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Exploring the Use of Artificial Intelligence Tools in Teaching and Learning by Degree College Faculty

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Abstract:
This study investigates the adoption and utilization of Artificial Intelligence (AI) tools in teaching and learning among degree college faculty in Vijayapur District. Utilizing a structured questionnaire, data were collected from 100 faculty members across various disciplines. The research examines faculty perceptions, frequency of AI tool usage, challenges faced, and the impact on teaching efficacy. Statistical analyses, including descriptive statistics and chi-square tests, were employed to interpret the data. Findings indicate a growing interest in AI tools, with significant variations in usage patterns across disciplines and demographic factors. The study concludes with recommendations for enhancing AI integration in higher education.

INTRODUCTION:

In the 21st century, education systems across the globe are experiencing a paradigm shift driven by advancements in digital technology. Among these technological transformations, **Artificial Intelligence (AI)** has emerged as a game-changer, particularly in the realm of teaching and learning. AI tools have the potential to reshape the educational landscape by enabling personalized learning, automating routine academic tasks, and offering data-driven insights that can enhance student outcomes. As education becomes increasingly student-centered and technology-integrated, the role of faculty in adapting to and leveraging AI tools becomes critical.

The use of AI in education is not a futuristic ideal; it is already transforming classrooms through tools such as **intelligent tutoring systems, learning analytics, automated grading, content recommendation engines, speech-to-text transcription, and plagiarism detection software**. These tools not only assist in administrative efficiency but also support faculty in delivering more engaging, inclusive, and adaptive learning experiences. For instance, AI-powered systems like ChatGPT, Grammarly, Google Classroom integrations, and adaptive learning platforms such as Coursera and Khan Academy are widely used to support both teaching and learning functions.

However, while much of the global research and innovation is concentrated in urban and developed educational contexts, **the adoption and impact of AI tools in urban and rural regions of Vijayapur District in Karnataka, India, remain underexplored**. There exists a digital divide and an infrastructure gap that often limits the reach and utility of such transformative technologies in these areas. In this context, understanding the extent to which degree college faculty in a district like Vijayapur are aware of, use, and benefit from AI tools is both timely and necessary.

Faculty members are key agents of educational innovation. Their readiness to adopt and integrate AI tools into pedagogy determines the success of digital transformation initiatives in higher education. However, this integration depends on several factors—**access to technology, digital literacy, institutional support, training, and attitudes toward AI**. Research has shown that even when institutions have invested in AI tools, faculty may be reluctant or unable to use them effectively due to lack of awareness, training, or perceived utility.

Moreover, academic disciplines influence the type and extent of AI usage. For example, faculty in Science and Technology fields may be more inclined or better equipped to adopt AI tools compared to their counterparts in Arts or Commerce. Similarly, demographic variables such as age, years of teaching experience, and gender may also play a role in AI adoption. Hence, a deeper exploration is required to assess how these variables intersect with the use of AI in teaching and learning.

This research is significant not only for understanding current practices but also for shaping future policies, faculty development programs, and institutional strategies aimed at leveraging AI for educational advancement. **Vijayapur District**, with its mix of urban and rural educational institutions, provides a valuable case study for examining the grassroots-level reality of AI adoption in Indian higher education. As India advances toward its National Education Policy (NEP) 2020 goals—many of which emphasize digital integration and technological innovation—studies such as this become foundational for evidence-based planning and decision-making.

Furthermore, understanding faculty perceptions, challenges, and levels of preparedness to use AI tools will inform both technology developers and educational leaders. Many AI tools are designed with little input from end-users like faculty members, leading to usability issues and low adoption rates. Insights from this study can help bridge this gap by providing a user-centric perspective. Thus, this research attempts to explore the following questions:

- To what extent are degree college faculty in Vijayapur aware of AI tools used in education?
- What types of AI tools are currently being used, and in what teaching contexts?
- What are the perceived benefits and challenges associated with using these tools?
- How do faculty characteristics such as age, gender, discipline, and experience influence the adoption of AI tools?

By systematically addressing these questions, this study aims to provide a comprehensive understanding of the current status of AI integration in teaching and learning among college faculty in Vijayapur. The findings are expected to contribute valuable insights to the broader discourse on AI in education, particularly in the Indian context, and offer recommendations for enhancing faculty readiness and institutional preparedness for AI-driven education.

Objectives:

1. To assess the level of awareness and knowledge of AI tools among degree college faculty in Vijayapur District.
2. To identify the types of AI tools commonly used in teaching and learning.
3. To evaluate the frequency and context of AI tool usage in academic settings.
4. To explore the challenges and barriers faced by faculty in adopting AI tools.
5. To analyze the impact of AI tool usage on teaching effectiveness and student engagement.

