. One of the key developments in AI is the creation of **Large Language Models (LLMs)** such as:

- ChatGPT
- Google Gemini
- Claude
- LLaMA
- BARD

These models are capable of understanding, generating, summarizing, and analyzing text. They can produce essays, solve coding problems, generate study notes, translate languages, answer questions, and even create lesson plans.

LLMs in Education

LLMs have become widely used tools in schools and colleges. Students use them for:

- Research and academic writing
- Completing assignments
- Preparing presentations
- Coding and debugging
- Summarizing concepts

Teachers use them for:

- Creating teaching materials
- Generating ideas
- Preparing assessments
- Providing personalized instructions
- Reducing workload

However, concerns exist regarding:

- Accuracy of AI-generated content
- Over-dependence
- Plagiarism and misuse
- Ethical challenges
- Data privacy

Therefore, it is important to understand the perceptions of both students and teachers to determine the responsible use of LLMs.’

OBJECTIVES OF THE STUDY

This study was conducted with the following objectives:

Primary Objectives To analyze the frequency of LLM usage among students and teachers.

1. To identify the main purposes for which students and teachers use LLMs.
2. To examine the perceived benefits and challenges of using LLMs in education.
3. To compare the perspectives of students and teachers regarding accuracy, usefulness, and risks associated with LLMs.
4. To determine how LLMs influence creativity, critical thinking, and academic integrity.
5. To evaluate the methods used by learners to verify the accuracy of AI-generated content.

Secondary Objectives

1. To understand how LLMs impact workload and efficiency in teaching-learning activities.
2. To identify concerns such as plagiarism, ethical issues, and over-dependence.
3. To recommend strategies for the responsible integration of LLMs into educational institutions.

This chapter outlines the aims that directed the study and guided the research methodology, survey design, data collection, and analysis.

SCOPE OF THE STUDY

The scope of this study includes several dimensions:

Population Covered

- **100 Students** from various academic backgrounds.
- **100 Teachers** from different disciplines.

Geographic Scope

The study is limited to respondents who completed an online questionnaire; hence, participants may belong to different institutions or regions.

Content Scope

The study focuses on:

- Usage patterns of LLMs
- Perceptions toward LLM usefulness
- Concerns related to accuracy, ethics, and dependence
- Comparative analysis of student and teacher perspectives

Time Scope

The data was collected during the academic year 2024–2025.

Technological Scope

The research focuses only on **Large Language Models** (LLMs), no other AI systems like robotics or machine learning algorithms.

LIMITATIONS OF THE STUDY

Like any research, this study has limitations:

Sample Size

Although 200 respondents (100 students + 100 teachers) provide substantial insights, results may not represent the views of all institutions.

Self-Reported Data

Survey responses rely on honesty and personal perception; biases may exist.

Limited to Online Users

Participants who completed the Google Form are likely more digitally literate than average users.

Constantly Evolving Technology

AI technologies change rapidly; findings may shift as LLMs evolve.

No Experimental Component

The study analyzes perceptions only. It does not measure actual academic outcomes.

RESEARCH METHODOLOGY

This chapter explains the overall approach used to conduct the study.

Research Design

A **descriptive survey method** was used to gather data and analyze perceptions.

Nature of Data

Both **quantitative** (percentages, frequency) and **qualitative** (open-ended responses) data were collected.

Sample Size

- **100 students**
- **100 teachers**

Sampling Technique

Convenience sampling, where participants voluntarily responded to online forms.

Data Collection Tool

A structured Google Form containing:

- Demographic details
- Questions about familiarity with LLMs
- Frequency of use
- Purpose of use
- Benefits and challenges
- Attitudes toward accuracy, dependence, and plagiarism
- Suggestions for improvement

Data Analysis Tools

- MS Excel
- Frequency tables
- Percentage analysis
- Graphs and charts
- Comparative interpretation

Ethical Considerations

- No personal information (emails, phone numbers) is used.
- Data was collected voluntarily.
- Participants remained anonymous.
- Responses were used only for academic research.

