

Integrating Generative AI into Course Content Development

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Abstract - Generative AI, through the efficient production of various forms of material, has the ability to completely transform the way that course content is developed. The use of generative AI in the creation of course content is crucial since it may further optimize the procedure, lessen the strain for teachers, and provide personalized, excellent, and captivating learning resources. The study aims to demonstrate how generative AI is included in the creation of course materials. Additionally, it suggests the use of a new framework called "Generative AI for Instructional Development and Education," or "GAIDE," which further makes use of AI's potential to improve educational outcomes. The use of generative AI in this framework demonstrated in particular how effective and useful these integrations were for creating instructional content and how applicable they were for creating, modifying, and evaluating the content. A mixed-methods strategy is being used in this project, which integrates quantitative and qualitative data collection techniques. The study's sample was primarily made up of about 75 Indian volunteers. The evaluation metrics for this study primarily consist of structured questionnaires and analysis using SPSS software for quantitative data analysis. Thematic analysis is used to evaluate secondary qualitative data in order to identify numerous recurrent themes and various patterns. As per the findings of this study, the applicability of generative AI is emergent and progressive for course content generation through stages of prompts and refinement, while the impact is held strongly through the efficiency delivered in faster and more extensive means for generating and refining quality course content through generative AI.

Keywords: Generative AI, GAIDE, Course Content, Development, Education, Educator

I. INTRODUCTION

The rapid advancement of technology has significantly transformed many sectors, including education. One of the most significant and promising technological innovations in recent years is AI 'Generative AI' (Gopalan et al., 2017). It has significant potential to enhance the development of the course content effectively. Generative AI (GenAI) is a significant type of AI 'artificial intelligence' technology that can effectively produce multiple types of content, including text, imagery, synthetic data, and audio. Generative AI models can also generate new content as they can turn the inputs of the text into an image, turn any video into text, and

turn an image into a song (Carter & Zhang, 2025). The Generative AI integration into the course content development is very significant and can further streamline the process, decrease the educators' workload, and produce personalized, high-quality, engaging learning materials.

The market size within the Generative AI market has been projected to reach approximately US\$1.11bn in the year 2025 in India (Roozbahani & Ghafari, 2014). At the same time, the market size is further expected to show a yearly growth rate of between CAGR 2025 to 2030 of around 41.52%. It will also lead to a market volume of approximately US 6.28bn in the year 2030 (Statista, 2025). India, being a large and highly diverse education environment, has a lot to lose by the Generative AI integration in education (Jain & Babu, 2024). The Indian education system has been characterized by a huge number of students and a shortage of qualified teachers. It has to face several challenges in effectively delivering any high-quality education (Sasikumar & Sujatha, 2024). However, the following study mainly aims to highlight the integration of Generative AI into course content development. It is also proposing a novel framework that further leverages the capabilities of AI in order to enhance educational outcomes.

Research Objectives

RO1: To evaluate the application of Generative AI for educational purposes for the development of course content.

RO2: To analyse the impact of Generative AI Integration on the quality of Course Content Development

The paper is organized in such a way that it covers the topic of the inclusion of Generative AI in course materials development, starting with the introduction to its possibilities in education and the description of the research goals. The literature review describes how AI can impact the quality of course content, its effectiveness, and how it can be implemented in different spheres of education. The mixed-methods approach, as well as data collection and sampling of participants, are described in the methodology. An AI integration framework (GAIDE) is outlined, followed by the

findings, discussion, and suggested implications of the research to educators. The conclusion is a reflection on the transformative nature of AI in the field of education, as well as the future research directions.

II. LITERATURE REVIEW

Influence of Generative AI Integration on the Quality Of Course Content Development

It has been indicated by research of Mulyani et al., (2025) that Generative Artificial Intelligence directly enhances the performance of teaching through accurately enhancing learning and usefulness. The perceptions of the teacher of the usability influence of AI and its overall integration into many areas (Kharipova et al., 2024). These include student-focused learning, teaching practice enhancement, and learning material development (Mulyani et al., 2025). Additionally, the ease of learning is very crucial for its accurate adoption. The study also accurately highlights different issues that need to be addressed for accurate integration of AI within education, like technical limitations, as well as the necessity for teacher training (Saleem & Mamidiseti, 2024).

The Generative AI Applicability in Several Educational Fields for Course Content Development

The research by (Bahroun et al., 2023) has effectively highlighted the overall significant performance of multiple chatbots of AI, like ChatGPT, within subject-specific exams. Additionally, it has also revealed the potential of several techniques that are associated with natural language processing techniques in order to enhance feedback processes of the peer (Bharathi & Sujatha, 2024). There are many concerns regarding authenticity, several errors, and the risk related to any plagiarism, along with credibility, which have been raised (Sasikumar & Sujatha, 2023). It further raises the requirements for caution and also the accurate and responsible integration of AI tools within study assessments (Bahroun et al., 2023). The papers also touch on the significance of updating several assessment strategies, many policy implementations, and student awareness regarding AI's impact on numerous evaluations (Dickey & Bejarano, 2024).

