# Artificial intelligence applied in innovative assessments in the world of work scenarios

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ABSTRACT: This article aims to showcase the implementation of artificial intelligence assessments in large classes, on-line and self-engaged lesson plans. The lesson plans adopted for soft-skill and practical training were not just limited to these, but also included tedious repetitive theoretical work to be taught and facilitated. Teaching and learning also make use of assessments and relevant feedback to such assessments to strengthen the knowledge gained not just in theoretical but also in practical and future work scenarios. This allows for multiple assessments taking away the load of assessment from the lecturer, especially in large classes, but also has a gamification effect of improving the learner's results or level. The article covers the reflection on the procedures followed and the results this achieved, as expected, and the desired results also achieved in the group. Although not a new concept in teaching, learning and assessment, this approach has proven to be time-efficient, custom-applied and used with relatively good results.

Keywords: Artificial intelligence, innovative assessments, future of work, soft skills, gamification

## INTRODUCTION

It is known that teaching and learning are more productive with an engaged student resulting in better grades and overall achievements [1]. The use of assessment tools is a way of increasing this engagement. More assessment especially in large classes impacts time management as more time is spent on evaluations, drawing up assessments and marking [2]. On-line or learner management system (LMS) implementation poses challenges with authentication with certain assessments [3]. Self-engaged lesson plans could also be a place for self-assessments as most prescribed books are used for this purpose [4]. Assessments for soft-skill training and practical also have their challenges [5].

This article looks into the implementation of artificial intelligence (AI) in assessments in this context, the way the AI tools are implemented in the evaluation and the results obtained.

## BACKGROUND TO ASSESSMENTS

Assessments are seen to form part of the teaching and learning process. This facilitation may have many forms and shapes depending on the application and objective to be achieved by the assessment process. Formative and summative assessments structure this in the two common groups [6]. Depending on the timelines, different types of assessments are being used for this purpose like multiple-choice, short answers, equation type and/or assignments to mention just the tip of the iceberg. These types can be implemented on LMS using question banks or newly created assessments including group work and discussion sessions [7].

Discussing a memorandum after the assessment helps students understand the correct answers and the reasoning behind them, which is essential for their learning process [8]. This provides immediate feedback, allowing learners to identify their mistakes and learn from them. This can guide their future study and improve their performance [9]. Discussing the memorandum ensures transparency in the grading process and helps address any concerns or misunderstandings students might have about their scores and contributes to fairness [10]. It may contribute to more engaged students in a discussion about the assessment, which can motivate them to take an active role in their learning [9].

Future of work [11] and work-integrated learning (WIL) [12] have a different approach in the teaching and learning process to assessments including for instance reading work, videos and presentations followed up with assessments including answering questions, demonstrations and evaluated practical work scenarios.

Authentication of users for on-line and face-to-face evaluations is done differently with the main aim to ensure the grades belong to the right person.

It is these types of assessments and approaches to authentication that this article speaks to. On-line assessments were implemented using technologies like The Invigilator app [13], LockDown Browser, Respondus Monitor [14] and Panopto [15].

## IMPLEMENTATION OF AI ASSESSMENTS IN A LESSON PLAN

The implementation of AI-assisted assessments stems from software implemented in the institution called EON XR [16]. This software also supports the development of 3D, 360 virtual reality (VR) and augmented reality (AR) lessons with the assistance of Spatial Meeting incorporating own created avatars for a profile.

The Metaverse Builder provides the opportunity to create full lessons in the AR and VR space utilising AI features and functionality including assessments generated or tailormade during the building phase or editing afterwards or on an upgrading or updating basis.

Figure 1 depicts a representation of such a lesson indicating the topics covered during the creation stage to be learnt, trained and assessed by the same lesson on the generated content.


Figure 1: Lesson created with Metaverse Builder including VR and AR assets.

Throughout the creation and training of the assessment process, the learner is guided by an avatar created for this purpose. Such a lesson could also be used as a presentation in a face-to-face class. To keep the assessments capturing and game-like, the creator could choose different scenarios or types of having the learner more engaged and not bored even with assessments.

