"STEM NEXT ESSAY COMPETITION"

Topic : Energy and Innovation

Title : " The Rise of AI and Virtual Reality: How They are Transforming Education"

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COVER PAGE…….(Below)

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TECHFEST'S STEM NEXT ESSAY COMPETITION COVER LETTER

To be completed by the student:

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Country (if UK, please specify, e.g.: Scotland, England, etc.):

Essay title: "The Rise of AI and Virtual Reality: How they are Transforming Education"

Essay category: Energy and Innovation

Essay word count: 1673

What is your age as at 16 June 2025: 18 years old.

Name of the person/s interviewed and where they work: Raju Ahemmed, Comilla Victoria

Govt. College.

I hereby declare that this work was composed by myself, does not contain writing produced by AI and is within the specified word limit. I have appropriately acknowledged material taken from other sources. All quotations have been distinguished by quotation marks and all sources of information have been specifically acknowledged.

Signed: SUBAITAH   **Date: 25 August,2025**

To be completed by the teacher/school representative (if no access to such, to be completed by parent/guardian):

Name: Raju Ahemmed

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School: Comilla Victoria Govt. College

"The Rise of AI and Virtual Reality: How They Are Transforming Education"

Introduction :

Artificial intelligence (AI), is a set of technologies that enable computers to perform a variety of advanced functions, including the ability to see, understand and translate spoken and written language, analyze data, make recommendations, and more.

Virtual Reality (VR), the use of computer, modeling and simulation that enables a person to interact with an artificial three-dimensional (3D) visual or other sensory environment.

In classrooms, AI is already supporting personalised practice and rapid feedback, and VR enables safe, hands-on experiences that are otherwise impossible or too costly. This essay examines how AI and VR are transforming learning through personalisation and immersion, evaluates the risks around equity, privacy and teacher readiness, and argues that—when implemented with clear guardrails—these tools can enhance outcomes rather than replace teachers.

AI in Education :

Artificial Intelligence (AI) has the potential to address some of the biggest challenges in education today, innovate teaching and learning practices, and accelerate progress towards SDG 4.(UNESCO 2024). AI has become an important part of our education. We use AI for solving our problems , it can solve any mathematical problems easily, one can study physics,chemistry,math with AI. It has become a personal tutor to students. Nowadays, ChatGPT , Google Gemini has created a feature to help students

in their education. AI can solve your problems,it can teach you new topics,it can help

you understand any topic you want, also it can even make a study plan for you, it can guide you to your destination. AI is now very popular among students. One can run codes ,create their own codes using AI.The biggest advantage is, AI allows personalised learning for every student. For example, Khan Academy's Khanmigo uses AI to give hints and explanations tailored to each learner, while Duolingo Max employs AI to provide grammar explanations and real-time feedback for language learners (Khan Academy, 2023; Duolingo, 2023). These tools act as virtual tutors that are available twenty-four hours a day, providing support that is not always possible in traditional classrooms.

However, AI in education is not without risks. One major concern is algorithmic bias. If the data used to train AI systems contains bias, then the recommendations and results may also be biased, which can disadvantage certain groups of students. Privacy is another key issue, as these tools collect sensitive student data such as performance, behaviour, and even emotions. Without strict safeguards, this data could be misused. In addition, there is the danger of over-reliance. If students begin to depend too heavily on AI tutors, they may struggle to think independently or develop critical problem-solving skills. Finally, unequal access to technology remains a challenge. Wealthier schools can afford advanced AI tools, while others may be left behind, creating a digital divide.

VR in Education :

Virtual reality technology is an immersive and interactive technology that simulates a computer-generated environment, allowing users to experience a sense of presence and interact with virtual objects and surroundings. It typically involves wearing a head-mounted display that tracks the user's movements, creating a sense of being physically present in a virtual world.

As VR technology advances and becomes more affordable, its adoption in education will likely grow. Educators and schools are exploring its potential across various

disciplines, including STEM subjects, medical training, cultural education, vocational training, and special education. VR has the potential to revolutionize the way education is delivered, making it more immersive, inclusive, and effective. (hp,8 March,2024). Nowadays,Instead of simply reading about a historical site or scientific concept, students can virtually explore them in real time. For example, ClassVR has been used in schools to provide virtual field trips to places like the Great Wall of China or the surface of Mars, while platforms such as Labster allow students to carry out interactive science experiments in a safe digital environment (ClassVR, 2023; Labster, 2024). These tools make abstract or distant subjects far more tangible and memorable. Not only VR helps to understand complex concepts such as medicine,engineering which is visualized in three dimensions, but also ,VR gives students access to laboratory experiments that they might not otherwise have due to cost or location.

