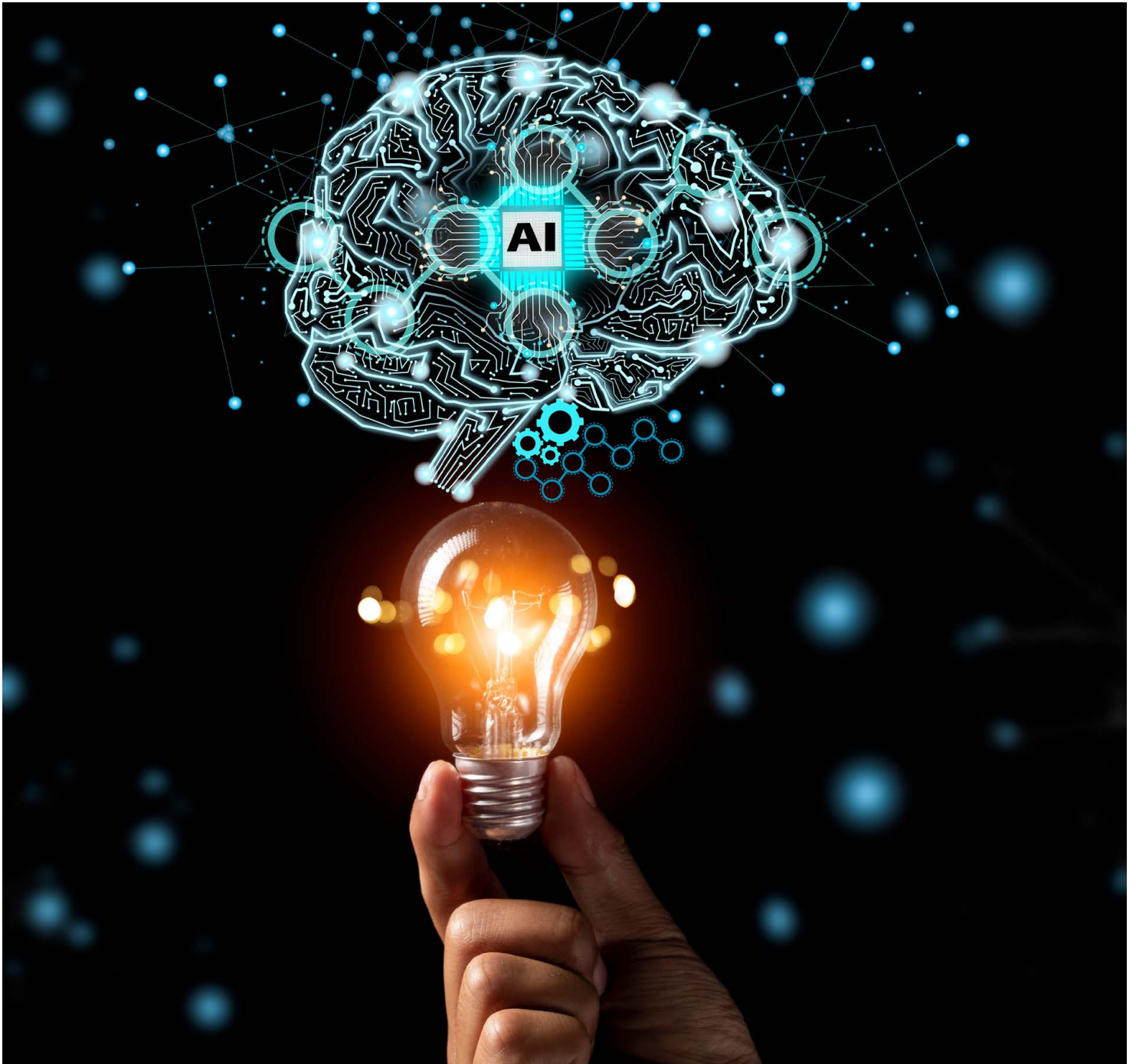




NELC ROUNDTABLE SERIES FOR ELEARNING

MEETING 1: 20 MARCH 2023

HOW ARTIFICIAL INTELLIGENCE IS IMPACTING EDUCATION AND ONLINE LEARNING



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FORMAT AND PARTICIPANTS

SECTION 1.

