

ANALYTICS IN MATHEMATICAL PROBLEM SOLVING



BACKGROUND

Mathematics is, for many students, the hardest subject they have ever encountered.



Learning mathematics is similar to building a tower. Each stone has to be securely placed for the tower to be unswerving.



Competence-based learning is a continuous and close monitoring of students' study and problem-solving activities to ensure that they learn positively and effectively.



Competence can only be assessed when students are evaluated.



It is important to address every wrong pathway, at real time, before they significantly affect the



competence and confidence of the student.

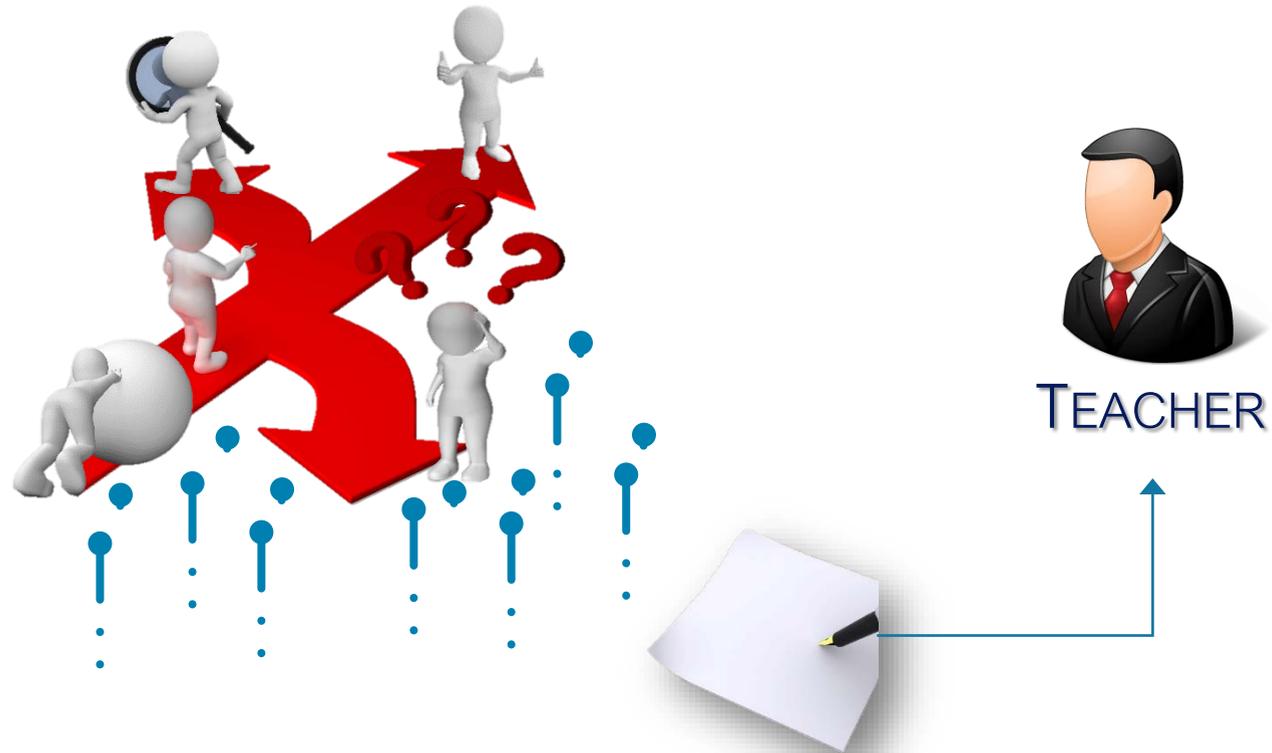
PROBLEM

Unfortunately, in today's classroom, it is impossible to give this individual attention to every student. Moreover, even with all the technological advancements, majority of the students in today's classes still do their math exercises on paper, thus leaving few information to assess.

Students are therefore left alone in their learning process and this lack of 'close' support is the likely reason many capable students lose interest in mathematics.



CHALLENGES FOR TEACHERS



The current approaches to classroom mathematics education do not provide the teacher with critical information that is needed to understand the learning and problem-solving process of a student.

