Design of a Mental Calculation App for Paramedic Students

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Initial Situation

https://pixabay.com/en/car-auto-convertible-classic-292852/

Overview

Problem – Paramedic students and maths

- Nature of the problem and needs analysis

Part of the solution – Mathematics App

- Game play
- Targeting learning
- Feedback

Collaboration

- John Latham, Andy Bell (Paramedicine Lecturers)
- Brendan Hall (Academic Skills Advisor)

Problem Definition

How do we empower students to calculate drug doses correctly and with confidence?

Traditional approach: Lecture content

- Essential - but only addresses part of the problem

Other parts of the problem

- Do students have sufficient foundational skills in maths?
- Do students prioritise maintaining these skills?

University Expectations

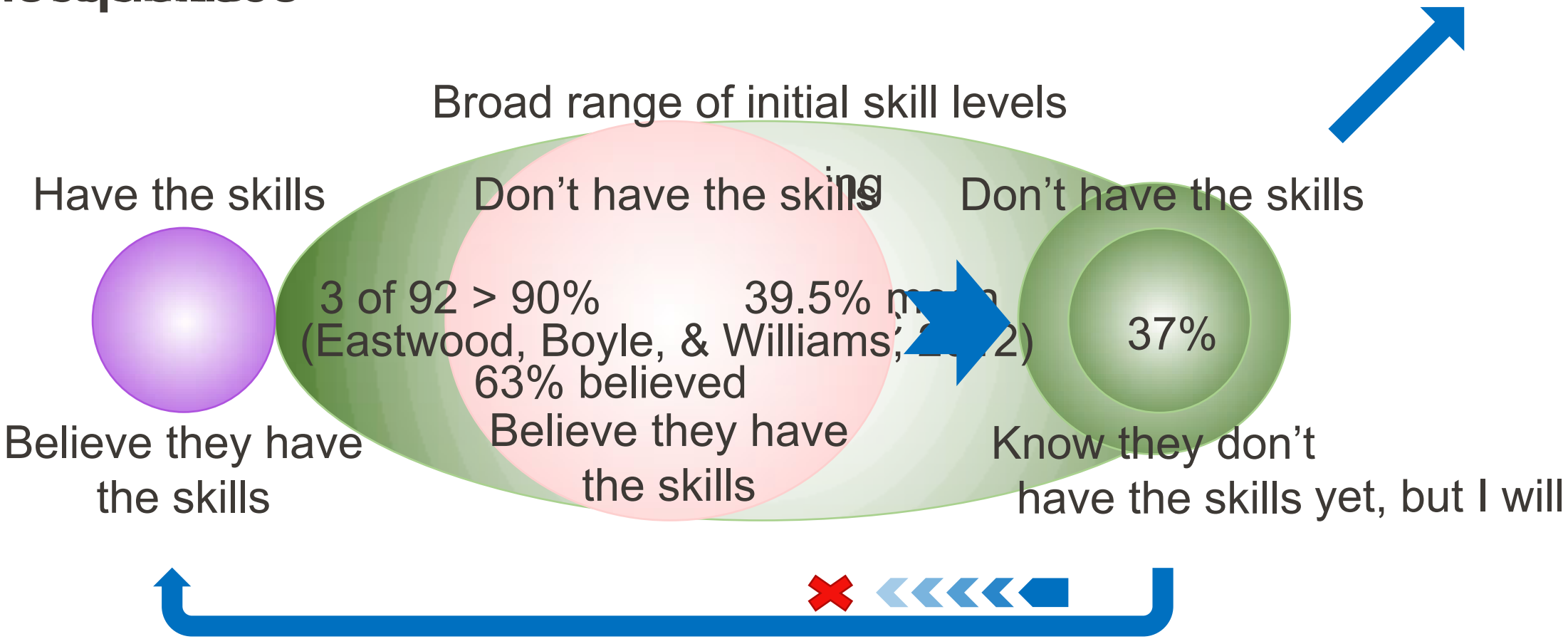
Table 1. Mathematical requirements prior to entering a Paramedicine courses* in Australia.

Courses with specified prerequisites	Number of courses
Mathematics is a prerequisite	2
Mathematics is an indicator of ability**	2
Mathematics not a prerequisite	12
Total	**16**

* The information for this table was obtained from state university entry bodies, including Victorian Tertiary Admissions Centre (VTAC, 2017), Queensland Tertiary Admissions Centre (QTAC, 2017), University Admissions Centre (UAC, 2017), Tertiary Institutions Service Centre (TISC, 2017), and university websites (Flinders University, 2017).

** Prerequisites for these courses have a list of 3 to 6 year-12 subjects and require the students to have completed two from the list. The list includes mathematics, but students can meet these requirements without completing the mathematics subjects.

Cohen's Skills



Do you believe that you have any issues or difficulties with the maths calculations?

ACU
AUSTRALIAN CATHOLIC UNIVERSITY

How do we close the skill gap *without* undermining the students' self-belief?