Format and participants

1.1 Introduction

This expert roundtable discussing the impact of AI in education is part of a series of meetings being organised and hosted throughout 2023 under the partnership of the Kingdom of Saudi Arabia's National E-Learning Centre (NELC) and the Global Online Learning Alliance (GOLA). Reform of education systems and the continued growth of online learning requires constant vigilance of rapid changes in technology and with it the a huge shift in skills development.

The NELC is the country's foremost authority to enhance trust in eLearning, responding to new trends in learning technologies that meet the Kingdom's Vision 2030 of being a global leader in human capital development. It is essential to stay informed of new trends and to provide information and resources to Saudi educational stakeholders. Hence, this series of roundtable meetings aims to convene a series of panels with experts in their field, from around the world, addressing the most pertinent questions around artificial intelligence (AI), online safeguarding, skills transformation, inclusivity in e-learning, innovation, open educational resources (OERs), online pedagogy and virtual learning environments.

The Global Online Learning Alliance (GOLA) has organised a series of video meetings for the world's education community. More than 3,000 officials from government, universities, and civil society have participated in a productive and collaborative manner to share ideas and make policy recommendations. The aim of expert panels in this series of meetings is to produce policy recommendations and discuss the technological developments impacting virtual learning environments.

The first meeting took place on 20 March 2023, titled:

How Artificial Intelligence is Impacting Education and Online Learning

Immediately this subject title raises questions of ethics in the use of AI systems, the role of the teacher, the use of data, monitoring of results, mitigating against bias and generally ensuring



appropriate educational change management in the digital age.

In this first section of the report we provide details of the format and participants, followed by details and findings of the discussion in section 2.

1.2 Format of Roundtable

The virtual roundtable format included four respected panellists with a moderator and a welcome from the Saudi National E-Learning Centre.

Welcome & opening statements: 10 minutes
Panel discussion with audience Q & A: 85 minutes
Total meeting time: 95 minutes

The audience were encouraged to type their questions into the chat and throughout the roundtable session these questions were interspersed with a variety of issues addressed, including:

Can AI systems in education be trusted and specifically please give your thoughts on the potential of AI being integrated into online learning?

What is your response to the use of ChatGPT in education? Apart from the obvious concerns such as plagiarism, are there benefits in utilising chatbots such as live mentoring in the online environment?

How can we leverage the potential of such AI systems to empower adaptive learning in the virtual learning environment?

What examples do you have of using AI in education, such as in the curation of content and how it may be used to help students identify their learning goals and support collaborative learning?

If AI can strengthen adaptive and collaborative learning, do you envision further developments in AI technology to support upskilling and reskilling that may help bridge the gap between academia and industry?

What is the potential role of AI in digital credentialing for recognition of competencies?

This represents just a sample of the questions and the floor was open for all panellists to freely express their ideas.

1.3 Participants & Audience

We would like to thank all those for participating and providing such outstanding contributions. It is an honour for the organisers to host such a distinguished panel of experts.

Welcome

Dr Alhanoof Alohalay

Senior Researcher, Research & Consulting, National eLearning Centre (NELC)

Expert Panel

Professor Matthew Montebello

Head of AI Department, Faculty of Information & Communication Technology, University of Malta

Professor Rose Luckin

Professor of Learner Centred Design, UCL Knowledge Lab, United Kingdom

Dr Fady Alnajjar

Associate Professor, Department of Computer Science and Software Engineering, College of IT, United Arab Emirates University (UAEU)

Professor Hanni Muukkonen

Professor in Educational Psychology, Learning and Learning Processes Research Unit, Faculty of Education University of Oulu, Finland

Prof Montebello heads the Agent Technology Research Group at departmental level and is published under the titles of 'AI-injected e-Learning' and 'Ambient Intelligent Classrooms', while also editing research on digital learning. Prof Luckin's research involves the design and evaluation of educational technology using theories from the learning sciences and techniques from artificial intelligence, with a particular interest in using AI to open up the 'black box' of learning to show teachers and students the detail of their progress intellectually, emotionally and socially. Dr Alnajjar's research focuses on AI and Robotics, with an emphasis on Human behaviour analysis, specifically in the areas of neuromuscular strategies involved in learning, adaptation, and recovery, as well as the neural dynamics and cognitive functions of the brain. Prof Muukkonen's work includes researching collaborative learning and knowledge creation in higher education, design for learning and technology-mediated collaboration, while on large R & D projects

in learning analytics.

