"NAVIGATING THE INTERSECTION OF AI IN EDUCATION: DIFFERENTIATED ASSESSMENTS AS A PEDAGOGICAL REFORM"

Research Paper

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"Abstract"

The 21st century with the intersection of AI and Education offers great opportunities to educators and learners.

This changing scenario can be navigated with new and varied pedagogical reforms. Technology 4.0 should bring out fast paced educational reforms. The research primarily focussed on a differentiated assessment system so that the creative and critical thinking can be evaluated. This assessment was learner centric rather than teacher centric; it explored a novel method of quantifying skill progress rather than route memorisation. This research aimed to develop creative thinking in graduates by implementing a differentiated assessment pattern based on the ACER creative thinking framework. The age of rapid automation and AI poses a threat to low-skilled labour; therefore educational institutions must focus more on developing skills that machines cannot replicate. The exploratory case study over a longitudinal period of six months concluded that a concept called as flip question paper, in the form of science fiction writing and white paper projects develop higher-order thinking skills in graduate learners. Though the variance in strengths of learners is a well-established fact most assessments sill follow a standardised pattern rather than differentiated . This study was also able to quantify data from the assessment so that transcripts can have creative and critical thinking mapped along with domain knowledge.

Keywords: ACER, Differentiated assessment, skill progress in transcripts, AI and Education.

1 Introduction

The intersection of AI in the realm of Education elicits a diverse array of reactions, ranging from excitement to a whole new myriad of questions. This breakthrough advancement in Technology 4.0 will revolutionize the educational landscape. The main area of concern for all Educators all over the world, Is Education keeping pace with Technological Advancements? The benefits of Technological advancement can be reaped completely if transformations in Education also keep progressing at the same pace .At its core AI entails the training of machines and algorithms to emulate human learning .In order to navigate the intersection of AI in Education ,it is imperative to take necessary steps to mitigate the associated challenges of any new technology .The main benefits of AI in education is immersive learning and Intelligent tutoring system .The immersive learning empowers learners to have real world experiences within the four walls of classroom. This gives the learner the freedom to explore as well as have greater autonomy in the learning journey. The digital natives enjoy the flow of rapid information and seek fulfilment in learning through virtual assistants and bots. The second-best tutor that a learner can access is the intelligent tutoring system. This system offers customised instructions and personalised feedback to support students in their learning journey. The Intelligent tutoring system provides a ground breaking fusion of AI and Education. This makes it more adaptive and individual focussed kind of teaching that most digital learners explore. Technology enhanced learning (TEL) as stated by Deng and Benckendorff (2017) is the use of Technology with relevant smart approaches designed to support learners.

However, amidst these advancements it is essential to recognise that while AI facilitates learning, it cannot replace the wisdom and guidance imparted by teachers.

The human touch, personalised interaction and experiential learning facilitated by educators remain the central and most unreplaceable part of Human Teaching. The need for rote memorization is declining as all knowledge is available at the click of a mouse. Each learner is unique in their learning style and requires a differentiated assessment to check the outcome of the teaching-learning process. Though many studies indicate the importance of analytical thinking, not much research has been done on how higher-order thinking skills can be developed or evaluated in the classroom. Developing higher-order thinking skills in classrooms will make graduates workforce-ready. It is observed that educational reforms do not keep pace with technological revolutions. It is imperative to implement innovative pedagogy in all classrooms to effectively upskill India's vast youth population.

Graduates must be equipped with higher-order thinking skills to become workforce-ready. Therefore, pedagogical practices must be revamped and revised to suit the needs of digital and automated workspaces. This study follows an exploratory case study method with fifty-four graduate learners over a longitudinal study period of six months. This research aims to establish that educators should move from a knowledge-based assessment system to innovative and differentiated methods that can assess skills required for future workspaces. Though many surveys and reviewed literature indicate the need for higher order thinking, no clear route map is facilitated to demonstrate how these skills could be measured. This study explores a novel concept of flip question paper, a method that gives complete freedom for the learners to unleash heir creative and critical potential. This concept encourages Science fiction writing and white paper project to facilitate differentiated assessments.

Though Educators acknowledge diverse learning styles and develop varied strategies to achieve the same, not much research is carried in the field of differentiated assessments (Dantas and Cunha ,2020). The concept of Differentiated Instruction can be most fruitful, if along with that Differentiated Assessments are followed. This was also further highlighted by the observations of (Marie et al, 2020) suggested that the overall success of students develops from a variety of active experiences. The objective was primarily to improve higher order thinking and to quantify skill progress. The research study mainly targets to obtain answers to the following research question

RQ1

Does the implementation of flipped question paper effectively enhance higher order thinking skills in graduate learners?