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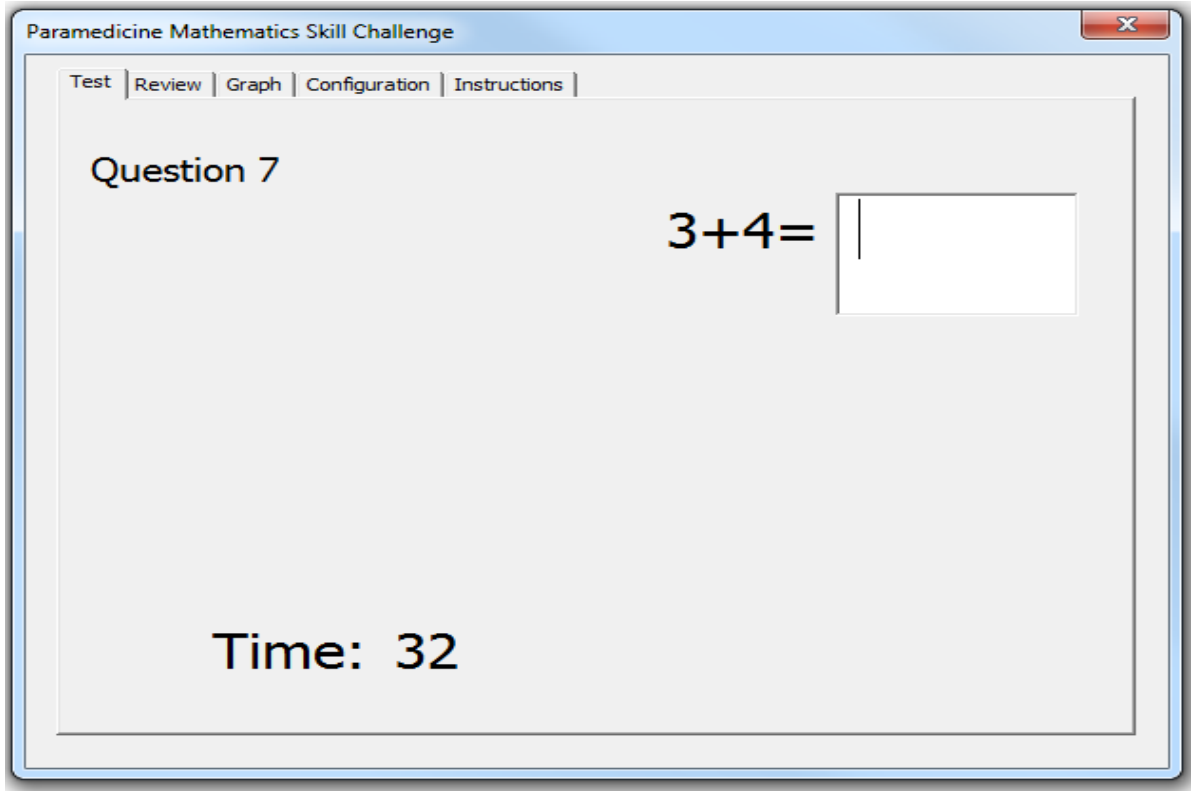
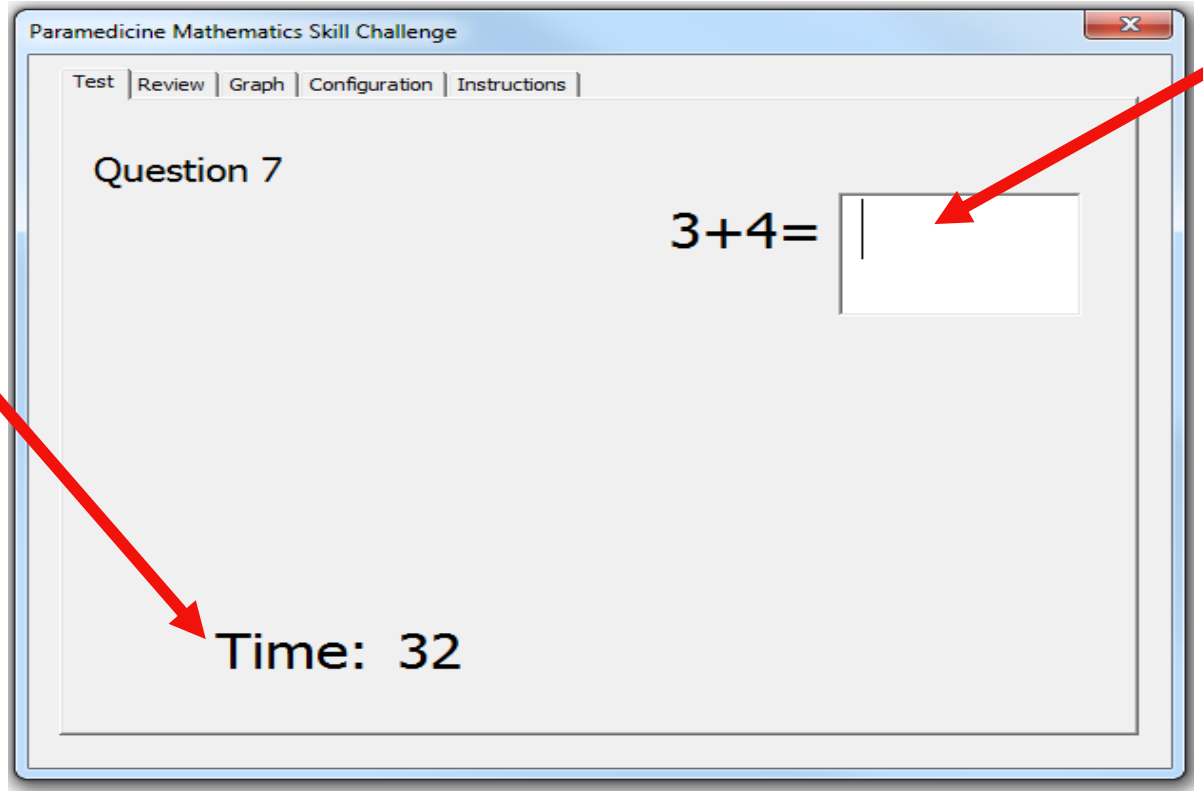