The Generative AI's Efficiency and Time-Saving Potential in Course Content Development

A study by (Kumar et al., 2024), has mentioned ChatGPT, where it has been identified that the applications of ChatGPT within education are continuously growing. It is also relevant in natural sciences, especially the planning of courses, and also in content generation among the vast majority of educators, which is also understudied (Latsoudis, 2020). The results of the research also emphasized the strengths of ChatGPT in making the course design more effective and also keeping the content consistent with many of the faculty competencies. It also further systematically facilitates professional development (Kumar et al., 2024). The study also effectively emphasized the significance of AI literacy

training in effectively supporting the strategic integration of Artificial Intelligence into multiple traditional teaching methods while also accurately fostering continuous professional development for many educators (Martinez & Garcia, 2024).

The Acceptance Levels of Educators and Students Towards Generative AI-Integrated Course Content

According to a study conducted by (Kumar et al., 2024), ChatGPT has also been mentioned, in which it has been established that the number of applications of ChatGPT in the educational sector is constantly increasing. It is also very prominent in the context of natural sciences, especially when it comes to course planning, and is also prominent in content generation among many educators, who also are not adequately studied (Jaiswal & Pradhan, 2023). The results of the research also demonstrated the advantages of ChatGPT to improve the effectiveness of course development and also align the content with numerous faculty competencies. It is also more systematic in helping to develop professionally (Kumar et al., 2024). The research was also successful in highlighting the importance of AI literacy education in effectively facilitating the strategic incorporation of the Artificial Intelligence into various conventional teaching strategies as well as correctly enhancing lifelong learning among most teachers (Dhamala, 2024).

Generative AI performance in the development of course content has been found to have a high degree of improvement in the performance, quality and efficiency of teaching. The studies indicate the positive aspect of AI applications, including ChatGPT, in planning courses, content creation, and optimization. However, the challenges of authenticity and errors as well as the risk of plagiarism increases the significance of the necessity to take care and responsibility in the integration procedure of AI (Azimfar, 2014). The role of AI in personalized learning and professional development of institutions also helps to justify the revolutionary potential of AI in the modern education system.

III.METHODOLOGY

Data Collection

This study employs a mixed-methods approach where there is an integration of both quantitative and also qualitative methods of the data collection (Petrova & Kowalski, 2025). Furthermore, the quantitative data are collected by employing structured questionnaires and then this is analyzed through SPSS 'Statistical Package for the Social Sciences' (Tominc & Rožman, 2023). Secondary qualitative data are gathered by employing interviews and also through focus groups in order to gain deeper insights into both the experiences and perceptions of participants (Agarwal & Singh, 2024).

Participant Sample

The sample of the study mainly comprised around 75 Indian participants, chosen by using purposive sampling in order to

also ensure representation of different backgrounds and diverse experiences (Zhan & Wang, 2024). The participants are mainly involved in multiple aspects of content development of the course. It further provides a deep and comprehensive knowledge and understanding of the generative AI integration into this specific process.

Evaluation Metrics

The evaluation metrics that are mainly for this study include structured questionnaires. The aim is to collect quantitative data on the experiences and perceptions of different participants. Additionally, qualitative data directly analyzed helps to capture numerous nuanced insights (Jang et al., 2022). The SPSS software is also employed for quantitative data analysis. On the other hand, secondary qualitative data is accurately assessed by using thematic analysis in order to recognise many recurring themes and different patterns.

Analytical Methods

The study further employed quantitative data analysis techniques to process and also to interpret the statistical information that is collected from the questionnaires. This mainly involved many descriptive statistics in order to summarize data and also for inferential statistics that mainly aim to recognise significant relationships and different trends. The qualitative data is mainly analyzed through using thematic analysis, allowing for the recognition and also exploration of different key themes that are associated with the generative AI integration that is into course content development.

IV. FRAMEWORK DEVELOPMENT

The “Generative AI for Instructional Development and Education” framework, abbreviated “GAIDE” framework as proposed by Dickey and Bejarano (2024), is a “pragmatic and systematic framework” that utilises generative AI for the purpose of instruction and development of educational context such as course material content. The application of generative AI under this framework particularly indicated the efficiency and practical impact that these integrations had on the development of educational content as well as their applicability in generation, adaptation and assessment of the content under the principles of Bloom’s revised taxonomy.