CHALLENGES FOR STUDENTS



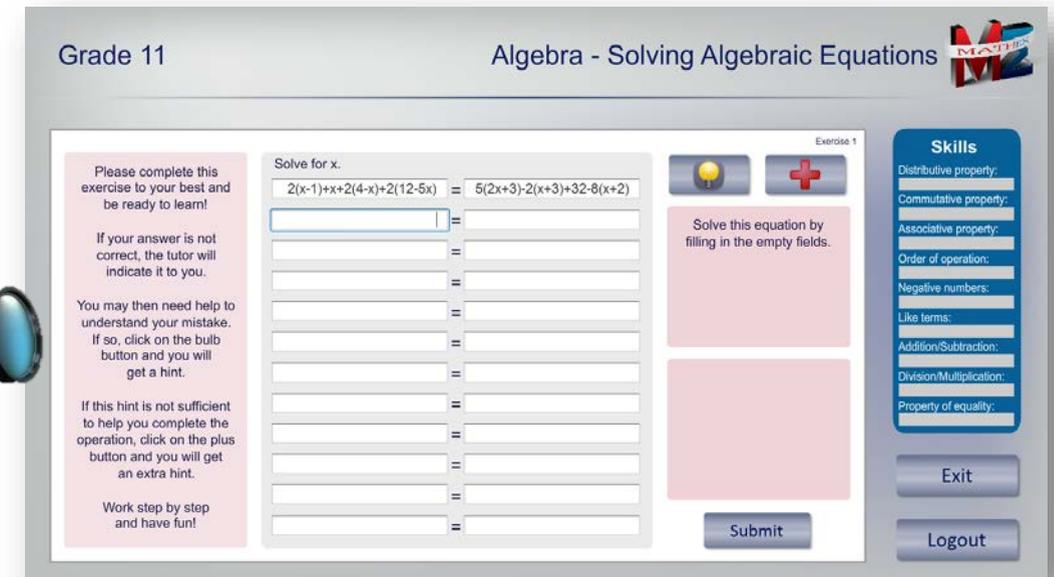
The biggest challenge for students is to go through the learning process with few feedbacks from their teachers and with few outlets to communicate the tiny details that make them perplex and alter the validity of their answers.

MATHEX SOLUTION – CAPTURING DATA FROM STUDENTS

MATHeX is a learning analytics tool that aims to capture as much data about the students' work as possible to better understand their study processes and the learning outcomes.

MATHeX is a companion software that is always there whenever students study mathematics and solve problems, 'observing' and 'listening' to their challenges.

Tracking such data will allow an in-depth analysis of competence levels in underlying mathematical concepts as well as a wider view of their study behavior.



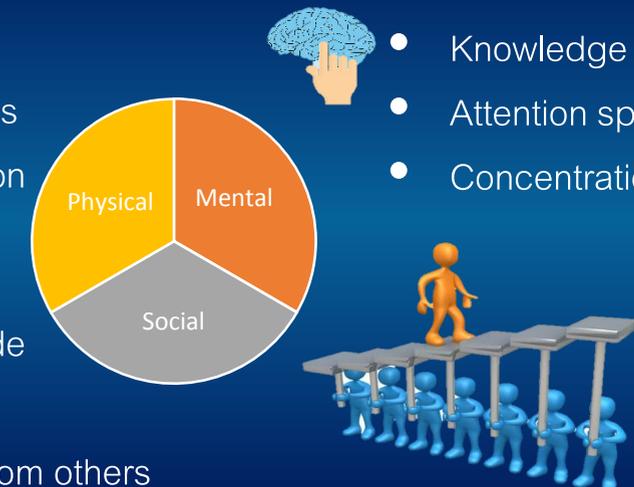
COMPUTER-BASED DATA CAPTURE

- Write-erase factor
- Mouse click for hints
- Timestamps
- Duration
- Time of absence



TRACKING STUDENT'S BEHAVIOR

- Body language
- Signs of tiredness
- Signs of confusion
- Signs of stress
- Knowledge
- Attention span
- Concentration skills
- Good learning attitude
- Desire to help
- Interest in learning from others



MATHEX SOLUTION – PROVIDING FEEDBACK TO STUDENTS

MATHeX is a companion software that is always there whenever the students study mathematics and solve problems, guiding them even in individual steps, giving them instructions, providing encouragement, displaying their progress, and much more.



Data can be valuable if they are visually accessible and meaningful.



The data captured are then analyzed, transformed, and displayed in an interactive dashboard for the consumption of students, teachers, parents, and school administrators.

The dashboard will also enable teachers to communicate with students at real-time to offer feedback on specific competences and struggles experienced by students.

CONTRIBUTION OF MATHeX

MATHeX helps teachers understand the problem-solving process undertaken by the students, and know where the students struggled, and what are their competence, confidence and metacognitive abilities. MATHeX is a tool intended to 'listen' to the students' mind during problem-solving processes.