Moderator

John Glassey

Chief Executive Officer, Brains Global and GOLA

The Audience

A special thanks goes to the over 1,400 people who joined the virtual roundtable meeting to here the thoughts of our expert panel and pose their own questions on the subject of AI in education. This excellent attendance demonstrates the enthusiasm and desire to understand latest trends amongst educators, learners, policy makers and professional in the Kingdom of Saudi Arabia.

The Kingdom has a collective commitment to achieve the objective of human capability programs of Vision 2030 to best prepare Saudis to be globally competitive citizens. As digital transformation in education gathers apace, e-learning has evolved from being a supportive tool to a resource that has a daily role in the lives of students, academics and faculty staff. The NELC is mandated to develop regulations and quality standards in the field of e-learning. One of the key initiatives of NELC is the *FutureX* platform. This is a platform of innovation that enables partner institutions to offer world class online learning experiences to stakeholders.





DISCUSSIONS

SECTION 2.

Discussion

This part of the report on the roundtable discussion is written under the titles of broad issues raised and findings along with further editorial input, rather than a mere chronological transcript of the meeting. Here the sub-headings are divided as:

Introduction to the Topic

Understanding AI as a Tool with Inherent Limitations

AI Systems in Education

Adaptive & Personalised Learning

Assessment & Digital Credentialing

2.1 Welcome & Introduction to the Topic

Dr Alohaly welcomed guests, recognising the significant impact AI is already having on various industries and how it has the potential to revolutionise education: from personalised learning to smart content delivery. The integration of AI within education comes with challenges and concerns particularly when it comes to trust and accountability. The purpose of this roundtable discussion is to can gain a better understanding of the potential impact of AI in education, and how we can ensure that the integration of artificial intelligence is ethical, responsible and beneficial for students, educators and the society as a whole.

Expectations of the significance of AI goes as far back when the US Navy started a project called the "Perceptron" designing the first non-living mechanism that was expected to perceive, recognise, identify its surroundings and be conscious of its existence without human control. It was expected to be finished in one year at a cost of \$100,000, that was 1958. What we have seen recently with the likes of ChatGPT and Mid Journey is the rapid development of "Generative" AI – meaning they can write, design and create new text and images which we think of as human activities.

In the 3 months since ChatGPT was made available to the public it is estimated that by January of this year it clocked 100 million users, making it the fastest growing application in history – it took Facebook and Instagram four years and two years, respectively. Since then OpenAI has attracted an additional \$10 billion in investment from Microsoft, with a current



market value estimated at \$29 billion.

Already we are seeing a fear of how AI may make many of our jobs obsolete and in education there is clearly going to be an enormous impact. This type of language model AI can write flawless computer code and academic essays exceeding the standard of the average student. Yet equally there are many examples showing ChatGPT's responses being factually incorrect.

In January, New York City Public Schools banned the software, other districts in the US, such as Seattle, have banned access to the site on school devices. Publishers of scientific journals have banned or restricted contributors' use of advanced AI-driven chatbots amid concerns that it could pepper academic literature with fabricated research, but some students are already openly admitting to using the technology to write essays.

Just last week we have seen rapid developments. Announcements that have included: Stanford University released its Alpaca AI with small file size that can be run on a standard laptop with no internet connection; Google announced increased AI functionality; a company called Anthropic released an AI chatbot called Claude. The big announcement was the release of GPT4 and Microsoft says it has been running on Bing for a few weeks. Mid Journey released version 5 and Microsoft announced its 365 co-pilot, meaning AI will be running in the background of all Microsoft applications. This all in just the week prior to 20 March 2023 as the corporate AI juggernaut gains momentum.

But artificial intelligence, is not all-intelligent – so what are the implications for education and particularly online learning? What do we mean by AI and data use in education? What are the ethical guidelines? Can AI systems in education be trusted? How will AI impact the role of teachers and experience of the learner?