Summary of Methodology

The methodological framework provided a structured way to compare students and teachers, identify patterns, and interpret educational implications.

ANALYSIS — STUDENTS

This chapter presents the findings from the **100 student responses**.

Respondent Profile (Students)

From your survey:

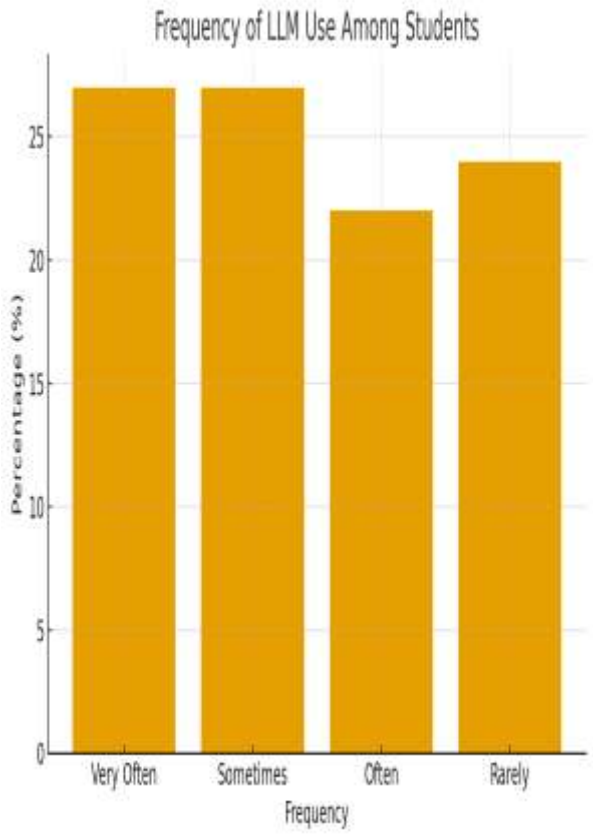
- **57% Male**
- **43% Female**
- Majority Undergraduate
- Some Postgraduate
- Few PhD scholars

Students come from various disciplines, indicating diverse opinions.

Frequency of LLM Use among Students

Frequency	Percentage
Very Often	27%
Sometimes	27%
Often	22%
Rarely	24%

Interpretation:
More than half of the students use LLMs frequently ("Very often" + "Often").
This shows strong adoption and reliance.



Purpose of Using LLMs

Students use LLMs for the following tasks:

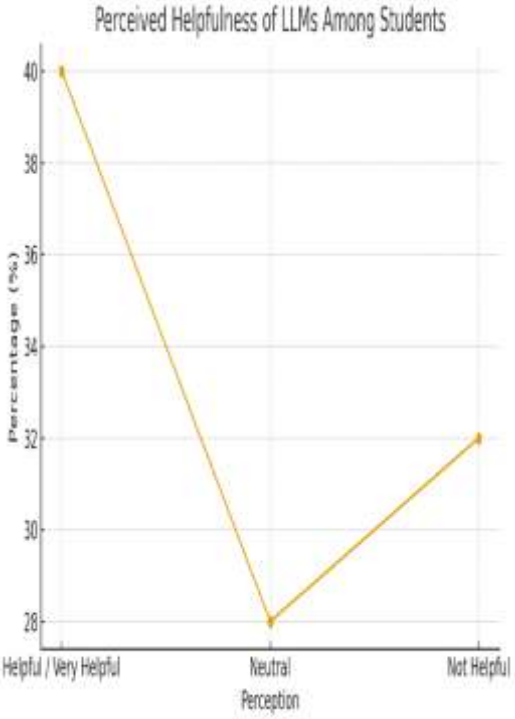
- **Research:** 21%
- **Writing Assignments:** 21%
- **Preparing Presentations:** 20%
- **Coding Assistance:** 15%
- **Essay Writing:** 14%
- **Creating Study Material:** 9%

Interpretation:
Students primarily use LLMs for academic improvement, especially writing and research.