RQ2

How can skills be mapped and graded accurately along with domain knowledge in transcripts.

The following hypothesis have been proposed for this study

H1 Differentiated and student led assessments improve higher order thinking skills in graduate learners.

H2 Real world Transcripts should have skills mapped along with domain knowledge.

2 Literature Review

The reviewed literature indicated important parameters namely the intersection of AI in teaching and the importance of pedagogical changes. Most studies indicate the importance of higher-order thinking but not much study was done on how it could be part of pedagogical practices. The current employment trend indicates that machines are replacing low and medium-skilled labor. The chapter’s review also indicated that higher education institutes offering three- and four-year degree would lose their relevance if they did not focus on bridging the skill gaps. More learners would prefer to learn short the integration of Artificial Intelligence (AI) in education has heralded transformative shifts in the dissemination of information. Like the impact of previous industrial revolutions, the advent of AI has rapidly evolved classroom management practices. With an abundance of AI machines, computers, and bots, the instructional quality in classrooms has undergone significant advancements. These AI tools play a crucial role in aiding learners to comprehend new concepts efficiently. This study is anchored on the ACER creative thinking framework to measure creative and critical thinking as stated by Ramlinga (2020). The three main themes are knowledge creation, Experimentation, and quality of thoughts. The two main themes and the three subthemes under the quality of thought namely logic, novelty, and elaboration are measured.

According to Levy (1999), differentiated learning is a pedagogical strategy that is used to design teaching according to the readiness of the student interests and abilities of each learner. Previous studies by Harbott (2017) and Dupleuis (2019) suggested that educators these days see large student diversity in many aspects such as cultures, learning habits, and academic abilities. ACER creative thinking framework is an approach that enhances creative thinking skills in individuals. It includes a range of principles and strategies to stimulate creative thinking. It draws inspiration from cognitive science and education, creativity involves generating novel and valuable ideas. It emphasizes that creativity is a process that includes problem-solving, testing, and communication.

The first theme of ACER creative thinking framework is Idea generation, this stage focuses on generating a large range of ideas and possibilities. It involves techniques like mind mapping and divergent thinking. The first strand focuses on generating many ideas. The second theme is idea selection and experimentation with the same, this involves shifting perspectives and creating new knowledge. The third theme is the quality of ideas and this enables one to select the best idea. This research is based on the ACER creative thinking framework. This theory provides a structured and systematic approach to cultivating creative thinking skills.

The Guilford (1950) theory of creativity is a pioneering framework for developing creative thinking. This theory is considered the original framework of creativity. It also has shaped our understanding of intelligence. The experiential theory developed by David A. Kolb describes how individuals acquire knowledge and develop skills. This theory indicates that learning is a dynamic process and not a static one. It consists of a process that involves four major steps namely concrete experiences, reflective observations, abstract conceptualization, and active experimentation.

Recent studies have highlighted the urgency to introduce skill-based and competency-based education, which unfortunately is lacking in universities. This research provides a detailed roadmap for imparting skills, domain knowledge, and a robust assessment system to track progress. Ignoring these findings will inevitably lead to a continued decline in India's human capital development, as confirmed by the India Skill Report (2021). The unemployment rate will be around 54% in 2021 and according to them, it could be improved if employees have better behavioural skill sets. According to the Future of Work, Education, and Skills Enterprise Survey, the data collected from 774 companies spread across 14 states indicated about 34% of these companies require new skill sets to handle the rapid automation, and more than 70% of them would up-skill their existing staff. Critical thinking, agility, and a problem-solving approach. The reports by Bessen (2020) provide a useful approach by stating that human capital development is the solution to the current wave of automation, and as studies reveal maximum benefit can be reaped if the skilling happens before employment. Various government surveys indicate that unemployment and underemployment are more common as the educational qualifications increase resulting in youth taking up jobs for which they seem to be over-qualified. This is not in line with the belief that Education will fetch suitable employment. An agile workspace will require creative minds that analyse and put forth strong solutions to adapt to a dynamic work situation. Human beings have almost an unlimited capacity for creativity and their imagination provides them the ability to develop new and innovative ideas. Educators need to acknowledge divergent learning styles and need to create changes through the learning perceptions, and it is observed that student success develops from a variety of active experiences.