2.2 Understanding AI as a Tool with Inherent Limitations

Artificial Intelligence chatbots such as ChatGPT have proved to be highly popular language models that can instantly generate fluent, human-sounding responses. But how accurate is the information in the responses and are such AI systems trustworthy, particularly in the educational context? ChatGPT has already been banned in some schools but in the past so were calculators. Hence, instead of fearing the technology, our panel agreed that it should be looked at as another tool in education. Instead of fearing it as evil, we should view it as a contributor. In the educational setting, answers must be checked against other sources. So the panic about technological threats to education are nothing new and the expert consensus is that AI systems can improve education.

We now often hear about algorithmic bias. Many examples of bias depending on gender or race have been cited, but after all humans are bias. AI systems can be biased based on who builds them, how they are developed, and how they are ultimately used. It is tough to figure out exactly how systems might be susceptible to algorithmic bias, especially since this technology often operates in a corporate black box. We frequently do not know how a particular artificial intelligence or algorithm was designed, what data helped build it, or how it works. So who designs the system and who decides how it is deployed? Who gets to decide what level of accuracy and inaccuracy for different groups is acceptable? Who gets to decide which applications of AI are ethical and which are not?

The algorithm is just an algorithm – it is the choice and type of data that may introduce bias. The AI system is not inherently bias but depending on the ingredients, the data, may result in bias.

It is worth noting that ChatGPT is a language model



and has certain tendencies that make it clearly identifiable as non-human. It tries to sound human but fails to include the subtleties at the intersection of language, expression, knowledge and passion. The model is seemingly repetitive and with that verbose in its explanations. Is this related to what our panellists referred to in terms of knowing the data inputted and how the model is “trained”? Has it been programmed towards the direction of repetitiveness considering it has, in part, been trained on and by human patterning? How else would it be able to string words together to form coherent sentences if it had not studied the way we communicate with each other prior? Because, by nature, repetitiveness is something we humans are able to rely on and something we utilise every day. If you ask ChatGPT why it is repetitive, it will answer:

As a language model, I am not capable of having thoughts or feelings. However, I am designed to provide helpful responses based on the information and training data that I have been given. If I am providing repetitive answers, it is likely because the input I am receiving is similar to previous inputs. My goal is to be as helpful as possible, so please let me know if there is a specific way I can improve

One way of looking at the answers provided by ChatGPT is that if you have an article written in a journal that has its main content copied and repeated by different authors and editors for different publications, over a period of time it will look similar to the ChatGPT. The overlay of copying and repeating many times will eventually smooth out the nuances and language subtleties of the original author. These answers provided by the model have been repeated many times over in literature so it is not unsurprising that we get this bland and repetitive use of language. Any teacher should quickly recognise a student submission that is plagiarising with an AI chatbot.

One of the more intriguing discoveries about ChatGPT is that it can write fairly good code. Can ChatGPT replace programmers? What programming languages does ChatGPT know? There are two important facts about ChatGPT and coding. The first is that it can, in fact, write useful code. The second is that it can get completely lost and produce absolutely unusable garbage. It must be understood that the AI system is not actually writing code, it is just replicating what it found online. It is parsing millions of websites and putting it all together in record time. Where ChatGPT succeeds, and does so very well, is helping someone who already knows how to code to build specific routines and get specific tasks done. It must be clearly understood that ChatGPT is just showing answers without understanding.

2.3 AI Systems in Education

ChatGPT and the cohort of new systems should be harnessed and not banned. No AI system will replace the teacher and already faculties are using AI to further empower teachers. Education experts are calling for calm and for AI to be seen as an opportunity, rather than a hindrance, in education. Chatbots are innovations that are here to stay, so banning them is futile, especially when it is far more beneficial for teachers to explore and experiment with them to get a better sense of what is possible. It is critical to have a decision support system that empowers the human to make better use of such tools. That is all it is – another tool, and in a few years from now we will be laughing at those who tried to ban ChatGPT.

Universities and other educational institutions are still developing their policies on how ChatGPT and similar tools that may or may not be used by students. Educators should prepare students to be ready to use such tools and then we do not have a problem with trust. Teaching is rapidly changing. By embracing new technologies, and learning how AI can complement teaching, we can better prepare students and ensure that teachers and learners build the familiarity they need to excel.