Perceived Helpfulness

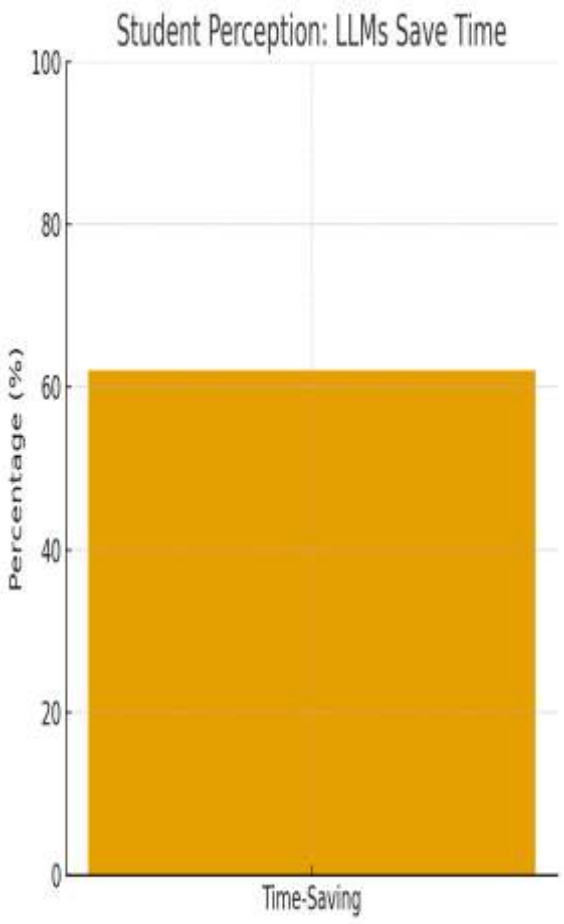
Perception	Percentage
Helpful / Very Helpful	40%
Neutral	28%
Not Helpful	32%

Interpretation:
40% find LLMs useful; however, 32% do not find them helpful, showing mixed feelings.



Time-Saving

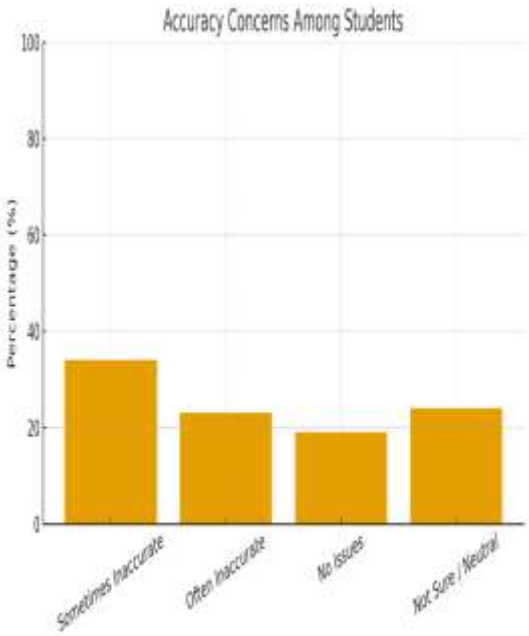
- **62%** believe LLMs save time “Always” or “Sometimes”.



Accuracy Concerns (Students)

Response	Percentage
Sometimes Inaccurate	34%
Often Inaccurate	23%
No Issues	19%
Not Sure / Neutral	24%