The reviewed literature indicated few of the challenges due to the intersection of AI in education. One of the primary challenges as stated by Simut et al (2021) is due to the virtual training environment which lacks physical and emotional interaction among the students. The findings by Acevedo-Duque et al., (2023) suggested the lack of collaborative learning since most learners will interact primarily with systems rather than other individuals. The next challenge in learning using AI as noted by Tewari (2020) is that fair interactions without any bias will be difficult. According to Tewari, (2020) another area of major concern is privacy and security reasons, as more and more learners share personal data on the internet. On the other hand, the main opportunities opening due to the intersection of AI in education is according to Lee et al (2021) Weng et al (2020) is more advanced machine learning algorithms for future performance predictions. Another opportunity that is offered is through adaptive learning as recommended by Paramythis and Loidl-Reisinger (2003). The reviewed literature strongly suggests the emerging trend of AI in education, and the future will have large scale intersection of AI with education. The changes of technological reformation can be mitigated if the corresponding changes in education are fast paced. The development of knowledge-based machines sees the need for development of higher order thinking skills in graduates. These developments will require highly skilled workforce that can coexist with machines, and therefore the requirement of evaluating the progress of these skills. When AI is developed with a lot of embedded data, educators should focus on develop skills in learners.

Source	Findings
Xie et al 2019	Technologies applied to make overall learning more efficient and engaged.
Wu et al 2021	Benefits of leveraging Technology into learning
Duyang et al 2023	Data mining and clustering to drive learning behavior.
Sing et al ,2022	Ai with tutoring system is difficult to implement.
World Economic Forum, (2023) Future of Workspaces.	The highest priority for skills training from 2023 to 2027 is analytical thinking
Afzaal et al 2021	AI algorithm gave predictions to provide necessary
Misra et al. (2012) A suite of cognitive complexity metrics. In Computational Science and Its Applications	Project-based learning is a novel method that is incorporated into the learning environment so that the learners can offer solutions to real-life problems
Patacsil and S. Tablatin (2017) Exploring the importance of soft and hard skills as perceived by IT internship students and industry:	Improving work skills while at college by providing a compulsory internship program

Table 1 Summary of the Literature Table.

3 Methodology

The study used an exploratory case study method by analysing the written work of the fifty-four students over a longitudinal time frame of six months. According to (Creswell, 2016), the qualitative exploratory case study method is chosen as not much data is available on similar studies. The cohort of fifty-four final-year graduate learners was divided into the control and experimental groups. The learners were all 21 years old except for two of them at 20 years old and all of them belonged to South India. Standard assessment methods were applied to the control group and differentiated assessments were for the experimental group. The fifty-four learners generated about three hundred and twelve case study answer scripts.

The experimental group was asked to develop a fictional story or a futuristic product based on the principles taught at the end of each unit of the program. A Flip question paper can be defined as a novel assessment method an alternative to the standardized assessment which gives the learner flexibility. Flip-the-question is a strategy for students to uncover their thinking. It can be used both to raise the cognitive demand of a problem and to provide information to a teacher about the depth of understanding. The knowledge assimilated could be used to create a futuristic product, or they could visualize the knowledge to write a paragraph of science fiction. The answer can be in the form of a white paper project or Science fiction. Though standardized assessments are clear indicators of the route learning done, they lack the space to exhibit creativity, critical thinking, and agility. The more creative people may not have time to engage with route learning and, therefore, might score lesser in standardized assessment methods. This idea will encourage more creativity in the answers and can be used as a source of knowledge creation rather than knowledge repetition.