MATHeX prevents the students to feel alone and overwhelmed being always beside them, providing them with precise feedback about what they master and what they don't. MATHeX prevents discouragement and allows constant monitoring.

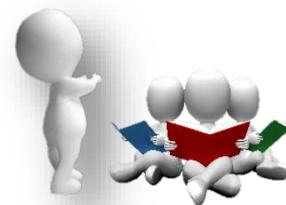
This research will contribute to discover a better approach in learning math and prevent failure or discouragement among students.



STANDARD



MATHeX



GLOBAL APPROACH



INDIVIDUAL "VIRTUAL" APPROACH

Which learning approach is most efficient?

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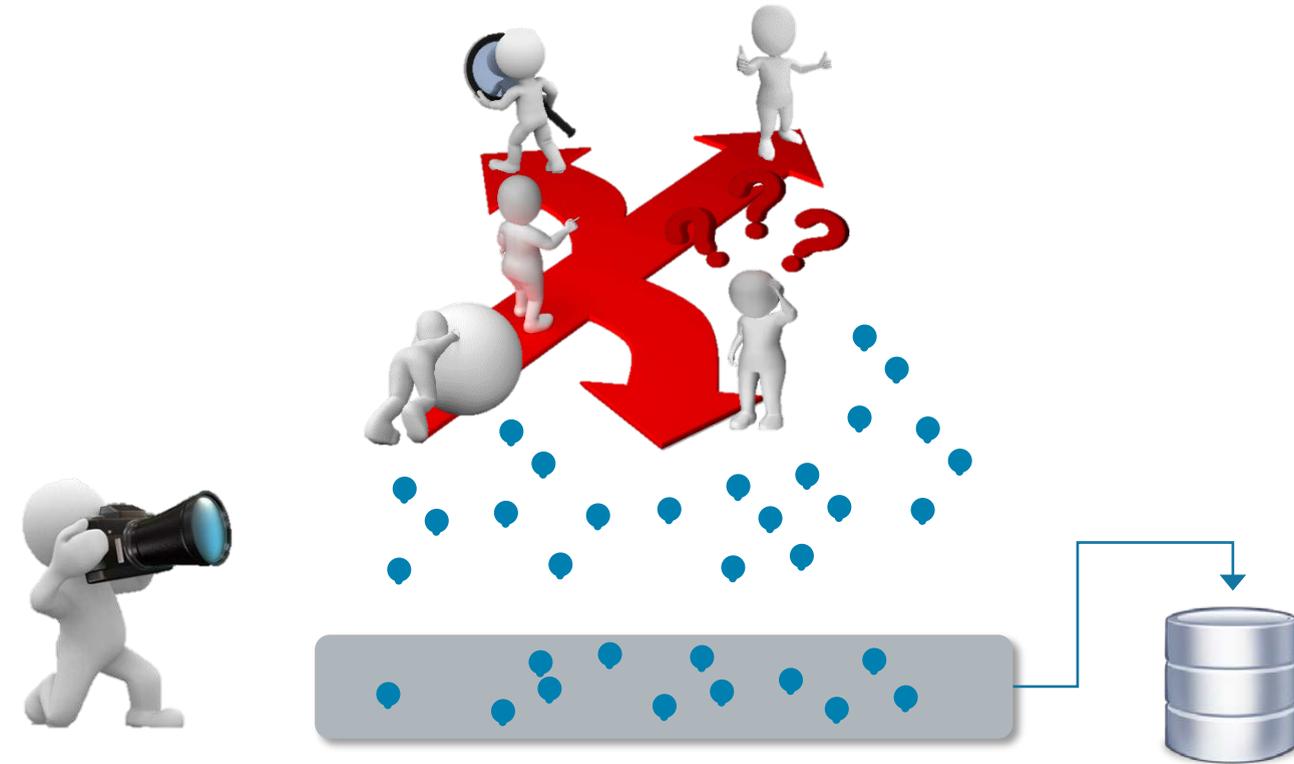


GOAL AND CONCLUSION



Building strong math skills needs tutor involvement, passion, care, time, and devotion.

The purpose of this study is to know if learning analytics would enhance the math experiences of the student and to discover the role of learning analytics in mathematics education.



MATHeX wants to bring solutions by being a learning analytics tool that accompanies the teacher and the student, captures the student's overall activities, identifies weaknesses through analysis, guides the student and provides instruction, gives feedback, and displays visually all needed information in a dashboard.