Abstract: This study investigates the effects of learning through AI-generated virtual instructors while incorporating a unique element - the ability for students to choose their admired role model or celebrity as a personalized learning guide in terms of face and voice. We aim to assess the potential enhancements in learning outcomes and performance when employing various test scenarios: face and audio instruction of the admired role model, audio of the admired role model but different face; face of the admired model but audio different; normal (physical) instructor instruction. Our research maintains a crucial focus on preserving the student-teacher relationship by exploring ways in which AI can complement traditional instructional methods. The study also investigates the advancement of AI technology in assisting instructors and engaging students effectively. For a test sample of 105 students for a 5 minutes’ class, students felt it as an interesting concept, but with a small sample and time of class, it will not be correct to say this method alone will bring drastic learning improvement. In the first instance, students were curious and highly attentive, which is evident on the result that 76% of students answered the questions correctly compared to other groups. This system can be further improved by providing body/hand gestures with AI instructors, or allowing students to customize their own AI instructor.

Keywords: Artificial Intelligence, Teaching and Learning Methodologies, Personalized learning

I. INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force across various fields, and its application in education has garnered significant attention in recent years. The integration of AI technologies into educational systems offers promising prospects for enhancing learning experiences, personalizing instruction, and optimizing educational outcomes. For instance, AI-powered platforms can tailor learning experiences to individual students’ needs, pace, and strengths, adapting content, exercises, and delivery methods for deeper understanding and engagement. This can empower students to learn at their own pace and explore topics in more depth. AI-powered virtual tutors can provide one-on-one support and guidance, answering questions, offering explanations, and filling in knowledge gaps [1]. These systems can be especially helpful for students who need extra assistance. From intelligent tutoring systems to adaptive learning platforms, AI has demonstrated its potential to revolutionize traditional teaching methodologies [2].

Lately, machine learning (ML) algorithms have improved their ability to generate realistic photos and movies of humans. This technique is used to create "deepfakes" or "AI-generated characters". There are synthetic photographs and films in which faces, and bodies have been digitally changed to separate them from real-world images and recordings, making identification impossible [3]. AI-generated characters have the power to tailor instructional information, increasing engagement and interest. It also has the ability to help real-world trainers and expand educational opportunities.

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II. LITERATURE REVIEW

Within the advancement of our generation it is crucial to fully understand the role of AI-generated instructors for the sustainability of future education. Within the scope of our questionnaire-based study, this literature review establishes the three different research contexts: 1) research on the learning performance of students; 2) usage of AI to assist instructors; 3) maintaining and improving student-teacher relationship.

A. Role models effect on learning performance

Role models or personal heroes are important to students’ personal growth. These heroes’ might be someone the individual encounters either through media or other means, even if they do not know them directly [4].

Individuals who act as good role models fulfill three roles. First, their actions promote positive conduct in others. Second, their actions reinforce the learners’ aversion to engaging in damaging behaviors. Third, learners form new habits as a result of what they observe.

Gunderman et. al [5] indicates that learning is more than just retention of knowledge; it is also the subconscious adoption of attitudes and methods to daily tasks. Medical students, for example, acquire many of their most essential lessons from residents, while junior residents learn many of theirs from senior residents. In summary, some of the most prominent models for this type of learning have not been labeled as teaching staff. Research has demonstrated that role models and mentors can improve a person’s performance and professional advancement [6-8], promote motivation [9], and lessen stereotype danger [10].

Many studies have found that pairing students who face such stereotypes with teachers who share their identity - for example, assigning female students to female teachers and minority students to minority teachers - improves students’ grades and commitment in school, and may change their expressed interests and professional field choice [11].

According to research, the relationship between students and instructors has a significant impact on their willingness to study and academic achievement [12]. Integrating personal experiences in STEM courses [13] and learning from individuals who relate with them (for example, the same ethnicity or gender) boosts student engagement and enthusiasm to study [14]. Combining online learning with character narrative can help to personalize the learning experience, increase engagement, and make learning content more approachable and motivating. One possible advantage is that character narrative may be used to personalize and convince learning experiences by incorporating characters that a student likes or values. For example, young children appear to have their instructor, or a classroom guest capture the image of a beloved cartoon or motion picture character. For example, these students may benefit from having an AI-generated version of Elsa from the film Solidified teach them about snow and ice formations [15].

B. Usage of AI to Assist Instructors

The creation of Generative Pre-Trained Transformers (GPT) has generated widespread attention. These models’ exceptional capabilities, such as creating humanlike language and allowing automated interactions, have far-reaching ramifications in a variety of fields, including education and healthcare.