Content Generation

Content generation as per this framework indicates the use of generative AI technologies and features for goal and context setting for the content generation. This is followed by using GenAI for generating learning objectives based on Bloom’s revised taxonomy and eventually generating the rough draft of course content based on the learning objectives refined through trial and error and with final generating of course content through macro, micro and iterative refinements.

Content Adaptation

Content adaptation is an interlinked stage with content generation in association to the activities of refinement processes of course content generation. Through the procedure, the content adaptation takes the place in refinement of the learning objectives, macro refinement of the rough draft for hence generated course content followed by the micro refinement of the decided draft, alongside focusing on an iterative refinement for the sake of contextual integrity. These stages within the framework indicate the predictive and data heavy utilization of generative AI tools for adding, changing and rewording existing generated content.

Content Assessment

Content assessment is the process that could fall within the transitional phases of content generation and content adaptation. It presents the impact of GenAI in the development of the course content and its adaptation through refinement processes by assessing the generated and refined content and discerning contextual integrity, bias, learning objective alignment and quality in association to generative AI being used as a productive, comprehensive and efficient tool for evaluating massive data and generating or assisting in refining course content drafts.

V. FINDINGS AND DISCUSSION

Primary Quantitative Data Analysis: Statistical Analysis

TABLE I RELIABILITY TEST

Reliability Statistics	
Cronbach's Alpha	N of Items
.958	11

Table I noted the evaluation for internal consistency of the data of the survey conducted in association to the research objectives and variables. The Cronbach’s Alpha value had resulted as 0.958, indicating a rather positive internal consistency within the data represented by the 11-research objective-based survey questions.

TABLE II DEMOGRAPHIC STATISTICS

Category	Frequency	Percent
<i>What is your gender?</i>		
Female	19	25.3
Male	56	74.7
<i>What is your age?</i>		
18-25 years old	30	40.0
26-35 years old	38	50.7
36-50 years old	4	5.3
50 years above	3	4.0
<i>What is your work experience?</i>		
0-5 years	29	38.7
5-10 years	38	50.7
10-15 years	8	10.7
Total	75	100.0

Table II presents the demographic frequency of the sample population of 75 participants. On observation of the above-mentioned data. In the aspect of gender demographics, male

participants ($r= 56$; percent= 74.7%) were higher than the female participants ($r= 19$; percent= 25.3%). The most prominent age group were the participants within the ages 26-35 years old ($r= 38$; percent= 50.7%), followed by the age group of 18-25 years old ($r= 30$; percent= 40%). Around 50.7% ($r= 38$) of the participants had a working experience worth 5-10 years while around 38.7% of the participants had 0-5 years working experience.

TABLE III DESCRIPTIVES STATISTICS

	Mean	Std. Deviation
Statement 1	4.28	1.122
Statement 2	4.48	1.057
Statement 3	4.29	1.183
Statement 4	4.47	.991
Statement 5	4.48	.964
Statement 6	4.45	.977
Statement 7	4.35	1.214
Statement 8	4.51	.906
Statement 9	4.47	1.070
Statement 10	4.47	.905
Statement 11	4.51	.991
Valid N (listwise)	75	75

The data distribution through the analysis of the clustered nature of the data is elevated through the central tendency and variance as depicted by Table III through mean and standard deviation respectively for the 11-research related survey question items. The mean value ranged within 4.27 and 4.51 while the standard deviation value ranged under 0.906 and 1.183. This indicated the clustered distribution of data among the central tendency and variance of the data.

TABLE IV CORRELATIONS

IV:		DV: Course Content Development	Statement 1
IV 1: Application of Generative AI in field	Statement 2	Pearson Correlation	.466**
	Statement 3	Pearson Correlation	.599**
	Statement 4	Pearson Correlation	.598**
	Statement 5	Pearson Correlation	.549**
	Statement 6	Pearson Correlation	.487**
IV 2: Impact of Generative AI	Statement 7	Pearson Correlation	.603**
	Statement 8	Pearson Correlation	.643**
	Statement 9	Pearson Correlation	.509**
	Statement 10	Pearson Correlation	.561**
	Statement 11	Pearson Correlation	.551**

The correlation analysis indicated that there is a potential positive and moderately strong correlation among the dependent variable with the independent variables in table IV. The correlation values for the multicollinearity among DV and IV 1 had ranged within 0.466 and 0.599. The correlation values for the multicollinearity among DV and IV 2 had

ranged within 0.509 and 0.643. There is a rather higher positive correlation between course content development and impact of generative AI.