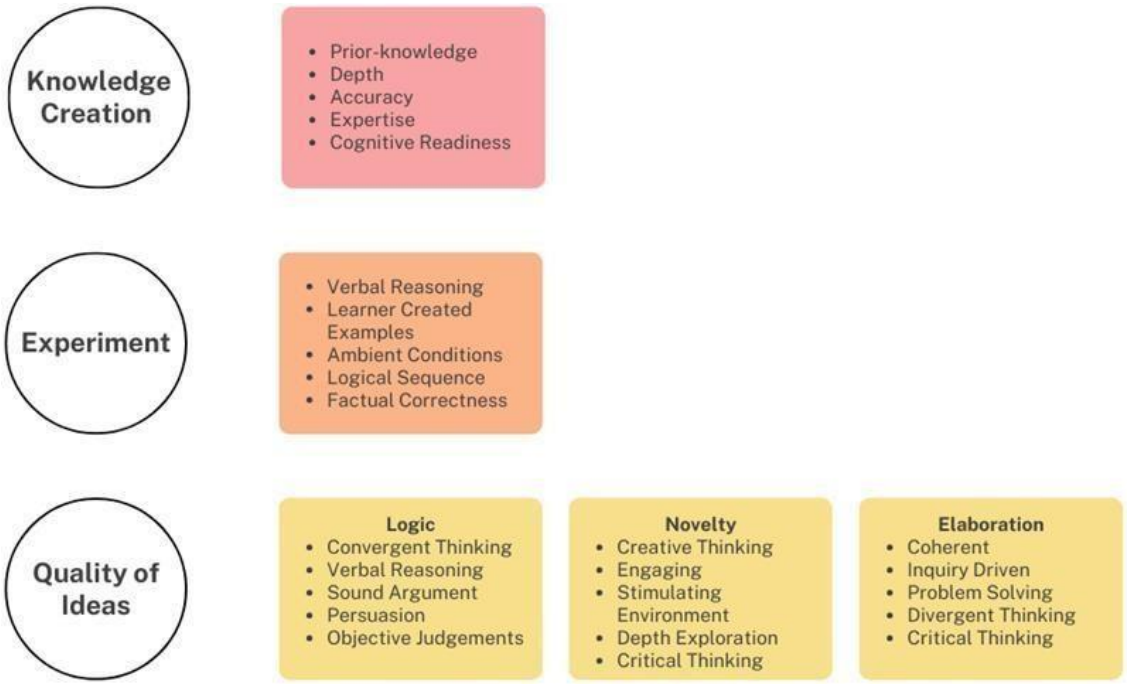

Figure 1. Rubric for Assessment of creative thinking.

The above figure is a rubric used to quantify the content of the learners in the experimental group. Each of the five themes explored had a five-point scale to determine the skill progress. The pretest and the post-test values were determined to indicate the development of creative thinking. The presence of each attribute enabled the quantification of each theme and subtheme, thereby generating a metric for skill progress.

The answer scripts generated both qualitative and quantitative data based on the analysis using the rubric. The rubric was designed to analyse the three themes and five subthemes. The pre test and the post test data

generated quantitative data that could be analysed using statistical methods. The thematic analysis generated the qualitative data and the rubric based on ACER creative thinking framework generated the quantitative data.

The first theme Knowledge creation is the first theme to be analysed under ACER creative thinking framework. This is achieved by generating many ideas and, most importantly, synthesizing the learners' existing knowledge. This is totally in synchronization with Guilford's (1950) concept of fluency of ideas. This is an essential step to develop creativity and creative thinking. The first step of knowledge creation is the generation of multiple ideas, the rubrics for assessment consisted of five characteristics namely prior knowledge depth of knowledge, accuracy, expertise, and cognitive readiness. The presence of one characteristic indicates that the learner is a beginner or Novice, with time if all five are strongly developed the learner becomes an expert. Another aspect of experimentation is the process of testing out new ideas to discover potential applications. This requires a methodical approach and a constant effort to shift perspectives. This is a crucial element of the creative thinking framework that enables individuals to consider different viewpoints and solutions. This practice of education, when done routinely, equips learners with the skills necessary for future workspaces, such as critical and logical thinking. The assessment rubric included verbal reasoning, examples created by learners, ambient conditions for experimentation, logical sequence of steps, and factual correctness. Here again, if all five variables are present learner develops from a novice to an expert stage. Let us look at the third theme which focuses on the quality of ideas. There are three sub-themes within this area: novelty, elaboration, and logic. It is imperative to emphasize that creative and critical thinking can only be fostered through top-notch ideas that offer a groundbreaking shift to existing concepts. Without such high-quality ideas, practical application remains impossible. The first sub-theme under the quality of ideas is logic and the assessment rubric had the following characteristics namely convergent thinking, verbal reasoning sound argument, persuasion, and objective judgment. A high-quality idea must be backed by ample reasoning and remain objective. Learners should develop the ability to make quick and objective judgments based on evidence. Effective decision-making is a crucial skill in any agile work environment. Guilford (1950) stresses the importance of both convergent and divergent thinking when it comes to creative product development. The second subtheme is the novelty of the ideas as well as the product created. This theme has the following five characteristics a stimulating environment, creative thinking, engaging, depth of exploration, and critical thinking. These characteristics can be developed if learners spend less time memorizing facts. The third subtheme under the quality of ideas is Elaboration. This theme has the following five characteristics coherence of ideas, Inquiry, problem-solving ideas, critical and divergent thinking. Assessments for creativity should be planned to be unique, it cannot be standardized in a pattern as one size fits all approach. The main reason why these skills are not assessed is that they can become subjective, time consuming, and difficult to assess.

4 Results

The below figure shows the results of the thirty-six students in the control group, with mean pretest and post test scores for the experimental and control group. The descriptive analysis of the scores of the experimental group indicated higher mean values for all five themes. The analysis of the scores of the control group indicated not much increase in the mean values during the longitudinal period of study.