The available scientific literature implies that AI technology has the potential to be a substantial asset in education, filling a variety of functions that enhance both learning and pedagogical experiences. Authors have proposed that AI technology is a useful tool in essay grading [16,17].

According to a literature, ChatGPT has the potential to automate and improve the grading system, and it could be used to semi-automate the grading process for students’ work by identifying both the strengths and weaknesses within a given task in a wide range of assignments, including research articles, academic essays, and other forms of written coursework [18]. Many researchers have demonstrated the successful use of AI for evaluating short answer replies in an online learning environment [19,20].

Studies indicate that utilizing AI alone to assess complicated tasks may not be adequate; instead, AI grades must be adjusted or weighted based on a variety of factors specific to each task. These variables might include the
student's individual effort and contribution, their understanding and representation of the current literature on a certain topic, and scenarios with little training data. The promise of AI tools extends beyond grading and evaluation; they may also be used to translate instructional content and create interactive and adaptable learning environments [21].

AI systems have been successfully used as teachers outside of traditional academic subjects, such as personal mentality trainers [22]. AI systems can play an important part in Adaptive Learning, which tailors instruction to individual learning styles and progress [23]. It has been argued that AI can provide a personalized teaching approach tailored to each student's unique talents, interests, and needs [24]. Such initiatives have been documented in the scientific literature, demonstrating the feasibility and promise of this technique in improving learning experiences [25-27].

With the recent rise in distant learning, researchers have created AI-generated virtual teacher which is the use of AI tools that can create realistic-looking images and videos of instructors that can deliver educational content to students. To help with the teaching and distribution of educational materials via video and video conferencing. These teachers do not have to be real individuals; they can be any digitally made figure, such as a 2D cartoon or his 3D character [15].

A meta-analysis examined the impact of virtual instructors on learning by analyzing 43 research including 3,088 individuals [28]. The findings indicated that virtual teachers had a major influence on learning outcomes. A study discovered that virtual teachers with one identity (young and attractive) had better intrinsic drive to learn than those with the other identity (aged and attractive) [29].

An empirical research employing NIRS discovered that when students learned with a virtual teacher, they exhibited more brain activity in the social areas of the brain and performed better on learning tasks than when they did not have a virtual instructor [30]. These studies demonstrate the educational potential of virtual teachers in online courses and suggest future study topics for virtual instructors.

C. Maintaining/improving student-teacher relationship

Potential benefits of teacher-student identity match include differentiated teaching approaches based on teacher identification, increased attention from instructors with the same identity, and the teacher serving as a role model for students battling stereotypes [11].

Previous research has shown that teacher identity and student-teacher relationships can influence student attitudes, motivation, and academic accomplishment [12]. For example, one study found that studying with people of the same ethnicity and gender increases engagement and motivation to learn [14].

Another study revealed that fictional characters may be used to boost motivation and promote a development mindset in learning [31]. These findings suggest that, even when all other variables are constant, how students interact with their instructors can have a significant impact on their attitudes and motivation levels. Several studies have revealed an association between motivation and improved overall learning outcomes [32,33]. The student-teacher connection is crucial in classroom learning because it influences students’ academic success, motivation, engagement, conduct, and social-emotional development. According to research, students who have pleasant and supportive connections with their instructors had higher grades, greater attendance, lower dropout rates, more positive attitudes, and higher self-esteem than students who have negative or conflictual relationships with their professors [34].

There are many studies that have examined the impact of student-teacher relationship in class learning. For example, a meta-analysis of 99 studies found that student-teacher relationship had a significant and positive effect on students’ academic outcomes, such as standardized test scores, grades, and academic skills [35].

Another study of 1,846 students found that student-teacher relationship predicted students’ engagement, self-regulation, and academic performance, even after controlling for students’ prior achievement, gender, and socioeconomic status [36].
A third study of 3,370 students found that student-teacher relationship moderated the effects of classroom climate on students’ emotional and behavioral problems, such that students who had high-quality relationships with their teachers were less likely to experience negative outcomes in classrooms with low levels of support, structure, and autonomy [37]. These studies and others suggest that student-teacher relationship is a key factor in class learning and student success. Therefore, it is important for teachers to build and maintain positive and caring relationships with their students, both in person and online.

III. METHODOLOGY

Using an online survey to determine the role model of students participating, we conducted a small-scale study with 50 participants to create the majority selected role model as a virtual teacher using a variety of test settings, including the same visual/audio instruction, audio/unmatched visual instruction, visual/unmatched audio instruction, as outlined in the following research questions: We investigated the impact of this on students’ learning outcomes.