Features

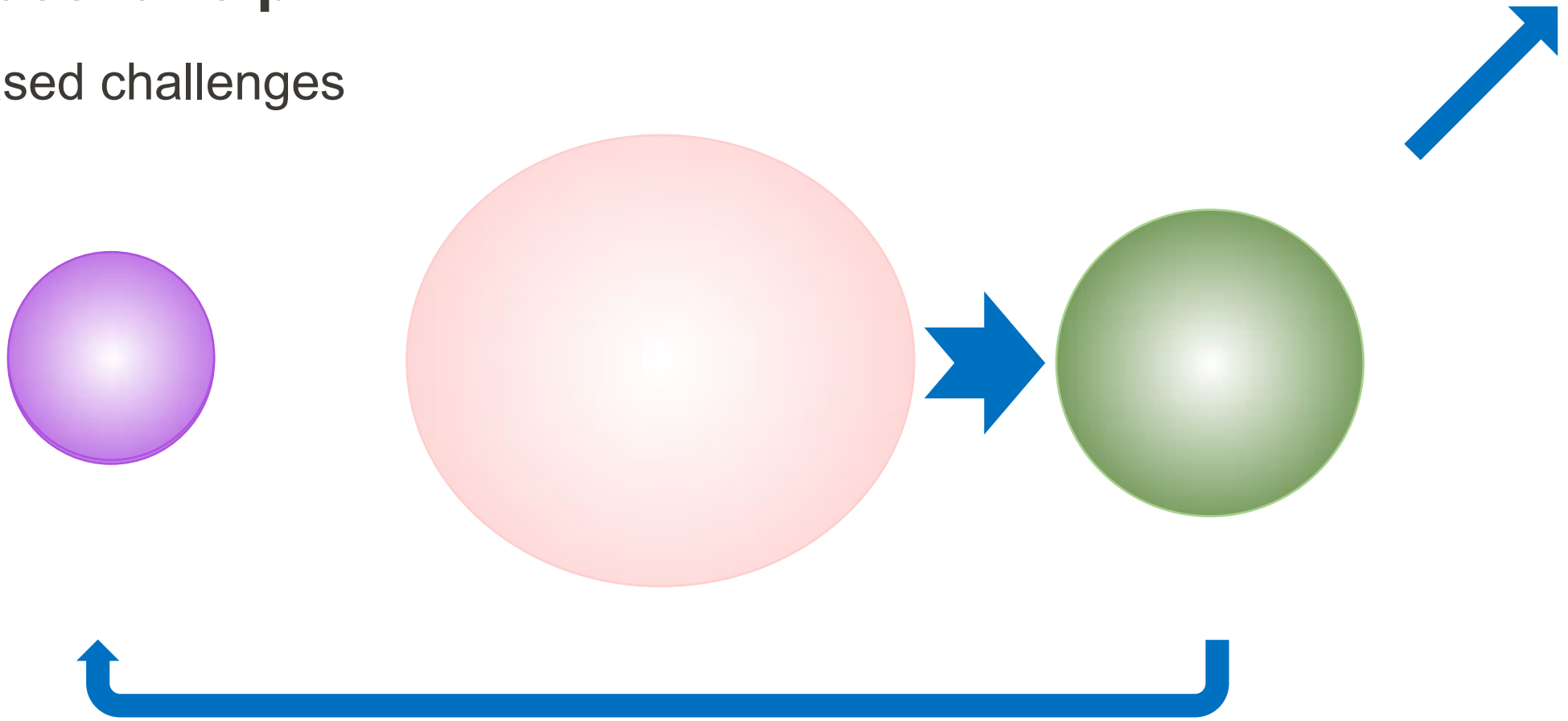
Answer as many problems as possible within 60 seconds

Time-based challenge



How does it help?