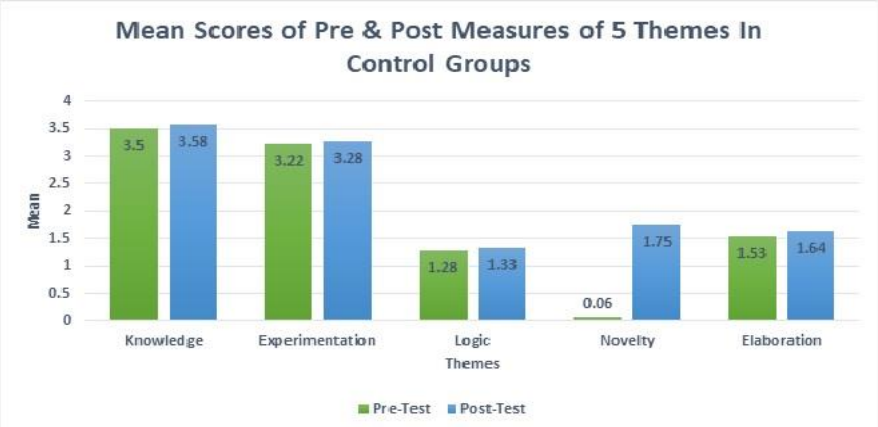

Figure 2. Mean scores of Pre- and Post-Knowledge Scores of themes in Control Group.

According to Mikdashi (1999), creativity is considered a principal term and it can be divided into three types either creating something new or combining things. Houran and Ference (2006) stated that creativity can be seen as a mental process that produces novel and useful concepts or ideas, it could also be seen as a process of introducing innovative relationships between existing ideas or concepts. In the literature reviewed creativity is defined as a principle of problem-finding and problem-solving and therefore requires several skills and talents and is unconventional (DiLiello and Houghton, 2008). The ability to capture ideas from all around enables learners to take different perspectives.

The below figure shows the results of eighteen students t experimental group, with mean pretest and post test scores for the experimental.

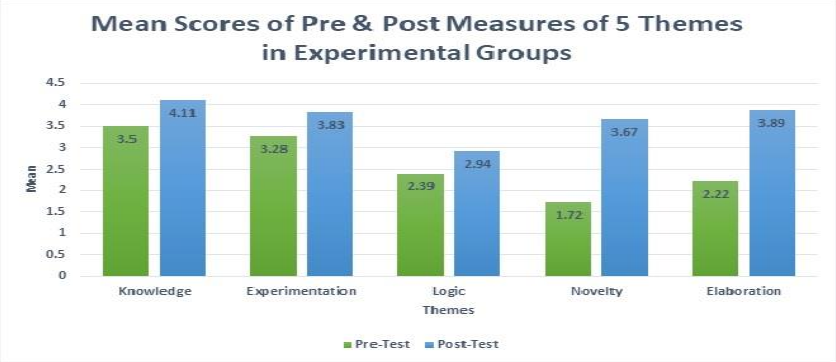

Figure 3 Mean Pre-test and post-test Scores of Knowledges of themes in Experimental Group

The pre-test and post-test analysis of scores of 5 themes in the control group and experimental group indicate that all 5 themes have obtained significantly higher scores in the experimental groups validating the hypothesis. In the control group, only novelty among the five themes has a significant difference between pre-test and post-test scores. Any new knowledge will be novel information. The effect size is also comparatively more in experimental groups for each pair-wise analysis.

This indicates that the Acer creative thinking model has a significant influence on students' performance

Theme 1 relates to the knowledge creation of the conceptual framework since creative thinking is a generative process. This is also synchronized with the importance of the production of many different ideas or in other words ideation fluency as mentioned by Guildford (1950). The findings suggest that most learners in the experimental group were able to generate ideas more fluently with time. The inclusion of knowledge creation helped the learners create more ideas and consequently the generation of creative ideas.

The first theme of Acer creative thinking framework is knowledge creation, it throws light on the ability to analyse and sort information to construct new conceptual relationships Fisher and Scriven, (1997). Knowledge creation is possible only if the learner has understood the concepts and can generate multiple solutions to a single problem. The ability to break away from conventional practices is also a form of creative thinking. Future workspaces require innovative thinkers who can generate multiple solutions to complex problems. This is an essential skill that machines cannot replicate fast. The results of theme 1 knowledge creation were quantified by evaluating the content. An interesting study by Smith (2020) stated that engaging with failure is essential for success, and the reluctance to inculcate failure in learning may sabotage the ability of learners to be creative. The rigid and standardized assessment so commonly followed never fosters failure for a student well prepared with memorization of the content. Though flexible assessment methods can seem like a failure regarding the memorization of content they prepare the learners for flexible environments. Another area of concern is that these skills are open-ended in nature and therefore it is difficult to evaluate and assess. The main dichotomies that exist regarding these assessments are psychometric versus behavioral, process versus product finally Individual versus group. The above-mentioned reasons hinder the assessment of higher-order thinking skills. Therefore, most universities and educators find it difficult to quantify these skills.