Q1. How do AI-generated virtual instructor that resemble most admired role model by students impact the learning performance?

Q2. How do AI-generated virtual instructors that resemble most admired role model by students can be used to assist instructors and engage students?

Q3. How do AI-generated virtual instructors that resemble most admired role model by students will maintain and improve the student-teacher relationship?

The way we will test our hypothesis will be to conduct 4 lectures among 4 different groups, each group consisting of 25 students in the university (UOF) following a 10 questions multiple choice related to the learning material used to generate the lectures. There is no bias in selecting the sample of students as the class was taken based on the suitable class when other subject classes were happening.

a) 1st lesson: AI generated celebrity with a matching face and audio.

b) 2nd lesson: AI generated celebrity with the face but different random person audio.

c) 3rd lesson: AI generated celebrity with their voice but different random face.

These lectures are conducted to investigate whether when using a motivational/role model the students admire have an impact on their motivation towards being attentive during the lecture which might allow them to perform higher in their education process.

Total number of students in sample study = 105 students.

The lessons mentioned above will be given to the same subject (principles of marketing) to eliminate certain errors that may arise. The frequency and duration of lessons will be for 2 weeks with 4 lessons given. Duration of each lesson will be 1 hour. Another questionnaire will be distributed among students after answering the 10 questions multiple choice related to the learning material used to generate the lectures, regarding the AI virtual instructor selected to examine the student’s motivation, interest towards virtual instruction based on their favorite role model selection.

The videos were created by a website called heygen by importing a picture of Lionel Messi from google. Messi’s voice was cloned by a website called Finevoice. We constructed different videos as mentioned above in the lessons.
After the 5 minutes lecture a questionnaire to test the knowledge and their satisfactory of such a method was circulated and analyzed. The following questions were asked about the material taught in videos in the questionnaire given to students after all 3 lessons were given to them.

After all lessons and questions were done, the students were graded to know which type of lesson scored the highest. The next section explains the results of this survey.

IV. RESULTS AND DISCUSSION

This section discusses the results of survey. Refer the tables given below.
TABLE 1. CROSS TABLE CALCULATION OF EACH QUESTION WITH DIFFERENT INTERACTION METHODS

<table>
<thead>
<tr>
<th></th>
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<th>FSAD</th>
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<td>100%</td>
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<tr>
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<td>% within Type</td>
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<td>100%</td>
<td>100%</td>
</tr>
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<td>% within Type</td>
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<td>100%</td>
<td>100%</td>
</tr>
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<td>50%</td>
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<td>100%</td>
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<td>34</td>
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<tr>
<td>% of Total</td>
<td>23%</td>
<td>27%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>% within Type</td>
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<td>100%</td>
<td>100%</td>
<td>100%</td>
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<td>Q9</td>
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<td>34</td>
<td>68</td>
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<td>% of Total</td>
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<td>27%</td>
<td>50%</td>
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</tr>
<tr>
<td>% within Type</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Q10</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
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<td>18</td>
<td>34</td>
<td>68</td>
</tr>
<tr>
<td>% of Total</td>
<td>23%</td>
<td>27%</td>
<td>50%</td>
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<tr>
<td>% within Type</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

TABLE 2. CHI-SQUARE TEST RESULTS OF EACH QUESTION

A. Inference
The data of table 1 suggests there are differences in the correctness of responses based on the type of virtual interaction (FSAS, FDAS, FSAD):

FSAS: Tends to have more correct answers (60% for Q1) than wrong, suggesting that when the face and audio of the motivating person are the same, participants may be more likely to understand and respond correctly.

FDAS: Shows a higher proportion of wrong answers (77.1% for Q1) indicating potential issues with the effectiveness of this type of interaction.

FSAD: Presents a mixed outcome but generally has a higher rate of correct answers than FDAS, suggesting that having the motivator's face, even with different audio, may be somewhat effective.

Implication
The pattern of responses indicates that congruence between the visual and auditory information (as seen in FSAS) enhances comprehension and the likelihood of correct responses. The mismatch seen in FDAS, where the face and voice are from different individuals, may lead to confusion, reducing the effectiveness of the message. FSAD, which mixes these elements, seems to yield varied outcomes, suggesting that the face of the motivator plays a significant role in conveying information effectively, even when the audio is from a different source.