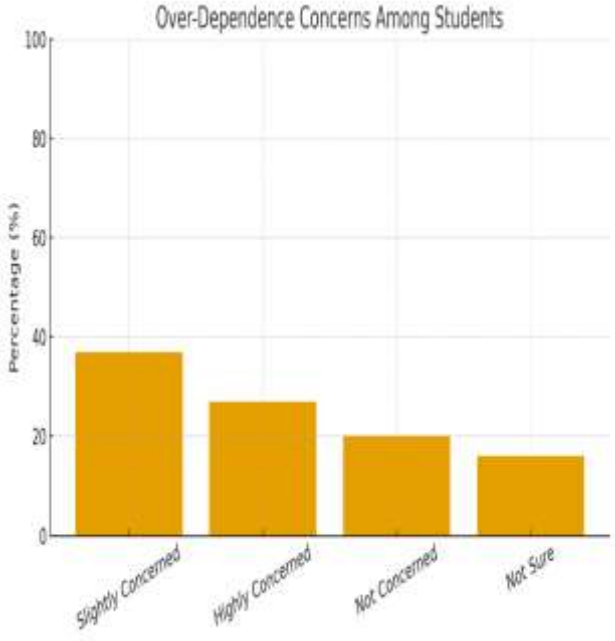
Interpretation:
A majority of students believe LLMs may provide inaccurate responses. This highlights the need for verification and fact-checking skills.



Over-Dependence Concerns (Students)

Concern Level	Percentage
Slightly Concerned	37%
Highly Concerned	27%
Not Concerned	20%
Not Sure	16%

Interpretation:
More than half the students (64%

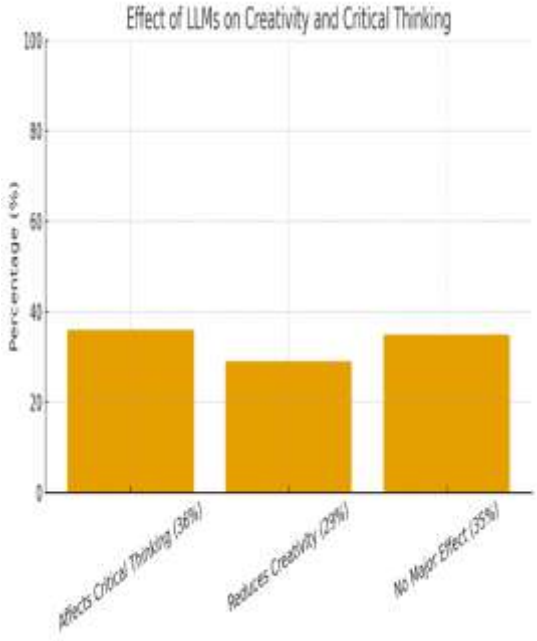


) have concerns about excessive dependence on LLMs.

Effect on Creativity and Critical Thinking

- **36%** believe LLMs affect critical thinking.
- **29%** feel creativity reduces.
- **35%** see no major effect.

Interpretation:
Students are divided—some feel creativity declines, while others see LLMs as neutral.

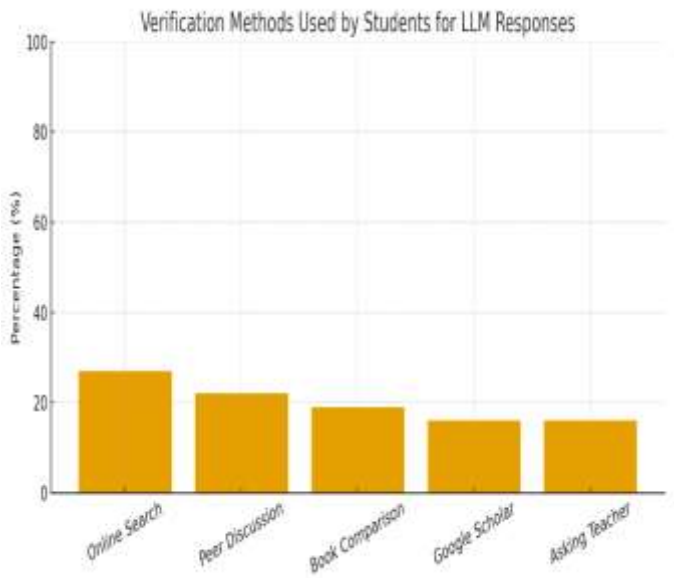


Verification Methods

Students verify LLM responses through:

- **Online Search:** 27%
- **Peer Discussion:** 22%
- **Book Comparison:** 19%
- **Google Scholar:** 16%
- **Asking Teacher:** 16%

Interpretation:
Verification habits are generally good, indicating responsible usage.