Figure 2 depicts these types of assessments catering for a quiz or short question and answer options, including a jeopardy challenge as a test, identifying objects or answers, location-based if applicable, 3D recording of exercise and assessments or procedural-like assessment methods or types.


Figure 2: Assessment types to be used in creating assessments.

These assessments are then marked with AI assistance correlating the lesson-created content with the answers provided to the question to score the user or learner. As this is all done with AI assistance and the option of editing these assessments, nowhere near the time and effort used to draw up these different types of assessments making it possible to implement more and more frequent assessments. This also provides the opportunity in a game-like fashion to implement grade-level achievements as it does not place more stress and time on developing these. Thus, the implementation of a 60% pass rate for continuing to the next phase of learning and assessment could be achieved.

Thus, the authentication of the assessed becomes the biggest challenge. For this purpose, the already standard assessment and invigilator tools could be used such as The Invigilator app, LockDown Browser, Respondus Monitor and Panopto. As an example, the assessment could be recorded by Microsoft Teams or Panopto having the detail of the shared assessment in conjunction with the person doing the assessment captured as a video or screenshot uploaded onto the LMS identifying the person doing the assessment. Assessment grades could be integrated into the grade centre or even captured yet again by the learner as evidence for confirming the learner and entering the assessment mark as shown in Figure 3.

RESULTS

With the implementation of AI-assisted marking, the time spent with assessments in large classes was reduced to acceptable margins. Even using AI-assisted assessments improved productivity and learner engagement by facilitating learning through continued self-improvement assessment practice.

In an assessment, the learners were tasked to achieve a minimum of 60% for the relevant assessment. The 1st assessment mark achieved by a relevant learner and recorded was 42%. This is indicated in Figure 3 as an overview chart and a final score percentage.

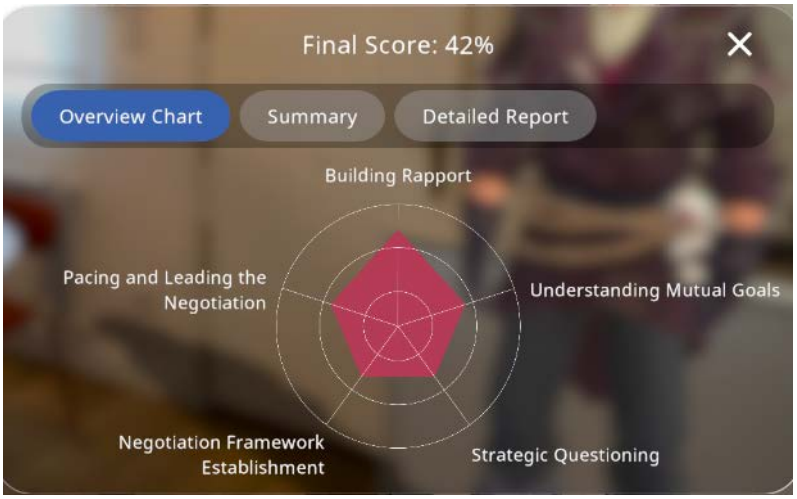


Figure 3: Overview chart indicating percentage achieved and topics of the assessment.

Figure 3 also indicates how well the topics of the assessment were answered by the learner. It is a standard practice of assessments to provide feedback regarding the assessments and a possible memo. This is achieved by the lesson detail again available to the learner after the assessment. A summary of the achievement of the assessment is provided to the learner as feedback in Figure 4 as part of the assessment.

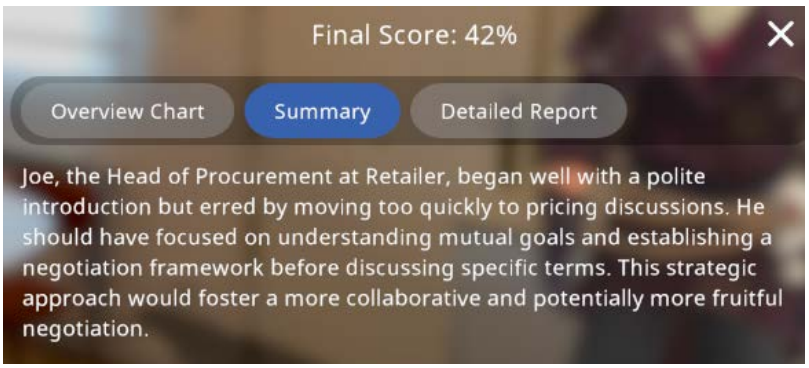


Figure 4: Summary provided by AI assessment.