However, there are few challenges to adopting VR widely in education. The first is cost: VR headsets and software remain expensive, and schools with limited funding cannot afford large-scale implementation. Another limitation is digital literacy. Both teachers and students need training to effectively use VR tools, otherwise the technology can become a distraction rather than a learning aid. Technical issues such as motion sickness, heavy equipment, or insufficient internet bandwidth can also reduce the quality of the learning experience. Finally, similar to AI, unequal access can widen the digital divide between wealthier and under-resourced schools. (Google Gemini) .

Figure 01: *Example of a VR classroom activity. Source: Pinterest.*

Interview with an Education Professional :

In order to know the opinion of an expert's perspective, I interviewed Raju Ahmed, a college Chemistry professor in Comilla Victoria Govt. College.

I'm presenting my interview below…….

Me : In your opinion, Sir, what do you think how AI is changing the traditional learning path for the students?

Sir: You know that, In this modern world , AI has become a significant part of our life, especially in our education. AI is already helping students by making learning more personalised. For example, tools like ChatGPT or Khan Academy's Khanmigo can give tailored explanations, instant feedback, and even practice questions based on the student's progress. This means students who struggle can get extra support, while

advanced learners can move faster. It also helps teachers by reducing repetitive tasks like grading and allowing them to focus more on creativity and discussion.

Me: Do you think VR has real effect in classrooms , or is it mostly hope?

Sir: VR definitely has real potential, especially for subjects where students benefit from hands-on experiences that are hard to provide in reality. For example, science experiments, history site tours, or medical simulations can be done safely and repeatedly in VR. However, I don't think VR will replace normal lessons. It works best as a supplement — something teachers use occasionally to make learning more immersive and engaging.

Me: Okay , last one, What risks should schools or colleges in our country keep in mind when using these tools?

Sir : Well, you know most of the students of our country do not belong to rich family, so, The main challenges are cost, training, and balance. Many schools cannot afford advanced VR headsets or premium AI tools. Teachers also need proper training, otherwise the technology can become a distraction. Another risk is over-reliance: if students only depend on AI for answers, they may not develop strong critical thinking skills. Finally, privacy is important because AI platforms collect large amounts of student data, so schools need strict policies to keep information safe.

Raju Ahmed, Chemistry Professor of Comilla Victoria Govt. College.
Interviewed by, Subaitah Binte Zaman .

Discussion :

Both AI and VR clearly offer powerful opportunities for transforming education, but they serve different purposes. AI is strongest in personalisation and efficiency. It can guide students step by step, adapt tasks to their progress, and reduce teacher workload. VR, on the other hand, excels in immersion and experience. It enables learners to "step inside" a science experiment, explore ancient history sites, or practise high-risk skills in a safe space. These strengths complement each other: AI improves individualised

learning, while VR creates memorable, real-world-like experiences.

However, the interview highlighted that neither technology can succeed without thoughtful integration. Cost and access are serious barriers. Schools with limited funding may struggle to provide AI subscriptions or VR headsets, which risks widening the gap between wealthy and under-resourced students. Teachers also need training. Without it, AI may be misused and VR may distract rather than support learning. Furthermore, data privacy is a major concern in AI platforms, as they collect sensitive information about students.

Taken together, the evidence suggests that AI and VR should not be viewed as replacements for teachers or traditional classrooms, but as supplements that enhance learning when used selectively. Successful implementation depends on strong teacher support, ethical safeguards for student data, and investment in affordable access. If these conditions are met, AI and VR have the potential to not only improve student engagement and outcomes, but also to make learning more inclusive and innovative worldwide.

Conclusions:

Artificial intelligence and virtual reality are no longer futuristic concepts; they are already influencing how students learn today. AI offers personalised pathways, instant feedback, and support for learners with different needs, while VR brings lessons to life through immersive experiences and simulations. Together, they demonstrate the potential to make education more interactive, inclusive, and effective.
Yet, as the interview insight and wider research suggest, the value of these technologies depends on how responsibly they are used. Without affordable access, proper teacher training, and clear safeguards for privacy, AI and VR could deepen existing inequalities

or distract from core learning. The goal must be to integrate them in a way that supports teachers and empowers students, rather than replacing human creativity or judgment. In conclusion, AI and VR have the potential to reshape education for the better. If implemented thoughtfully, they can open doors to new opportunities, bridge learning gaps, and prepare students for a future where digital and human skills work side by side.

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……………..THANK YOU………………..