DATA ANALYSIS — TEACHERS

This chapter presents the findings from the **100 teacher responses** from your Excel sheet.

Respondent Profile (Teachers)

Gender Distribution:

- **Female:** 39%
- **Male:** 31%
- **Other:** 30%

Qualification Levels:

- MA — 20%
- MSc — 20%
- PhD — 19%
- B.Ed — 15%
- M.Ed — 14%
- Other — 12%

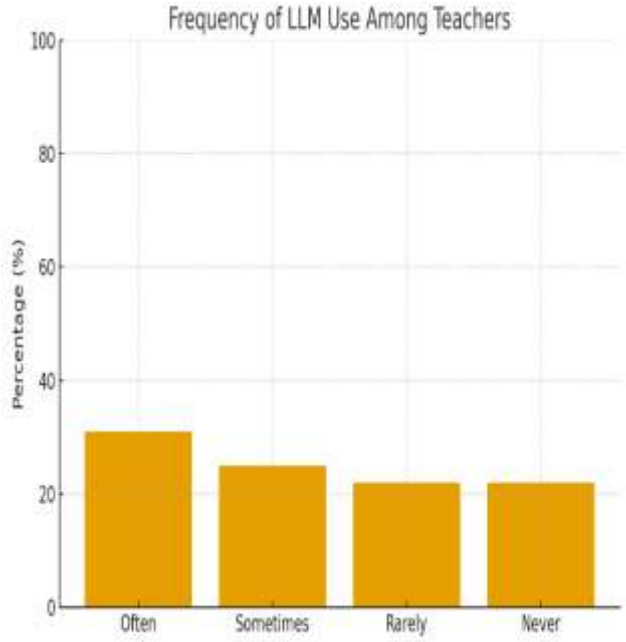
Interpretation:
Teachers from diverse academic backgrounds participated, adding credibility to the findings.

Frequency of LLM Use Among Teachers

Frequency	Percentage
Often	31%
Sometimes	25%
Rarely	22%

Frequency	Percentage
Never	22%

Interpretation:
Teachers use LLMs moderately, but a notable number (22%) do not use them at all.

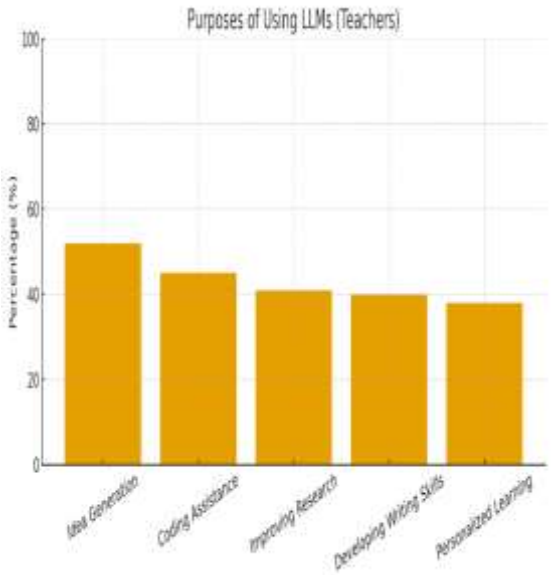


Purposes of Using LLMs (Teachers)

Top uses selected by teachers:

- **Idea Generation:** 52%
- **Coding Assistance:** 45%
- **Improving Research:** 41%
- **Developing Writing Skills:** 40%
- **Personalized Learning:** 38%