It is not always possible to provide individual feedback or a detailed report in assessments for large class assessments or even in normal benchmarked classes. This is achieved by AI-assisted assessments as indicated in Figure 5.


Figure 5: Detailed report provided for the learner by AI-assisted assessment.

Such a summary or detailed report is usually only achieved when the learner has queries regarding the marks of the assessments after discussing the memo with the class. What could be achieved by the AI assessment assistance is individual feedback to the learner to enhance the learning process in facilitating a teaching experience.

The learner was given another chance/s to improve the assessment mark. This was achieved the second time, thus the pass rate was improved by setting targets to achieve in game-like level improvement practice implementation as time spent on marking was mostly eliminated.

Assessments were mainly done under invigilation in computer venues. With the possible implementation of on-line, WIL and workplace assessments, the adoption of these assessments was implemented with the same procedure and timeframe allowed. The learners were requested in some instances to record a video of this assessment shared in Microsoft Teams and/or Zoom. Panopto was also introduced as a platform with the same capability. Both Microsoft Teams and Panopto were integrated for the institution onto the Blackboard platform for this purpose. Figure 6 indicates a screen capture of such an assessment and its results as proof and authentication of a learner compared to the captured photograph on the learner's profile.

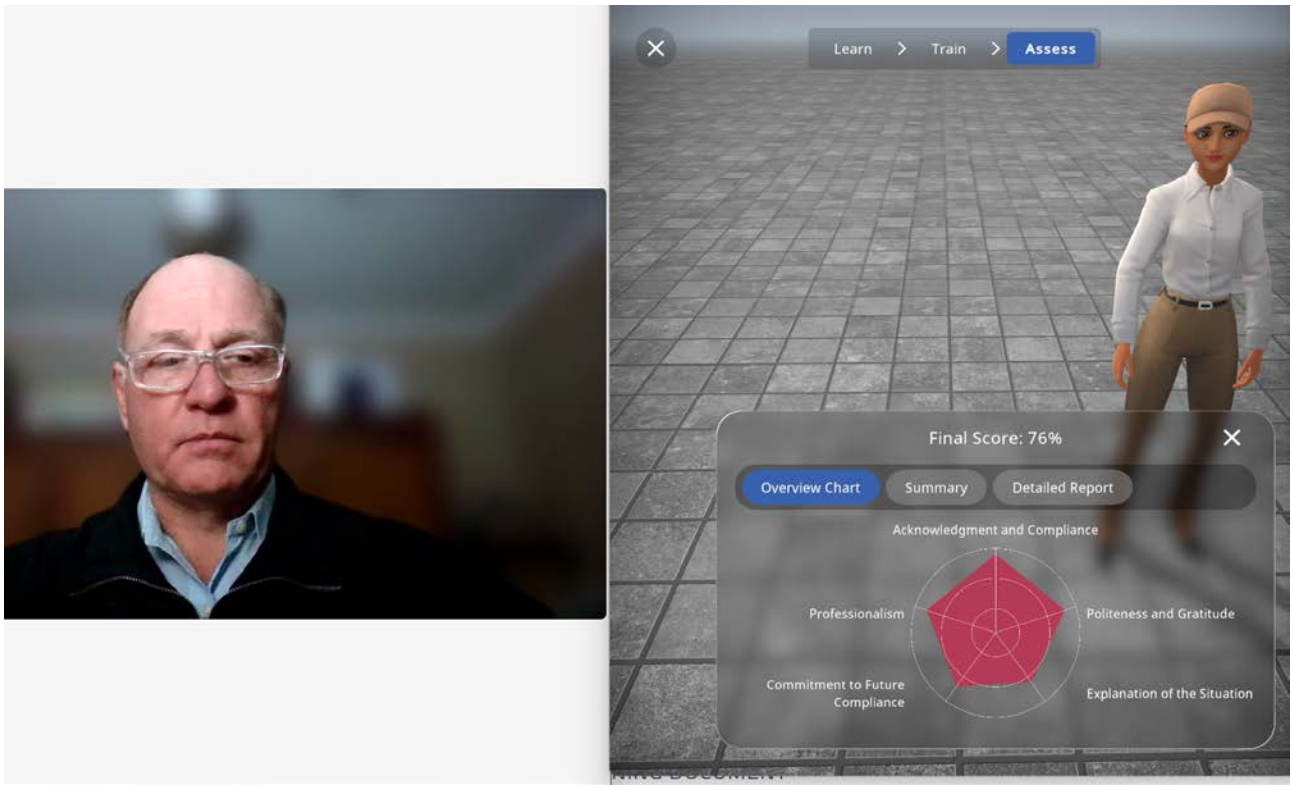


Figure 6: Screen capture of a Microsoft Teams meeting used in screen share mode.

This screen capture is uploaded to the LMS system as part of an assignment submission. This mark is then entered as the grade of the learner and the photo is compared with the learner's profile photograph. The Invigilator app could also be used utilising a mobile phone.

## CONCLUSIONS

Implementing AI-assisted assessments provided automated results not just in normal typed assessments but also in soft-skill assessment capabilities as a result of AI drawn-up assessments. An overview chart and assessment mark were provided with a summary and detailed report which assisted largely in the learning process and clear concise feedback which is not always possible individually. Pass rates were improved as it was a time-safe application using AI-assisted assessments to provide more chances within a particular assessment indicating achievements in the relevant categories.

Having multiple chances of completing assessments by the learner did not increase the workload of marking these by the facilitator but implemented a time-saving solution. Having implemented AI assistance in drawing up and marking the assessments created an ease of implementation process.