These discussions of visionary speculative writing formed the foundation of various student-led assessments over six months. The study was able to support the hypothesis that alternative assignments like flip question

papers can improve creative and critical thinking in graduate learners. The embedding of critical and creative thinking throughout the learning and assessment process enables learners to engage in higher-order thinking. The use of logic and imagination makes learners able to select from a range of ideas and strategies. These assignments were challenging and engaging and maintained a fun approach for the learner to develop various alternatives and seek new knowledge. These assignments though flexible and the concept's developed imaginary were evaluated for quality as well as for correctness. Intelligence and creativity should be measured from a multidimensional perspective and intelligence always is composed of different abilities than a single attribute. The hypothesis proves that the learners who engage in this type of assessment were able to integrate their ideas and expand their understanding to develop new insights; the concept of divergent and convergent thinking for the same assignment enables the learners to generate multiple ideas and finally choose the best of these ideas. The fluency of ideas comes forward with the depth of knowledge and it is directly proportional to the growth of knowledge. Integrating ideas enables a generation of new insights. The standard assessments of the control group never allow them to develop their knowledge rather it enables them to memorize and repeat the knowledge.

The existing information of the learner plays a significant role in the learning process. A strong foundation of prior knowledge helps learners build upon existing and new knowledge. This also enhances the success of the learners. Activating prior knowledge helps students establish connections faster. Learners with a strong foundation of prior knowledge can retain and comprehend knowledge faster. Therefore, the motivation of the learners increases leading to new learning outcomes. Learners with strong prior knowledge will have fewer learning gaps. The overall learning experience is thereby enhanced when prior knowledge which is the foundation for building new knowledge helps learners make connections between previous and new information.

The depth of knowledge framework provides a common language for assessing the degree to which cognitive engagement translates into learning opportunities and tasks. The depth of knowledge framework provides student growth and positive academic outcomes. The depth of knowledge assists educators in creating assessments that align with the desired level of cognitive engagement and depth of understanding. deeper understanding at appropriate cognitive levels happens with a higher depth of knowledge. The learners with higher levels of skills were identified by the depth of their knowledge. Though the fluency of ideas indicates the ability to think creatively, not all learners can generate factually correct ideas. Successful outcomes are possible when the data is accurate, this can be achieved when learners have the depth of knowledge to create relevant ideas.

The last attribute to determine knowledge creation was cognitive readiness. The future workspaces will require the agility of thought and people who are quick to adapt to rapidly emerging and unforeseen challenges. This is also a sign of creativity and should be of special relevance. These are the new-age characteristics that educators and educational institutions should be gauging and not the content knowledge memorized by the digital natives.

This case study focused on an assessment system that evaluated competencies rather than knowledge. The key benefit of this assessment is the development of their intrinsic motivation to achieve their best performance. This may be due to the learner competing with her understanding of the lessons taught and not comparing with her peers. In contrast, the learners of the control group were anxious in comparing the grades of their peers. This tendency made them anxious and introduced certain doubts about their abilities. The experimental group enjoyed their assessments as a play method of acquiring knowledge. The rubric for assessment for knowledge creation was the ease with which prior knowledge was intertwined into the product, depth of knowledge, the accuracy of facts stated, and most importantly the expertise and cognitive readiness. The learners in the experimental group demonstrated a higher level of cognitive readiness when compared to their counterparts in the control group; this indicated their readiness to work in agile work environments. The machines of the future will be able to do routine work but adapting to agile and dynamic work situations will be difficult. Therefore, these are the skills that learners should develop more rampantly than memorizing large chunks of data that are available at the click of a mouse.

There is a clear lack of literature that indicates that skill is measured and quantified as a metric in any mark sheet. Most students do not focus on skills as it is not quantified to show progress over the study period. This study was able to provide a transcript that can have skill progress along with content knowledge. Many countries are facing an "invisible underemployment" which refers to a situation where an individual is unable to find a job in line with their educational qualifications and secures a pay much below the expected industry standard. The current lockdown and the technological shift have further escalated this issue. This means that any skill set comprising even a small share of tacit capability will remain the domain of humans because tacit

skills cannot be codified. Automation has so far been the most successful in areas where a task can be converted into explicit instructions that a computer understands. This hypothesis is based on the following real-world cases of various science fiction concepts that have now become a reality. Science fiction has often inspired real-world inventions and technological advancements. Here are some well-known examples of science fiction concepts that have become a reality.

Communicators: The concept of handheld communication devices used in "Star Trek" became a reality with the invention of flip phones in the 1990s recorded by the inventor of the handheld phone Martin Hooper (1990). The concept of current-day inventions like driverless cars, hoverboards, blade runners, bionic limbs, teleportation, and universal translators was adapted from several Science fiction movies including Star Trek according to Elizabeth Howell (2018).