TABLE V REGRESSION MODEL SUMMARY

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.695 ^a	.483	.402	.867

a. Predictors: (Constant), Application of Generative AI in field, Impact of Generative AI

TABLE VI ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.983	10	4.498	5.981	.000 ^b
	Residual	48.137	64	.752		
	Total	93.120	74			

a. Dependent Variable: Course Content Development
 b. Predictors: (Constant), Application of Generative AI in field, Impact of Generative AI

The Table V and VI presented the linear relation among the dependent and independent variables in the study. The R square value stands at 0.483, indicating that 48.3% of the variance is explainable through the model summary on the relation of the independent variables through the dependent variables. The p-value as per the ANOVA analysis under the multiple linear regression was 0.000, lower than the set threshold ($p\text{-value} < 0.05$). This indicates the presence of a highly statistically significant linear relationship among the independent variables with the dependent variable

B. Secondary Qualitative Data Analysis: Thematic Analysis

Theme 1: Application of Generative AI for Development of Educationally Useful Course Content

Generative AI application undergoes the procedures of content generation and adaptation through the action of prompt generation of learning objectives, course content drafts and materials alongside their refinement through prompts for faster and inclusive adaptation of course content. Algorithms called generative AI models are made to find patterns and rules in their training data and produce new observations that follow those same principles (Pesovski et al., 2024). Generative AI tools and solutions offer new possibilities for personalized learning and adaptability towards each student's unique demands by using sophisticated algorithms to automatically produce and generate instructional content (Ruiz-Rojas et al., 2023). As per the findings, diverse forms of content generally fall under the categories of lecture style and problem creation forms of content types (Dickey & Bejarano, 2024), that could involve reading materials and explanation notes for the former and practice questions and study problems for the latter case (Sasikumar & Sujatha, 2023). Use of generative AI tools entail prompt-based content generation of content to solve problem and explanatory texts such as development of learning objectives (Statista, 2025).

Theme 2: Impact of Generative AI Integration on the quality of Course Content Development

Generative AI integration has positive impacts for the educators in terms of content development for educational course materials (Ullmann et al., 2024). This is identified to contribute towards the development of content adaptation and generation being more rapidly, extensively and proficiently being handled (Bjola, 2022). Prompt based content generation with use of Bloom's revised taxonomy for learning objectives generation of either lecture style content or problem content and followed by course content draft, refinement and consolidation through contextual integrity of the content are outcomes of generative AI (GM & Sujatha, 2024). GenAI integration provides an instance of developing outlines for contextualisation of the course content for adaptation of content according to the effect of the content (Ullmann et al., 2024; Ahmadi et al., 2021). Improving the use of AI in education and its influence on learning outcomes requires an understanding of how students view and interact with these tools (Kotsiovos et al., 2024). Moreover, use of generative AI in that context also adds to the quality of course content on the specific basis of creating quality educational material (Hussain & Li, 2022).

VI. IMPLICATIONS FOR PRACTICE

The findings of the study on generative AI integration into course content development hold numerous implications for practice. The educators will be able to leverage AI in order to manage personalized learning materials. Through automating different routing tasks educators will also be able to allocate more time to different activities that need any human judgment (Bjola, 2022). Generative AI has the key potential to accurately make different high-quality educational content (Tominc & Rožman, 2023). However, through understanding and implementing the implications both educators and also institutions will be able to integrate generating AI in the development process of course content.

VII. CONCLUSION

This work emphasizes the potential of the Generative AI as a transformative one in the context of educational content creation. Using AI models with high quality, teachers will be able to create high-quality learning materials more quickly and personalized. The suggested framework of Generative AI in Instructional Development and Education (GAIDE) shows how AI could be used to simplify the process of creating, adapting, and assessing content and improve the outcomes of teaching and learning activities. The results verify that generative AI is a key to better quality and effectiveness of educational materials, which is a more flexible and less time-intensive way of teaching. The implementation of AI improves teaching material and, in addition, reduces the workload of educators, which gives them a chance to pay more attention to the essential elements of pedagogy. Moreover, the fact that AI can generate personalized learning experience makes it highly tuned to the needs of individual learning and contributes to improved student success.

The potential of generative AI in the creation of educational content is immense in the future, especially the expansion of its features in various fields of study and learning environments. The research of the future should seek to optimize AI models further at creating even more contentious content generation and adaptation, so that AI tools do not only sound efficient but also respectful to cultural and cultural differences in the educational environment. Recent studies on the ethical issues and overall effect of AI in educational equity are also essential. Also, the discussion of AI implementation in the context of assessments automation and real-time feedback to students can help to make AI even more useful in schools. By incorporating AI in conjunction with the new technologies, including augmented reality and virtual learning environments, the way content is presented and learnt will continue to evolve and change around the world.

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