Time based challenges



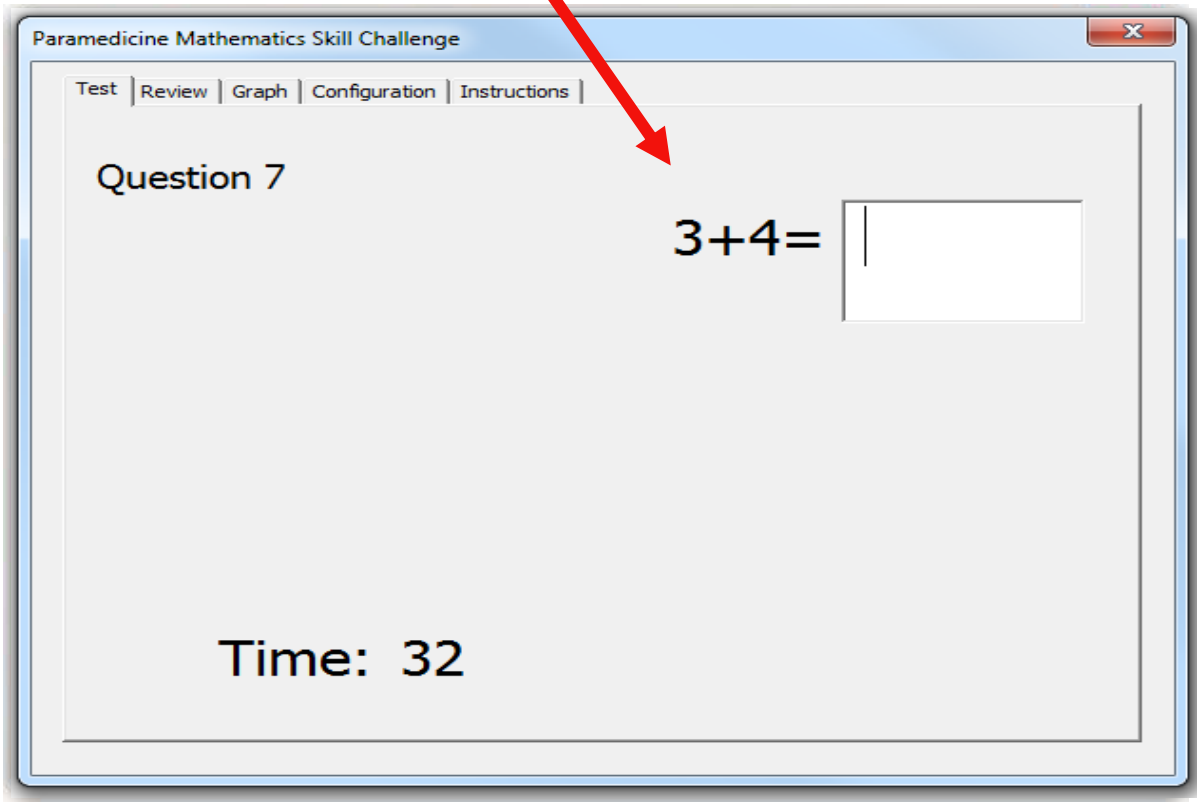
How does it help?

Time based challenges

Challenges = Practice Levels

Level	Explanation
1	Adding first 5 numbers together
2	Adding all digits together
3	Subtractions up to 5
4	Subtractions any single digit
5	Mixture of add and subtract up to 5
6	Mixture of add and subtract any digit
7	Adding 2 digit numbers with a single digit

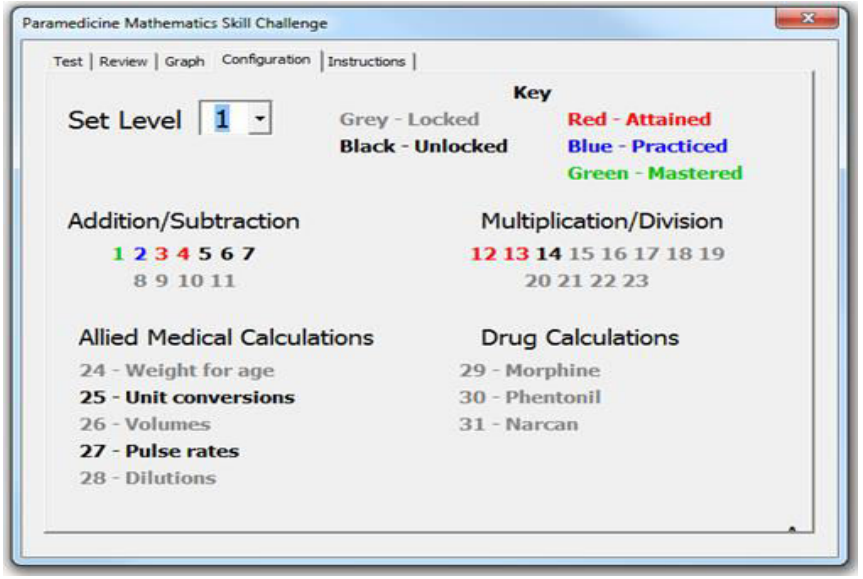
Randomised values = infinite repeatability