There are several examples of individuals who did not perform well in traditional educational settings but went on to become successful inventors and entrepreneurs. Here are a few notable examples that prove the use of standardized assessments is not a good predictor of student achievement.

The goal of this study was to highlight the importance of providing alternative and differentiated assessments in the form of white paper projects or Science fiction writing to improve the ability to think creatively and critically. This assessment method also provided the context for learners to navigate an agile environment. The themes of knowledge creation, experimentation, and quality of thought were analysed for the experimental and control groups over six months. The results proved that there was a positive outcome of the hypothesis, thereby opening new avenues to check the development of creative and critical thinking. The only way to develop skill is to foster an environment where skill can be measured. The dependence on flexible assessments over standard assessments developed creative and critical thinking. The hypothesis was validated as most of the learners in the experimental group showed gradual progress in the development of higher-order thinking skills. The results of the study indicated that the hypothesis was not just a theoretical construct but could be evaluated practically, thereby indicating a positive outcome.

The discussions of the results of the exploratory case study of fifty-four graduate learners over a longitudinal study of six months and the discussion of the one hundred and twelve survey respondents.The World Economic Forum reinstates the importance of the right skills for the future workforce since technological advancements and automation are replacing low and medium-skilled labor (Gordon, 2013; Kristal & Cohen, 2015; Smith & Anderson, 2014). Recent studies by Malone et al. (2020) prove that we are many decades away from the day when computers have complete human-like intelligence and therefore there is a lesser possibility of machines replacing humans. The above observations show that new advancements will require agile and advanced skills to cope with these fast and smart machines. The studies carried out by Aniket (2018) indicate a skill gap between the education offered and the requirement of the industry. This will be of serious concern as educated people may not find the right employment. Most low-skilled jobs could be executed by intelligent and smart machines created specifically for the job. This will lead to serious economic and social unrest if several youths are educated but underemployed. As a solution, Dubey et al., (2021) illustrated that by analyzing the performance and competencies of specific industries certain corrective measures can be incorporated to bridge the observed gaps.

5 Discussions

It can be stated that differentiated assessment validated the hypothesis with most learners in the experimental group showing gradual progress in developing their critical as well as creative thinking. The study was able to quantify skill progress, thereby allowing transcripts to display skill as well as knowledge gained. The study also highlighted the importance of alternative assessments to align with the dynamic needs of the current workforce. This study's findings enriched the education landscape by providing a differentiated assessment system.

The references to previous literature indicate that pedagogical reforms are not aligned with technological advancements. To bridge this skill gap, educators must reinvent pedagogical practices to prepare the learner for future workspaces. The pedagogical transitions are the need of the hour as workforce skill sets are evolving. These are the competencies that learners require to navigate the demands of future workspaces. The focus of this research is to explore a transformational change so that all learners develop higher-order thinking skills along with domain knowledge. The findings of this research indicate a positive development in the three themes of knowledge creation, experimentation, and quality of ideas (sub-themes of novelty, logic, and elaboration). The digital natives require the integration of creativity as an educational practice and the incorporation of assessments that gauge the progress of 21st-century skills. An interesting study by Smith (2020) stated that engaging with failure is essential for success, and the reluctance to inculcate failure in

learning may sabotage the ability of learners to be creative. The rigid and standardized assessment so commonly followed never fosters failure for a student well prepared with memorization of the content. Though flexible assessment methods can seem like a failure regarding the memorization of content it prepares the learners for flexible environments. Another area of concern is that these skills are open-ended in nature and therefore it is difficult to evaluate and assess.

The main dichotomies that exist regarding these assessments are psychometric versus behavioral, process versus product finally Individual versus group. The above-mentioned reasons hinder the assessment of higher-order thinking skills. Therefore, most universities and educators find it difficult to quantify these skills. This innovative assessment enabled complete freedom for the learner to create his understanding of the knowledge learned. It eliminated the need for route learning and memorization which is a total waste of time for the digital natives. These assessments were able to quantify the progress of the three themes under ACER creative thinking framework. In conclusion it can be stated that alternative assessment method validated the hypothesis with most learners in the experimental group showing gradual progress in developing their critical as well as creative thinking. The study was able to quantify skill progress, herby allowing transcripts to display skill as well as knowledge gained. The study also highlighted the importance of alternative assessments to align with the dynamic needs of the current workforce. The findings of this study were able to enrich the education landscape by providing a novel and flexible assessment system. A differentiated assessment that enables every student to bring out his talents and have a more engaging learning experience.

Diverse students of varied abilities cannot be evaluated on a standard assessment, this study enabled differentiated assessments. This provided for a more holistic and a learner centered method which reduced the anxiety and fear of exams. The findings of this study indicate a positive result in the development of 21st-century skills this pedagogical transition is essential for learners to realize the fact that they need to be aware of the evolving skill sets. The assessment though different from the standardized one enabled complete freedom for the learner to explore. The learners found the assessment challenging yet completely flexible.