Correlating the photograph captured with that of the profile photograph in the assessment and uploading thereof could be streamlined and also authenticated utilising AI as part of the process of the application to eliminate the lecturer to be involved in this process and to save time as part of such assessment.

Although the learner is allowed to do the assessment; under invigilation, using an invigilation app, on-line in some cases or any other mode for that matter, it seems similar to an open book assessment but still differs. However, such practice implementation could be implemented in the type of assessment and type of questions to be assessed. It is different though as it could test graduate attributes, soft skills, practical and normal questions and answered questions as a known implementation method.

Calculation-based questions have other implementation methods that worked better and the LMS also provide ample solutions. Implementing such a practical class assessment provided the option of providing the learner's different values for instance reading from the measuring equipment and having the learners provide different results as answers eliminating copying from one another.

This article proved that AI could be used in providing a lesson or lesson plan but implementing it in providing an assessment and marking such assessment proved to be the most productive. Providing a minimum result to the learners had an automatic increase in pass rate for such assessments, thus, improving throughput and content knowledge gained by the learner by improving engagement from the learner using assessments.

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BIOGRAPHY

Ben Kotze holds a Master's and a doctoral degree in electrical engineering. He is professionally registered with the Engineering Council of South Africa (ECSA) and several associations of which the oldest is South African Institute of Electrical Engineers (SAIEE est. 1904) where he is a Fellow. With seven years of industry experience and over thirty-three years of tertiary education experience in electrical engineering during which he lectured more than 23 subjects, he is still actively involved with industry and work-integrated learning (WIL). He is currently researching vision, several different AGVs, renewable energy systems, simulation and control, augmented reality systems, IoT security, smart farming and prediction methods. Several undergraduate, Master's and doctoral students passed through his mentorship. He attended several international and national conferences in engineering and education, and has published in accredited journals on these topics. He is currently the Assistant Dean of Teaching and Learning in the Faculty of Engineering, Built Environment and Information Technology at the Central University of Technology, Free State, South Africa. Dr Kotze is also actively involved in the Centre for Sustainable Smart Cities.