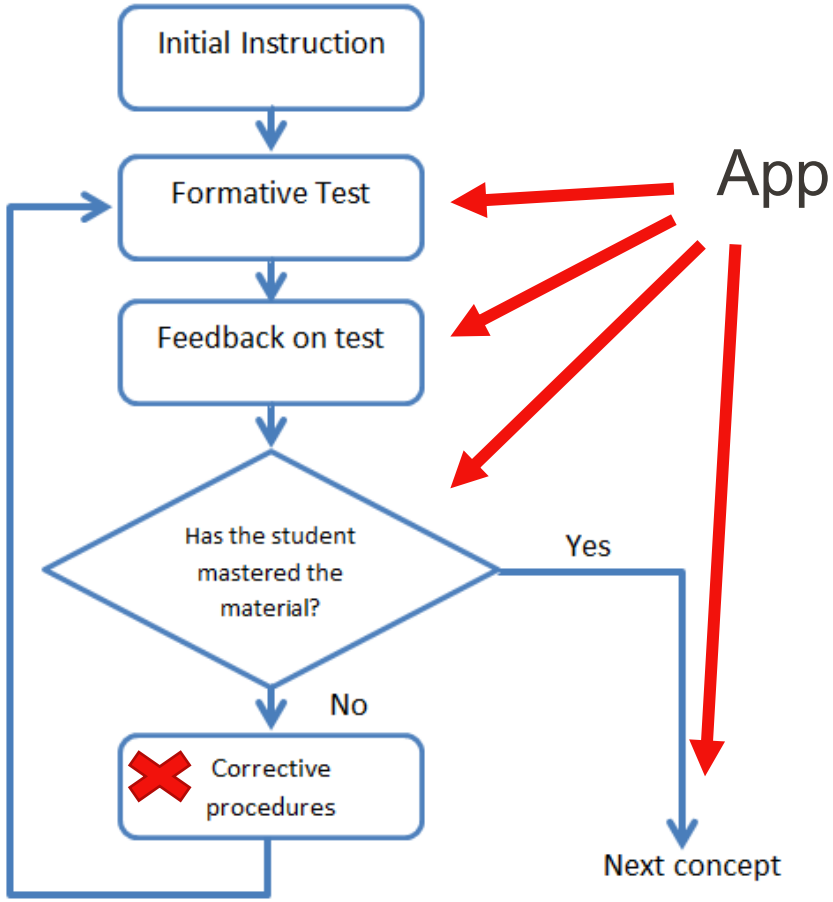
How does it help?

Time based challenges

Challenges = Practice Levels



Bloom's Mastery Learning



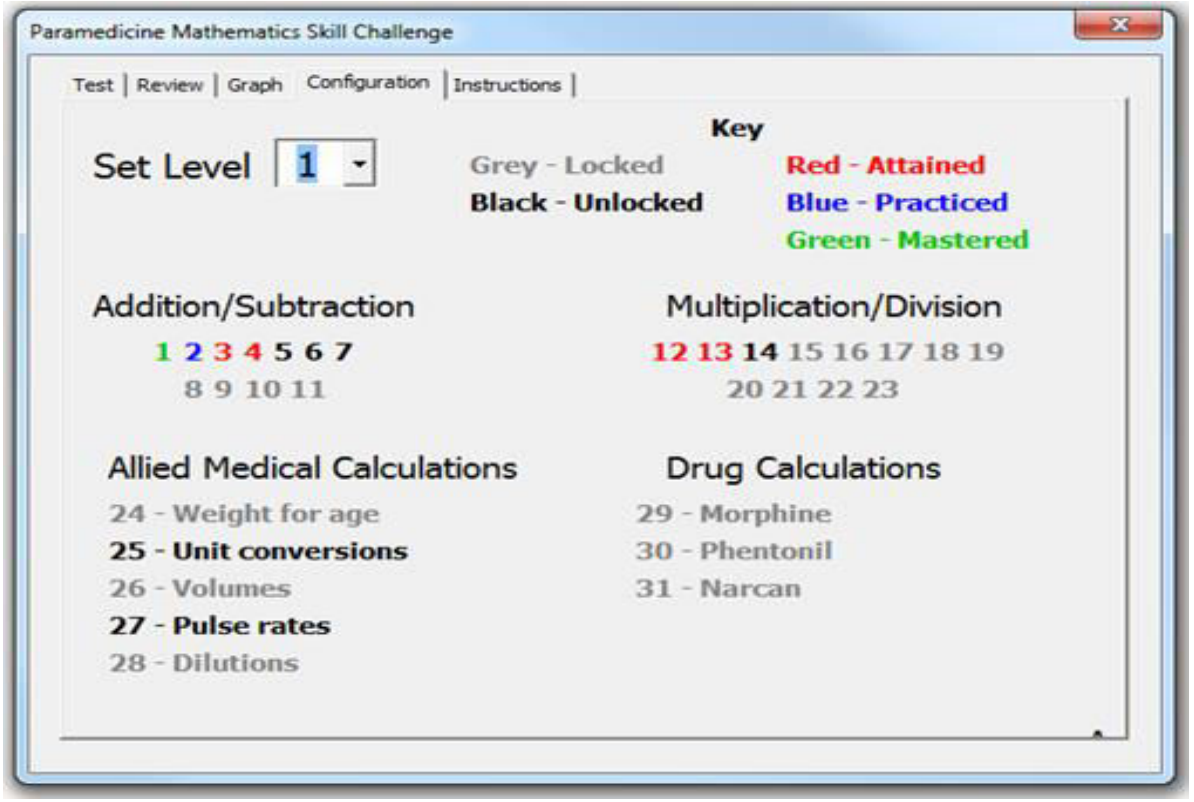
How does it help?

