Special Needs Classroom Assessment Using a Sign Language Communicator (CASC) Based on Artificial Intelligence (AI) Techniques

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ABSTRACT

This research focuses on deaf students in the United Arab Emirates. The proposed classroom assessment using sign language communicator (CASC) for special needs students (SN) in the United Arab Emirates is based on artificial intelligence (AI) tools. This research provides essential services for teaching evaluations, learning outcome assessments, and the development of learning environments. CASC model is composed of two models. The first model converts the speech to a sign language, which contains a speech recognizer, sign language recognizer. The second model converts the sign language to written text. This model generates a report for students' understanding and class evaluation in advance before ending the course based on the sign language recognition and image processing tools. This model will have a significantly positive impact on SN students' success and on effective lecturing and optimizing teaching and learning in the classroom. The accuracy of the model is 92%. The analysis of the student's feedback in real-time provides effective instructional strategies.

KEYWORDS

Artificial Intelligence, Classroom Assessment, Deaf Students, Image Processing, Speech Recognition

INTRODUCTION

One of the difficulties experienced by Deaf learners is the lack of understanding of Sign language to interact with the teacher in the classroom directly without helping a sign language translator as well as their need to use the supporting tools in the teaching and learning process more efficiently. Assessment is the most significant determinant of student learning, and it should be specific and measurable, it measures the student's knowledge and skills in their learning area. Assessment plays an important role in learning by encouraging the students to ask questions about anything they have not understood. The students are involved in indirect assessments such as course assessment surveys to increase their self-awareness and engagement.

This paper presents the designing and implementation of Classroom Assessment using United Arab Emirates Sign Language Communicator (CASC) based on Artificial Intelligence (AI) tools to

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enable Special Needs Students (SN) to overcome the language barrier for the discussion-based learning in classrooms that are focused on giving SN skills to apply their knowledge to real-life problems will make the classes more effective and engaging and help achieve desired outcomes.

CASC model generates a report for students' understanding and class assessment before ending the course. The generated report is used to customize the courses, teaching methods, and activities to suit SN learners' needs. This model also predicts SN learners' learning outcomes based on their responses and guides them in an effective learning environment. CASC model uses oral surveys to monitor the face and body gestures of Deaf students to reduce the failure rate and identify students at risk. The CASC model is shown in Figure.1.

CASC model supports the teaching development and specifies how can we reduce the failure rate of SN students, how can we identify SN students at risk and help teachers choose a strategy to support and motivate them, and how to overcome the language barrier between Deaf students and teachers.

LITERATURE REVIEW

Recently a lot of Classroom Assessment Techniques were suggested to give the teachers and students useful feedback on the teaching and learning (Classroom Assessment Techniques (CATs), 2021) (Diane M. Enerson, 2020). These techniques are considered as one of the parameters to develop the learning and teaching methods, where the following are also involved in the development plan: Class

Figure 1. Teacher and SN student communication