It is important to note that AI language models aim to create convincing responses to inputs. But the model does not really “know” things in the way a human does; it just produces text based on the patterns it was trained on. It never deliberately lies, but it does not have a clear understanding of what is true and what is false. How is an answer generated? The way a question is asked will influence how the answer is generated. ChatGPT is likely to give correct answers to most general knowledge questions most of the time, but it can easily go wrong or seem to be making things up when the question is phrased in an unusual way or concerns a more specialised topic. Hence, it is not a reliable source but it has potential in improving the understanding of students. This aligns with the call amongst educators to reform education where there is more critical thinking, problem solving and formative assessment.

If allowing students to utilise an AI system or language model, then the role of the educator is to make the learner understand the concepts behind the subject questions. Like the calculators were once banned in schools, do learners need to know the answer to 12×12 when it can be solved with a simple click on the calculator? What matters is that the student understands the concept of the question and the fundamental mathematical principles.

For example, if a student is asked to work on a research article then they are able to use an AI system so long as they first know the concepts of how to carry out research, what specific and relevant research to do, the structure of a research piece, the referencing and the particular pedagogical ethics of the research. But if the student does not know these rules and the merit of carrying out such research, then they are likely to just trust the answers that ChatGPT gives them. A student who understands the framework of doing research will easily recognise when the system produces a strange answer or even contradicts itself.

Real fulfilment of the potential in education will be with future versions of tools such as ChatGPT, compared to the limiting cases we have now. Yet it remains that intelligent tutoring cannot go beyond all the skills and competencies without human project management. For example, how does one self-regulate the learning process? In collaboration how do we understand the dynamics and inner workings of a team and its associated human interactions? Bringing this back to education where we understand that it is so much more than just getting results, but ensuring the skills are developed in the process and that we understand learning gaps and the creative potential of students. These factors are clearly a signpost to the future role of educators and irrespective of how disruptive a technology can be, it always requires highly competent human oversight to ensure that AI is leveraged as a useful tool and not a driver of policy, pedagogy or approaches to assessment.

Educators and assessors will definitely have to upgrade their plagiarism software. Students are always recommended to use as many sources as possible, so long as they meet the proper academic standards of referencing and citations. It must be clearly understood that ChatGPT is just showing answers without understanding. It is the responsibility of the user to have the understanding – if not they may easily fall into the trap of taking the answers as read. For example, the model sometimes produces fake references. It is a “large language model” that uses a statistical model to guess, based on probability, the next word, sentence and paragraph to match the context provided by the user. The size of the source data for the language model is such that ‘compression’ was necessary and this results in a loss of fidelity in the final statistical model. The model has no ability to evaluate if the output it is producing equates to a truthful statement or not. The model was created based on data obtained via a crawling websites and it must not be forgotten that the public web is largely unfiltered with data sometimes containing a fair amount of

mis-information and myths as well as the expected factual data.

So how will AI change education and teaching? Is this going to lead to a different way that educators do their job? Our panel expressed the sentiment that they hope it does (like other technological and pedagogical developments in recent times) change the nature of education because parts of the system are broken – particularly the memory-based summative assessment system. We need to think what we teach and how we teach in the context of the modern world. This could be a fantastic time to have a step change in the way we deliver education. We use these powerful systems to help us but that is only going to work if people understand the difference between human and artificial intelligence, if they understand what AI can do and what it cannot do. What is it good at and what are we way better at? Because that is how you get the best relationship between the artificial and the human. We do not want students memorising bits of information that they do not understand how to apply in the real world. People need to understand what AI is capable of and what its strengths are and what its weaknesses are. If we get that right, we really can supercharge ourselves as humans.

Our teachers need to know what AI is, and what AI is not. How can such AI systems be utilised by teachers? As an extra resource to obtain a concise and fast answer without having to sift through thousands of results provided by a browser. AI systems could potentially create assessments so long as that is done with the educators oversight. And automation really helps teachers streamline their most time-consuming tasks.