Time based challenges

Challenges = Practice Levels

Contextualised skills

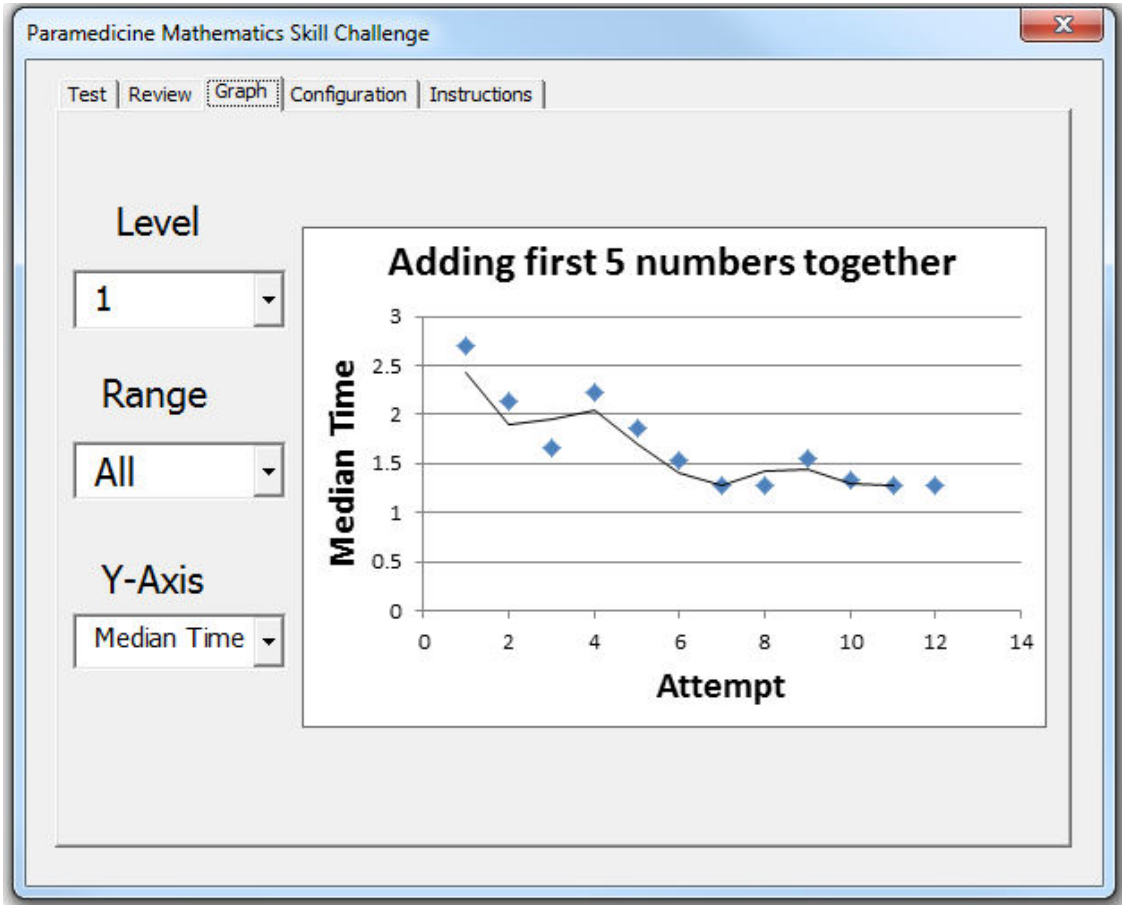
- Allied Medical Calculations
- Drug calculations