In practical terms, this could mean that in virtual learning or remote working environments, ensuring that visual and auditory messages are from the same source could enhance communication effectiveness. When designing virtual content, such as educational materials or marketing campaigns, the consistency of visual and audio cues should be a key consideration.
Table 2, the Chi-Square Tests for each question (Q1 to Q10) assess whether there is a significant association between the type of virtual interaction and the correctness of the response (0 for wrong, 1 for correct). The Pearson Chi-Square and Likelihood Ratio statistics, along with their associated p-values (Asymptotic Significance), help us determine this:

Q1, Q3, Q6, Q7, and Q9 all show significant Chi-Square values ($p < .05$), indicating a statistically significant association between the type of virtual interaction and the participants’ responses. This means the type of virtual interaction can influence whether a participant is more likely to answer these questions correctly or incorrectly.

Q2, Q4, Q5, Q8, and Q10 do not show significant Chi-Square values ($p > .05$), suggesting no significant association between the type of virtual interaction and the responses for these questions. This implies that for these particular questions, the type of virtual interaction does not significantly affect the likelihood of a correct or incorrect response.

**Implication**

The significant associations found in Q1, Q3, Q6, Q7, and Q9 imply that the design of virtual interactions should be carefully considered to enhance the correct comprehension of content. For instance, educational platforms and virtual training programs may need to align visual and auditory information more effectively to improve learning outcomes. Meanwhile, the lack of significant association in Q2, Q4, Q5, Q8, and Q10 suggests that other factors may influence the correctness of responses, such as the inherent difficulty of the questions, participants’ prior knowledge, or the clarity of the question wording.

**Table 3**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>%</th>
<th>Valid %</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
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<td>57</td>
<td>54.3</td>
<td>54.3</td>
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<tr>
<td></td>
<td>Yes</td>
<td>48</td>
<td>45.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>105</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 3 suggests that out of 105 valid responses, a substantial majority (74.3%) believe that an AI instructor showing body/hand gestures during a lecture would make a difference. In contrast, 25.7% do not think gestures would contribute to the effectiveness of the lecture. This result indicates a clear tendency among respondents to favor the inclusion of gestures in AI-led instruction.

**Implication:**

The implication of these findings is that incorporating body and hand gestures could potentially enhance the learning experience in AI-mediated education. Gestures may aid in conveying information more effectively, keeping learners engaged, and potentially improving the retention of information. It also suggests that users may perceive AI instructors with gestures as more relatable or human-like, which can increase their comfort level and satisfaction with the learning process.

For developers and educators, this feedback points towards the need for advanced AI that can simulate human-like gestures. Investment in such technology could lead to more sophisticated AI teaching tools that not only provide information but also engage users on a more interactive and personal level.

- Would you be interested along with AI technological advanced to customize your own AI generated instructor?
Table 4

PREFERENCE TO CUSTOMIZATION OF AI-GENERATED INSTRUCTOR

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>%</th>
<th>Valid %</th>
<th>Cumulative %</th>
</tr>
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<tr>
<td>Total</td>
<td></td>
<td>105</td>
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</tr>
</tbody>
</table>

B. Interpretation

Table 4 shows a clear preference among participants regarding the customization of AI-generated instructors in line with technological advancements in AI. With 73 out of 105 respondents (69.5%) showing interest ("Yes") and 32 respondents (30.5%) indicating disinterest ("No"), there’s a marked tendency among the majority to explore the possibilities offered by personalized AI technologies in education. This indicates a significant curiosity and openness towards the role of AI in providing tailored educational experiences.

Implication:

These results have profound implications for the evolution of educational technologies and the personalization of learning experiences. The strong preference for the ability to customize AI instructors reflects a growing demand for education that adapts to the individual learning styles, speeds, and interests of students. This could spur further advancements in AI and educational technology, leading to the creation of more sophisticated AI tools that allow for extensive customization. Nonetheless, this enthusiasm also brings to light several challenges, such as the complexity involved in developing such technologies, concerns over data privacy, and the implications for conventional educational frameworks and roles.

- Do you imagine yourself as an AI generated instructor during a lecture with uploaded learning material of choice?

Table 5

Self imagination as AI generated instructor

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>%</th>
<th>Valid %</th>
<th>Cumulative %</th>
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<td>100</td>
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</tr>
</tbody>
</table>

C. Interpretation

The Table 6 survey results indicate a strong interest in attending courses constructed and led by an AI instructor of the respondent's choosing, with 74 out of 105 respondents (70.5%) expressing a willingness to attend such courses ("Yes"). Conversely, 31 respondents (29.5%) indicated they would not be motivated to attend ("No"). This data reflects a significant inclination towards the integration of AI in educational environments, especially when it allows for personal choice in the AI instructor, suggesting that customization and control over the learning experience are key factors for most respondents.