For students, AI has the potential to help with homework, improve writing skills, provide feedback and support research – subject to its current limitations. In doing so it is essential that learners are made aware of the cons, including accuracy limitations; lack of context that may lead to incorrect outputs; lack of critical thinking; lack of original thought and the problem of plagiarism; possible data biases; and the danger of it leading to a technology over-dependence. We are all only too aware that the more technology is introduced, the more reliant humans become. We cannot even be away from our smart phones any more.

2.4 Adaptive & Personalised Learning

An important pedagogical question is how can we leverage the potential of AI systems to empower adaptive learning in the virtual learning environment? Here we have the thoughts of our expert panel,

followed by the answer given by ChatGPT.

One of the key potentials is data and learning analytics. Without data an AI system does not work. Data is what makes machine learning AI systems do what they do. The more data the better it will work, allowing us to customise and tailor adaptive learning to the needs of the student. When training our personalised e-learning systems we need to get the data right – bearing in mind that much of the data comes from the student who is generating their own information depending on their activities. As time goes by, the data refines further, the machine learning keeps improving and the potential of adaptive learning gets better.



The collection of data is a very big issue and will need better understanding and monitoring if AI systems are to be more involved in the educational process. In the case of ChatGPT we don't know exactly where all the data comes from and what filtering or editorial framework was put in place, as well as what methodologies were used to train the model. When considering personalised learning it is critical to be cognisant of the addictive nature of certain technologies. Why is social media so addictive? Because it shows us what we want to see. The model has learned your personality and feeds your desires. If it does something different, you don't go back. So if we think about this in the context of education, it becomes about building systems and algorithms that understand the needs of the learner. From this feedback loop we can build curricula and assessments to truly deliver personalised learning.

The key objective of AI in education is to find a better way to understand a student's perspective and progress in learning and then use that data to build an AI assistant. It is important that this also feeds into what the student likes and aspires to and not just

what the education system likes. This approach will hugely increase motivation and the a greater desire for learning amongst young people. Not forgetting that AI in education has already been around for some time and one of its key characteristics is the ability to provide adaptivity. So why are we adapting something? What is the purpose of the adaptivity?

These questions are critical if promoting the use of AI in education. It is not just a matter of using technology for technology's sake but rather asking why we are using it. Why is AI the tool that is going to enable us to do something that we cannot do without? For example, if a teacher is faced with a large group of students, all at different places in their learning, then it is extremely useful if the teacher is supported by an adaptive platform whereby those students can learn according to their own pace and level. They can get individualised instruction.

Still we need to think very carefully on what grounds we are making adaptations. What is the adaptation designed to do? What kind of material are we putting in front of the student and are we adapting how difficult that material is? Are we adapting the level of support that we offer students and as AI systems develop, what are we trying to achieve from each learner activity? The answers to these questions are dictated by the kind of pedagogy we want and our approach to learning. With a pedagogical and assessment framework in place then we can properly leverage the potential of learning analytics and the power of big data.

When the question: "how can we leverage the potential of AI systems to empower adaptive learning in the virtual learning environment?" – ChatGPT provides the following answer:

Adaptive learning involves creating personalized learning experiences for individual learners based on their strengths, weaknesses, and learning style. AI systems can be instrumental in delivering adaptive learning in virtual learning environments by analysing data on student performance and behaviour and generating personalized recommendations for learning resources and activities. Here are some ways to leverage the potential of AI systems to empower adaptive learning in virtual learning environments:

Data analysis: AI systems can analyse vast amounts of data, including student performance data, feedback, and other relevant data sources, to identify patterns and develop personalized learning plans for each student. The analysis can provide insights into student behaviour and learning preferences, enabling educators to

customize learning experiences that best suit each student's needs.

Personalised recommendations: AI systems can recommend learning resources and activities tailored to individual learners. For example, an AI system could recommend a specific video, article, or exercise based on a student's learning style and interests.

Intelligent tutoring: AI systems can act as intelligent tutors that provide personalized guidance to students as they learn. For example, an AI system could identify areas where a student is struggling and provide targeted feedback and support.

Adaptive assessments: AI systems can also provide adaptive assessments that adjust to a student's performance level, providing them with more challenging or easier questions based on their progress.