Feedback

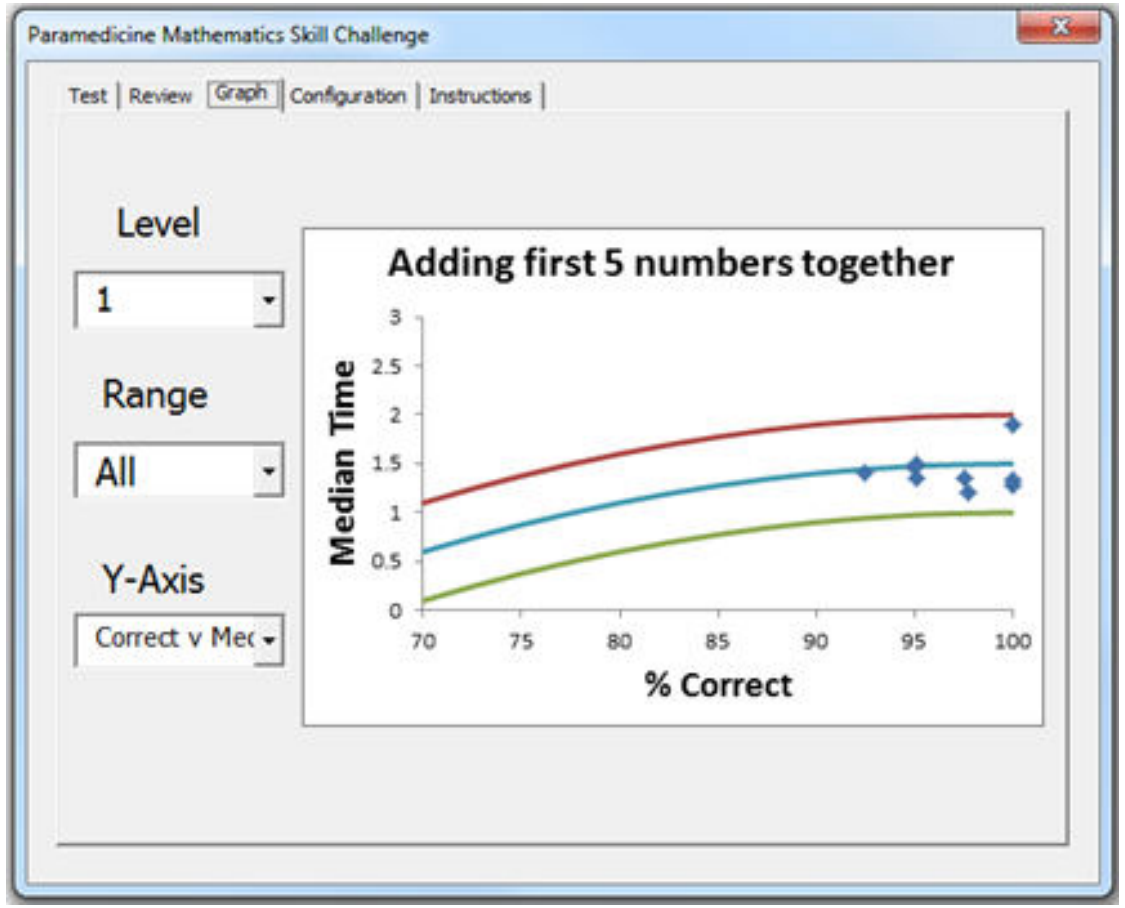
Fast feedback

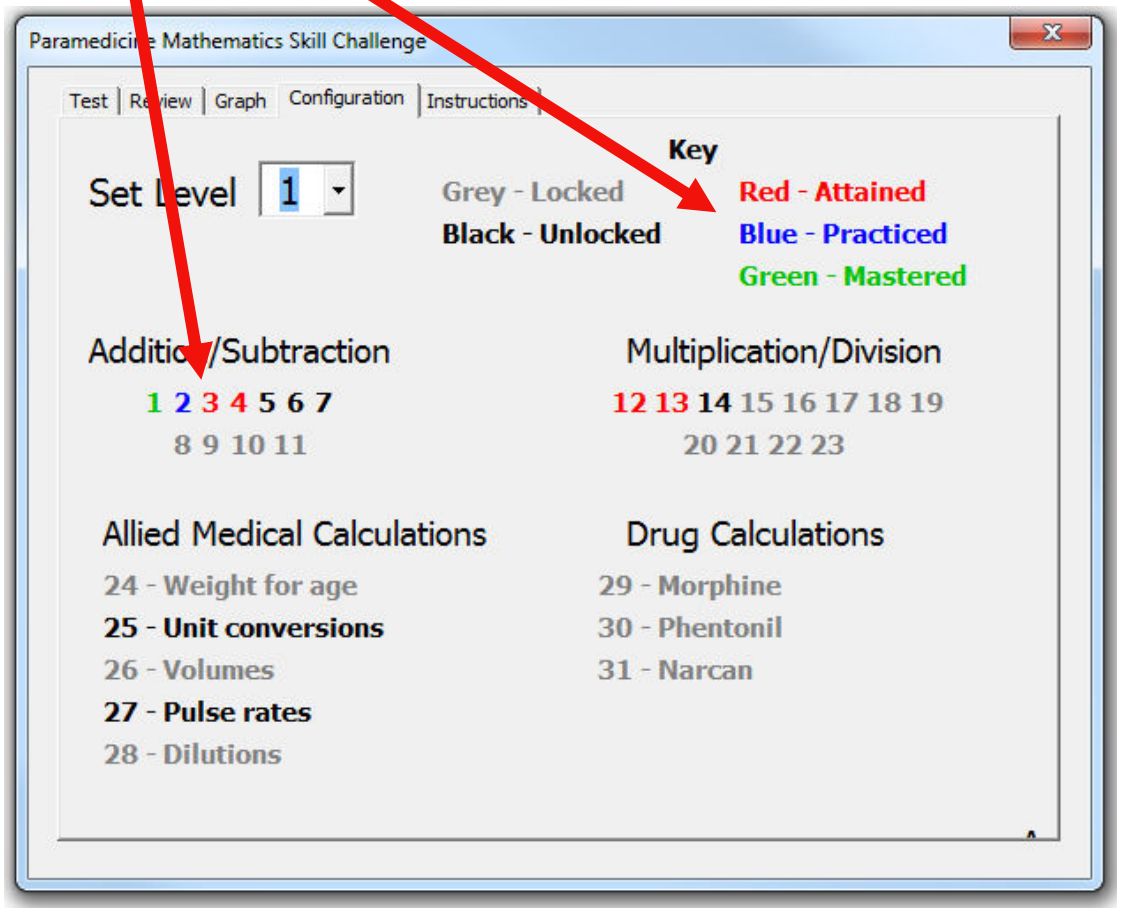
Long term feedback



Extrinsic Motivation

Colours show attainment

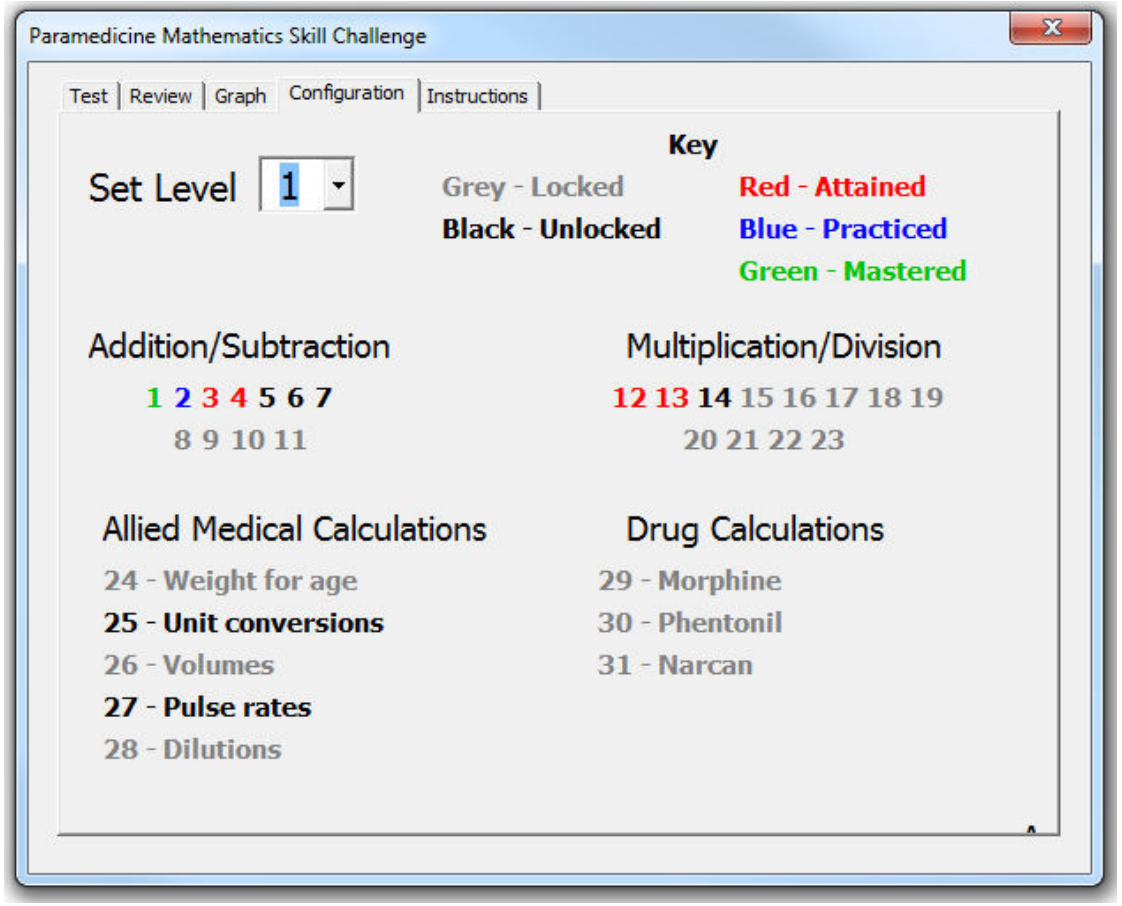




Summary

App helps because:

- Equalises cohort, targets speed
- Repeatable practice
- Provides feedback
- Provides motivation
- Contextualised problems



Questions

References

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