Development of an educational card-game to aid student understanding of instrumental chemical analysis

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1. Aim

A card-game "Laboratory Manager" has been designed, suitable for students at the secondary-tertiary education transition. The game focus is to understand how to apply instrumental analytical techniques to solve various scenario problems presented.

2. Introduction and project context

Game-play in education forms an engaging informal environment in which students can feel comfortable and less fearful of making mistakes[2].

NTU undergraduate students have designed and developed an educational game resource to enhance learning of analytical chemistry and the instrumentation used in this field.

This topic challenges students new to university who typically have a theoretical, rather than applied, understanding: they know how the instruments work in principle without appreciating which instruments are best used for a given task.

3. Laboratory Manager: game design and how-to-play

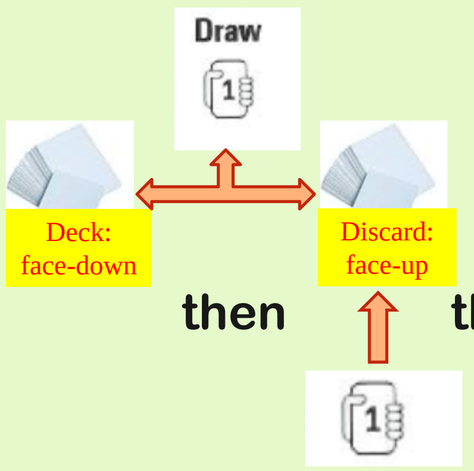
2-4 players  30 minutes (4 hands @ 4-7 min.) 

<u>Set-up for each hand</u>

Randomly choose analytical scenario: all players view.

Each player dealt <u>six</u> *Analytical Process* cards.

<u>Each player in turn, clockwise</u>



<u>Hand Scoring</u>

Points scored:

correct analytical separation (3) and detector (3) card held; for quantitative/qualitative card (2) and for staff card (1 or 4). Bonus points for Declaring early.

Play next hand with new scenario until four scenarios are played. Total aggregate points wins the game.

4. Project: next stages

The design works robustly as a game.

Scenarios require:

- editing and finalisation,
- Inclusion of an expanded range of techniques.

The educational impact of the game requires classroom evaluation.

5. Conclusions

Undergraduate students have successfully designed and developed an educational resource.

"Laboratory Manager" aims to help bridge the understanding gap between how analytical instruments work theoretically and how they are utilised.

The educational efficacy of the game needs evaluation, but play-testing shows the game works well mechanistically and is enjoyed by participants.

Reference and note

[1] Corresponding author. michael.coffey@ntu.ac.uk

[2] **Meluso, A.** ***et al*** **(2012)** Enhancing fifth graders' science content knowledge and self-efficacy through game-based learning. *Computers & Ed.* **59**, 497-507.