Overall, leveraging AI systems in virtual learning environments can help create personalized learning experiences that meet the unique needs of each student, improving their engagement and learning outcomes. However, it's important to ensure that these systems are designed with ethics and inclusivity in mind to avoid perpetuating bias and discrimination in education.

ChatGPT gives four ways on how AI in education can be used for adaptive learning. Interesting how the system has given answers that are not too dissimilar to those from our expert panel that include data analysis, personalisation, intelligent tutoring and adaptive assessment. We see the model fail to give the nuanced answers with caveats and qualifications that our panellists do. Though, interestingly it delivers a final sentence that warns of ensuring AI systems in education are designed with ethics and inclusivity in mind. All part of the training by its developers!

2.5 Assessment & Digital Credentialing

The main idea when faced with new and disruptive technologies like AI is to empower the human. If the human is an educator then we empower the teacher with AI rather than think of banning the technology. One area where this may help is in assessment. In recent times, educators have expressed a growing discontent of summative assessment and rote-based learning. Broadly speaking formative assessment is where one is making judgments about how students are progressing so that we can help them develop further and summative assessment is the process whereby the work is completed and we are asking how much has been learnt.

So if we create an AI system that can pass an assessment when it does not understand a word of what it produces or any idea how these words can be used in the real world, then there is something wrong with the assessment. We know that formative assessment is not only more accurate in terms of assessing an individual (what they really understand), but also it contributes to the learning journey. The problem with a lot of summative assessment is that it is time consuming and often inaccurate – not contributing to learning. So the challenge of utilising generative AI is to ensure that it is better for learners. Such a powerful “digital assistant” has the potential to enable teachers to provide a personalised and adaptive learning experience for every student based on AI-powered assessments and feedback.

AI can be our friend. We can use AI to analyse data and get a much more accurate picture of learner progress.

In the context of formative assessment, if we work out the right way to use AI and what data the system is going to process then we can also start to ameliorate the algorithmic biases. This is because the process of formative assessment provides a much more accurate picture of each individual student’s performance. Summative assessment is about getting the grades to get into university but it is not accurate and causes anxiety to the detriment of better education.

Universities and institutions are now bringing in artificial intelligence courses and qualifications. AI will impact all sectors from agriculture to engineering and people will need the necessary understanding to be at the forefront of their industry. Understanding how AI works, and how to implement it in a particular industry is a crucial step to integrating into the changing technological landscape. AI qualifications will allow the application of new skills into jobs of the future, even more so when we appreciate that we do not yet precisely know what many of those jobs will be. Modules should include the likes of robotics, algorithms, data mining and text analytics, and machine learning. The workplace is going to be increasingly full of AI tools, impacting white collar professional jobs.

The panel made some final comments on the potential role of AI in digital credentialing and training for the recognition of competencies.

ChatGPT has the potential to be a valuable tool in training in all industry sectors. The recognition of competencies may be fulfilled in those areas that are particularly well-suited to the technology: personalised learning; gamification; language training and soft skills. Some universities around the world are already offering online certification in the use of AI. There is now even an online ChatGPT certification program that offers an examination of the intricacies of ChatGPT’s architecture and training methodology

as well as practical applications in real-world scenarios. The conventional method of credentialing is knowledge and effort-intensive that is not just time-consuming but prone to errors. It is possible that the certification process can have better outcomes by using artificial intelligence and machine learning by eliminating the need for constant manual involvement using algorithms to analyse data and make decisions.

For digital credentialing this can result in enhanced efficiency by cutting the time and resources needed; increased accuracy; and improved compliance to ensure that learners studying

for a particular industry sector know how to adhere to legal and regulatory obligations. AI systems can analyse documents making onboarding more efficient. They can assist in minimising errors and ensuring that primary source verification is faster. By using AI, many of the data entry and verification procedures associated with credentialing can be automated.

While there are many advantages to adopting AI credentialing process, there are certain difficulties and factors that need to be taken into account as well. These include: integration with current systems and the cost of replacing legacy systems where such integration is not possible; assuring accuracy and reducing bias whereby manual checks will be required; and the necessary digital transformation of information to ensure compatibility. All things considered, these new technologies hold significant promise for enhancing precision, and effectiveness, while minimising errors in credentialing.

- End -

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