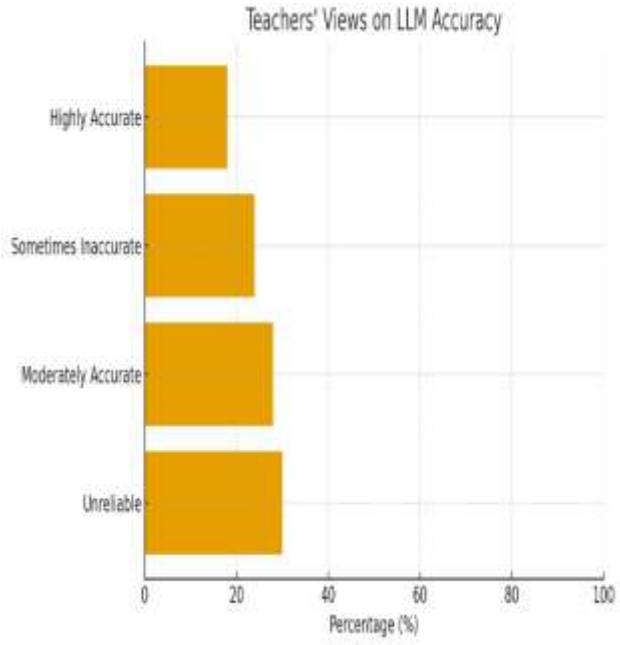
Interpretation:
Teachers mainly employ LLMs for creativity, improving productivity, and supporting instruction.



Teachers' Views on Accuracy

Accuracy Level	Percentage
Unreliable	30%
Moderately Accurate	28%
Sometimes Inaccurate	24%
Highly Accurate	18%

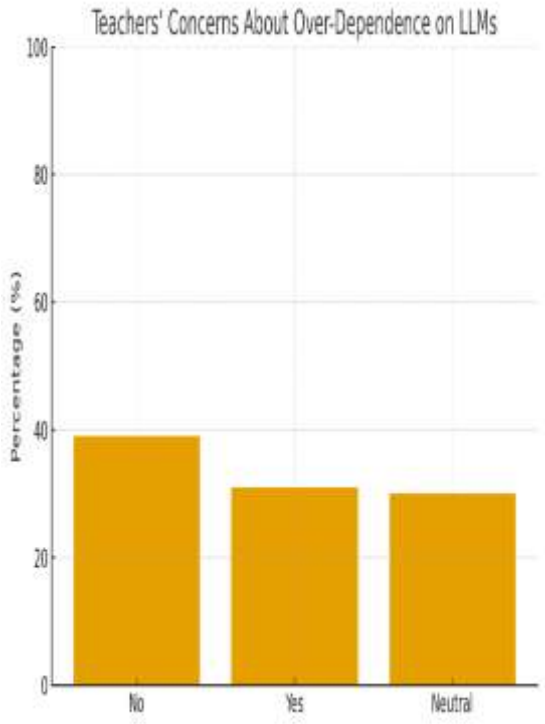
Interpretation:
Teachers are more cautious about the accuracy of LLM responses than students.



Concerns About Over-Dependence (Teachers)

Response	Percentage
No	39%
Yes	31%
Neutral	30%

Interpretation:
Camp is divided—39% believe dependence is not an issue, but 31% are concerned.



Plagiarism and Ethical Concerns

Teachers expressed concerns about:

- Misuse of AI in assignments
- Plagiarism
- Students avoiding real learning
- Incorrect information
- Ethical risks

This highlights the need for stricter academic policies.

Opportunities of LLM Integration

Teachers see several opportunities:

1. Enhanced digital learning
2. Personalized teaching
3. Greater accessibility to knowledge
4. Reduction in teacher workload
5. Support in research and content generation

Challenges Identified by Teachers

1. Reliability issues
2. Misinformation
3. Over-dependence
4. Privacy concerns
5. Increase in plagiarism

Interpretation:
Teachers view LLMs as beneficial but potentially risky when misused.