Implication:

The implications of these findings are multifaceted for the future of education, particularly in the development and adoption of AI-driven educational tools and platforms. The pronounced interest in AI-constructed courses
highlights the potential for increased engagement and motivation among learners when they are given autonomy in selecting their AI instructors. This could lead to a shift in how educational content is designed, delivered, and personalized, pushing for advancements in AI technologies that can offer more tailored and interactive learning experiences. However, this enthusiasm also underscores the need to address potential challenges, such as ensuring the quality and effectiveness of AI-generated content, the ethical considerations of AI in education, and the digital divide that may limit access to such technologies for all learners.

D. Interpretation

Table 7 provides results from Chi-Square tests for five different questions (Q1 to Q5). The Pearson Chi-Square values for all questions are highly significant ($p < .001$), indicating that for each question, there is a statistically significant association between the categories examined. The degrees of freedom (df) vary across questions, with Q1 and Q2 having 6, while Q3, Q4, and Q5 have 8. This suggests that the number of categories compared within each question differs. The likelihood ratio, which is another measure of association, also indicates significant results consistent with the Pearson Chi-Square. Notably, for Q3, Q4, and Q5, there is a significant Linear-by-Linear Association, suggesting a trend across ordered categories for these questions.

Implication:

The significant Chi-Square test results for all questions suggest that there are meaningful differences or associations in the distributions of responses across the categories of each question. Since some cells have an expected count less than 5, particularly in Q3, Q4, and Q5, caution should be exercised in interpreting the Chi-Square values as it can affect the validity of the test. The significant Linear-by-Linear Association in Q3 and Q4 implies that there could be an ordinal relationship worth investigating further.

Text analysis (out of 105 students, 29 have given the additional comments or feedback)
E. Interpretation:

The data Table 8 presents a sentiment analysis of a collection of 29 statements, categorized into positive, negative, and neutral sentiments. A significant majority, 19 out of 29 statements (66%), were identified with positive sentiment, indicating a predominantly favorable or optimistic outlook within the sampled statements. In contrast, both negative and neutral sentiments are represented equally, with 5 statements each (17%), suggesting a lesser prevalence of outright negativity or indifference in the analyzed data. This distribution highlights a strong inclination towards positive sentiment, while still acknowledging the presence of critical or ambivalent perspectives.

V. CONCLUSION

In this paper, we investigated a comparative analysis of self-developed AI virtual instruction models at the University of Fujairah with a test sample of 100 students for a 5-minute lesson. We found that students found it to be an interesting concept, but with such a small sample size and class duration, it is incorrect to claim that this strategy alone will result in significant learning progress. In the first instance, students were curious and very attentive, as evidenced by the fact that 76% of students correctly answered the questions compared to other groups.

The aggregate of findings from diverse data analyses reveals important perspectives on virtual learning, the application of AI in education, and sentiment dispositions. Central to effective virtual exchanges is the uniformity of audio and visual signals, with any inconsistency typically resulting in decreased comprehension, as demonstrated by higher instances of incorrect responses when such alignment is lacking. The efficacy of the congruence between visual and auditory information in virtual interactions is found to be situationally dependent, which highlights the need for custom-designed content to support specific learning goals and communicative intentions.

The pronounced inclination towards AI-customized educational experiences underlines a shift towards a learning paradigm that values personalization and the unique preferences of the learner. This is enhanced by a preference for AI teaching tools that include non-verbal communication to create more engaging and human-like learning environments.

Despite the optimistic views on the role of AI in educational contexts, there remains a level of reservation that advocates for a measured, principled, and people-centric approach to incorporating AI into education. This calls for an inclusive dialogue among all stakeholders to address the myriad challenges that accompany the adoption of AI in learning, ensuring that its integration bolsters educational effectiveness without overshadowing the indispensable human aspects of teaching.

Statistical analyses such as the Chi-Square tests indicate that there are meaningful associations in the data that warrant further investigation. These findings suggest that there are distinct patterns in how individuals respond to certain questions, which could have implications for future inquiries and policy-making within these areas.

Sentiment analysis paints a picture where positivity is prevalent; however, the presence of both skepticism and impartial sentiments cannot be ignored. The roots of these sentiments are critical to explore as they offer insights that could be leveraged to fortify the positive and address the concerns embodied in the less favorable viewpoints.

To encapsulate, there is an evident enthusiasm for the integration of AI in educational realms, signaling a move towards more individualized and interactive learning experiences. The collective data supports the advancement of AI in education, provided it is done with an eye toward maintaining the delicate balance between technological innovation and the essential elements of human interaction, ensuring equitable and comprehensive access to educational advancements.

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