This reduced stress levels considerably and therefore the learners in the experimental group were able to perform better than the experimental group. These flexible assignments allow learners to develop a spirit of inquiry and a quest for knowledge creation. It can be used as a business model to identify key strengths of the learner, and this will equip the learners to analyse their strengths and weaknesses. This transcript can be used as an objective assessment indicating learner proficiency in a particular skill; it enables learner progress tracking of skills. It also enables goal setting and a means of differentiated assessment for the learners.

This innovative assessment enabled complete freedom for the learner to create his understanding of the knowledge learned. It eliminated the need for route learning and memorization which is a total waste of time for the digital natives. These assessments were able to quantify the progress of the three themes under the ACER creative thinking framework. Diverse students of varied abilities cannot be evaluated on a standard assessment, this study enabled differentiated assessments. This provided for a more holistic and learner-centred method which reduced the anxiety and fear of exams.

A natural progression of this study will be to extend this method to other programs of study like engineering and learners of diverse backgrounds. A limitation of this study is that case studies usually have a small sample size and it might be difficult to generalize in the broader sense. The second limitation is the subjectivity of the researcher's views and bias can influence the data collection, analysis, and interpretation process. These findings will be of interest to educators, administrators, and policymakers as they offer the following three solutions that need urgent attention to bridge skill gaps. This study was able to offer the following three solutions to pedagogy.

The measurement of creative and critical thinking is a demanding task as these skills represent a broad and abstract process. Most of the rubrics developed indicate either the presence or absence of these thinking skills. The drawback of this is that it does not enable the learner to improve their skills or measure their progress. Therefore, educators must devise innovative assessment methods to gauge the progress of higher-order thinking skills. This will equip the learners to have essential skills for future workspaces. This research anchored on ACER creative thinking framework and Guildford's (1950) definition of creative thinking was developed as a solution framework. The themes of knowledge creation can be compared to the fluency of ideas, experimentation is compared to the flexibility of ideas, and the quality of ideas can be compared to the originality of ideas. These themes and the five rubrics of assessment were developed in this research to measure the progress of higher-order thinking skills in the learners.

The unique potential of a learner can unfold if he/she is allowed the freedom to develop their understanding of the learning. Most educational institutions depend on standardized tests to evaluate mainly the knowledge content and power of memorization. The data from the learners in the experimental group indicated positive

outcomes, all five themes showed remarkable progress. Analysis of the content alongside the rubric for the period of six months yielded data for quantitative analysis as well. The striking feature of this assessment was that the learners were completely relaxed and eager to experiment with their thought processes.
No two learners are the same therefore the entire assessment cannot be standardized for a whole class of students. Each learner must develop their thinking and ability. This research was able to cut the stereotype of assessment that one size fits all. The learners of the experimental group developed versatile skills and were able to create knowledge rather than memorize the same. Further research is required on diverse groups and programs of study to evaluate the impact of this speculative fictitious scientific writing.

If educators and institutions do not focus on developing skills on a larger scale, most learners would prefer short-term skill-based programs rather than four-year degree programs that have outdated pedagogical practices. The primary focus of educational institutions should be to develop workforce readiness in graduate learners. To ensure that AI can provide sustainable development pedagogical practices must be fine-tuned rapidly to keep pace with the evolving needs of society. The primary focus should be to develop a highly skilled workforce so that job losses can be mitigated. To attain sustainable development education should evolve and large-scale upskilling should be incorporated both at the workplace and in educational institutions. The results of this study can be used to develop targeted interventions and innovative assessments in graduate learning programs so that educators all over the world can evaluate creative thinking along with domain knowledge.

6 Conclusions

This study added value to the concept of evaluating creative and critical thinking and mapping it in transcripts along with domain Knowledge. Traditional educational systems focus more on evaluating conceptual knowledge as stated by Morris (2022) and the current times with the intersection of AI in Education requires

Innovative pedagogical transformations. This concept of quantifying skills and marking it in transcripts along with domain knowledge will shift the focus of education from knowledge based to skill based. This shift will enable educators all over the world to focus on developing tacit skills in learners that machines will find difficult to emulate. Though many research findings establish the fact that higher order thinking skills should be developed in learners not much literature is available on how this could be developed and assessed in classrooms. Therefore, this study is one of the pioneering studies to develop a rubric for measurement of higher order thinking skills as well as in developing the concept of a differentiated assessment. Though, differentiated learning styles and Instruction is commonly used differentiated assessments are not so common. The assessment of creative and critical thinking using ACER creative thinking framework is a step forward to improving employability skills in the age of rapid automation.

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