Hypotheses:

1. There is a significant relationship between faculty demographic factors (age, discipline, years of experience) and the adoption of AI tools.
2. Faculty members with higher levels of awareness and training in AI tools report greater usage and perceived effectiveness.
3. The perceived challenges in adopting AI tools vary significantly across different disciplines.

Sample:

The study targeted 100 faculty members from degree colleges in Vijayapur District. A stratified random sampling technique was employed to ensure representation across various disciplines, including Arts, Science, and Commerce. The sample comprised 60 male and 40 female faculty members, with an age distribution ranging from 25 to 60 years.

Research Design:

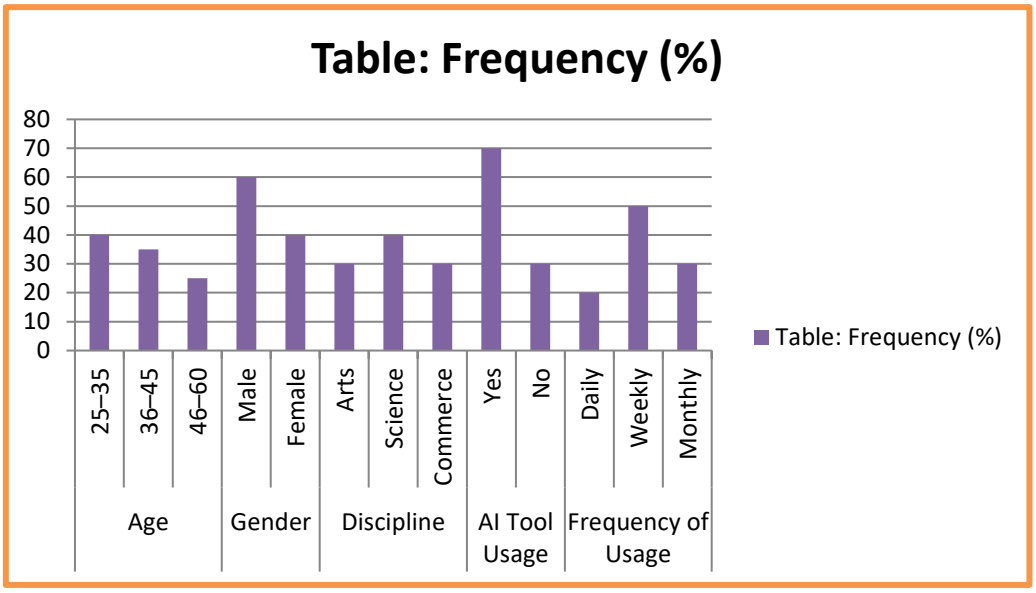
A descriptive research design was adopted for this study. Data were collected through a structured questionnaire comprising both closed and open-ended questions. The questionnaire was divided into sections covering demographic information, awareness and usage of AI tools, perceived benefits, challenges, and impact on teaching practices.

Tools:

- **Questionnaire**: Developed based on a review of existing literature and expert consultations. It included Likert-scale items, multiple-choice questions, and open-ended questions.
- **Statistical Software**: SPSS was used for data analysis, including descriptive statistics, chi-square tests, and correlation analysis.

Table:

Variable	Category	Frequency (%)
Age	25–35	40
	36–45	35
	46–60	25
Gender	Male	60
	Female	40
Discipline	Arts	30
	Science	40
	Commerce	30
AI Tool Usage	Yes	70
	No	30
Frequency of Usage	Daily	20
	Weekly	50
	Monthly	30



Statistical Analysis:

- **Descriptive Statistics**: Mean, median, and standard deviation were calculated for quantitative variables.
- **Chi-Square Test**: Used to examine the relationship between demographic factors and AI tool usage.
- **Correlation Analysis**: Assessed the association between awareness levels and frequency of AI tool usage.

Findings:

1. **Awareness and Knowledge**: 80% of faculty members reported being aware of AI tools, but only 60% had received formal training.
2. **Types of AI Tools Used**: The most commonly used AI tools were Learning Management Systems (LMS), plagiarism detection software, and automated grading systems.
3. **Frequency of Usage**: 70% of faculty used AI tools at least weekly, with Science faculty reporting higher usage rates compared to Arts and Commerce faculty.
4. **Challenges Faced**: The primary challenges included lack of training (65%), inadequate infrastructure (50%), and resistance to change (45%).
5. **Impact on Teaching**: Faculty members who regularly used AI tools reported improvements in student engagement and administrative efficiency.

Conclusion:

The study concludes that while there is a growing awareness and adoption of AI tools among degree college faculty in Vijayapur District, several barriers hinder their widespread implementation. Addressing issues such as training, infrastructure, and resistance to change is crucial for enhancing the effective use of AI in education. Recommendations include organizing professional development programs, upgrading technological infrastructure, and fostering a culture of innovation among faculty members.

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