FINDINGS

Based on the responses of 100 students and 100 teachers, the following findings were drawn:

Findings from Student Responses

1. Students are frequent users of LLMs, with nearly half using them often or very often.
2. Most students use LLMs for research, academic writing, presentations, and coding help.
3. Students acknowledge that LLMs save significant time.
4. Mixed opinions exist regarding helpfulness: 40% find LLMs helpful, whereas 32% do not.
5. Many students worry about accuracy—34% believe responses are sometimes inaccurate.
6. Over-dependence is a major concern, with 64% expressing worry.
7. Students fear reduction in creativity and critical thinking.
8. Students verify responses using search engines, books, teachers, or peer discussions.

Findings from Teacher Responses

1. Many teachers use LLMs for idea generation, coding, research, and content development.
2. 31% of teachers often recommend using LLMs, while 22% do not use them at all.

3. Teachers expressed more skepticism about accuracy: 30% find LLMs unreliable.
4. Teachers acknowledge workload reduction benefits.
5. Ethical concerns are higher among teachers than students, especially plagiarism.
6. Teachers support the idea of integrating LLMs into the curriculum with caution.
7. Teachers believe LLMs can enhance personalized and creative learning if used properly.

Overall Findings

1. Both students and teachers recognize the educational potential of LLMs.
2. Students benefit from LLMs in completing assignments and research; teachers benefit in content creation.
3. Both groups perceive accuracy issues as a problem.
4. Ethical issues—especially plagiarism and misuse—are major concerns.
5. LLMs are considered time-saving and productivity-enhancing tools.
6. Responsible use and AI literacy are essential.

DISCUSSION

The integration of AI and LLMs into educational environments offers a transformative opportunity. The study reveals that *students rely on LLMs for academic tasks*, while *teachers use them for enhancing instruction and productivity*. This demonstrates a shift in educational practices.

Educational Value of LLMs

LLMs help students by:

- simplifying complex topics
- giving step-by-step guidance
- generating examples and explanations
- improving grammar and writing quality

Teachers benefit through:

- faster lesson planning
- personalized teaching material
- reduced administrative workload

Pedagogical Implications

LLMs can contribute to:

- blended learning
- flipped classrooms
- interactive engagement
- continuous learning beyond the classroom

Ethical & Practical Concerns

Both groups express concerns about:

- accuracy
- misinformation
- plagiarism
- dependency
- fairness
- data privacy

These issues highlight the need for regulations, training, and ethical practices.

Students vs Teachers

Students are more enthusiastic about using LLMs daily, while teachers are cautious. This difference reflects varying levels of responsibility and professional accountability.

Conclusion of Discussion LLMs are powerful educational tools but require guidance, policies, and ethical implementation to become sustainable.

RECOMMENDATIONS

Institutional Recommendations

1. **Develop AI literacy programs** for students and staff.
2. **Implement strict plagiarism policies** specifically addressing AI content.
3. **Create syllabus-specific AI tools** designed for academic use.
4. **Include AI usage guidelines** in school handbooks.

Student Recommendations

1. Verify AI-generated content before using it.
2. Use LLMs as learning tools, not as shortcuts.
3. Focus on building creativity and critical thinking.
4. Avoid copying AI-generated assignments directly.

Teacher Recommendations

1. Use LLMs to create interactive and personalized content.
2. Encourage students to use LLMs responsibly.
3. Train students to cite AI content ethically.
4. Stay updated with AI tools and advancements.

Policy Recommendations

1. Conduct periodic audits of AI usage in academics.
2. Establish ethics committees to monitor AI integration.
3. Promote research on AI in education.

CONCLUSION

This study concludes that **Large Language Models (LLMs) have become essential digital tools in the field of education**. Students rely on LLMs for academic work, while teachers use them for content preparation and enhancing instructional delivery.

The results indicate:

- **High usage** among students
- **Moderate usage** among teachers
- **Clear benefits** including time-saving, improved writing, idea generation, and personalized learning
- **Significant concerns** including accuracy issues, plagiarism, over-dependence, reduced creativity, and ethical issues

LLMs, when used responsibly, can greatly enhance educational quality, accessibility, and efficiency. Educational institutions should promote responsible use, ensure AI literacy, and implement policies to prevent misuse.

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