ASSESSMENT OF A SELF-PACED WEB-BASED PHARMACEUTICAL CALCULATION PRACTICE TOOL

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Introduction

Pharmaceutical Calculation is an integral part of Pharmacy Education, which is taught during the first academic year of most of the PharmD programs nationwide. Numerous non-traditional learning tools have been introduced including self-paced practice modules at online Learning Management Systems (LMS), Mobile Applications as well as Gamified lessons. Video hosting site-based passive learning has been popular for many years. However, we developed a custom-coded website for the students of Appalachian College of Pharmacy (ACP) which may be accessed by anyone at www.rxcal.org/practice, and possesses a unique feature of generating unlimited number of problems keeping the skeleton of the question unchanged. For students intending to practice similar problem over and over, this 'shadow method' may be applied. The website was offered to the students as an optional practice site and various characteristic of the website were assessed through survey.
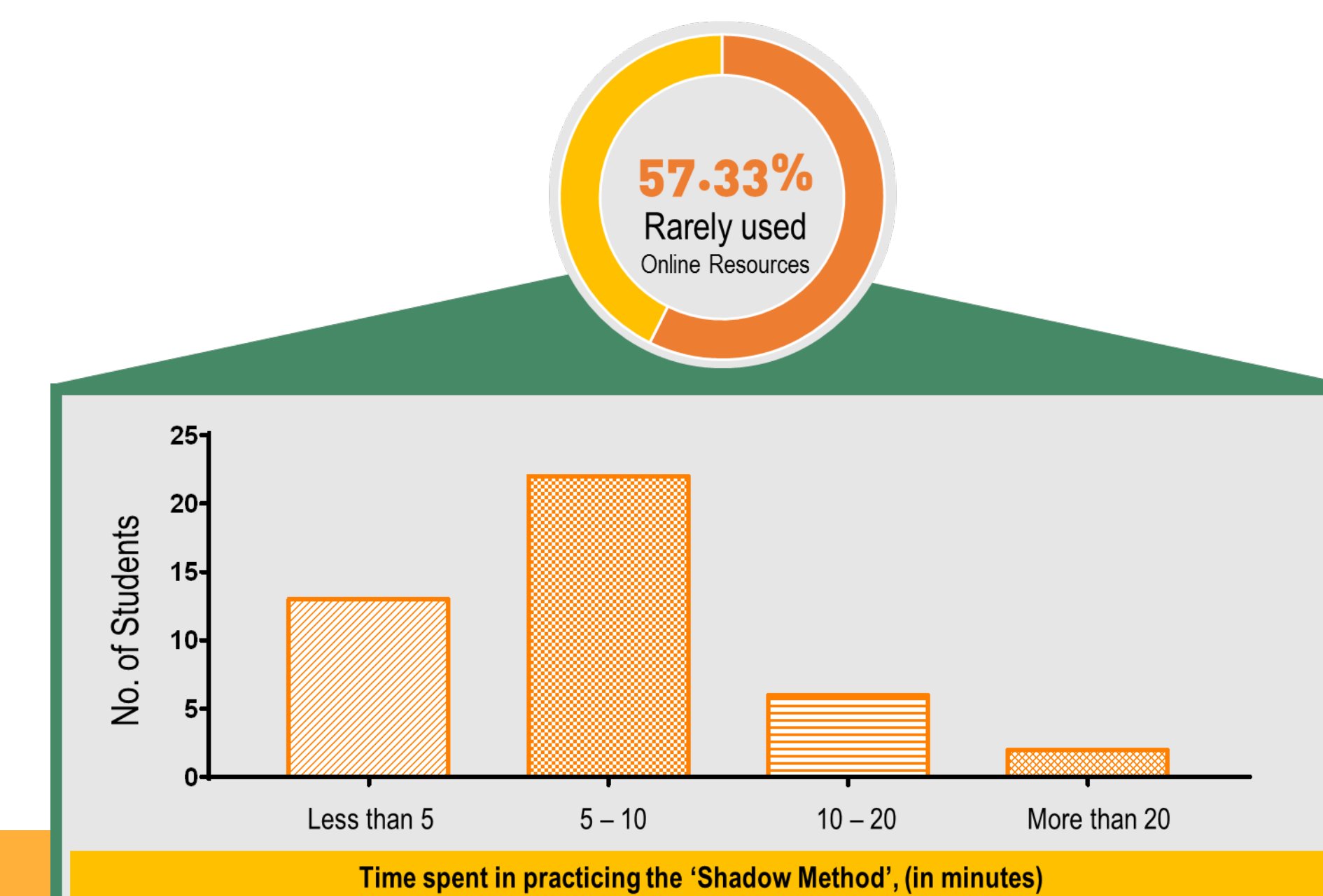
Conclusion

- About 23% of the students never used and 57% of the students rarely used online resources for the calculation preparation.
- Students who never or rarely used online resources provided higher variability to assess the website.
- The mean ranged from 95.78% to 100% with a few outliers above 100.
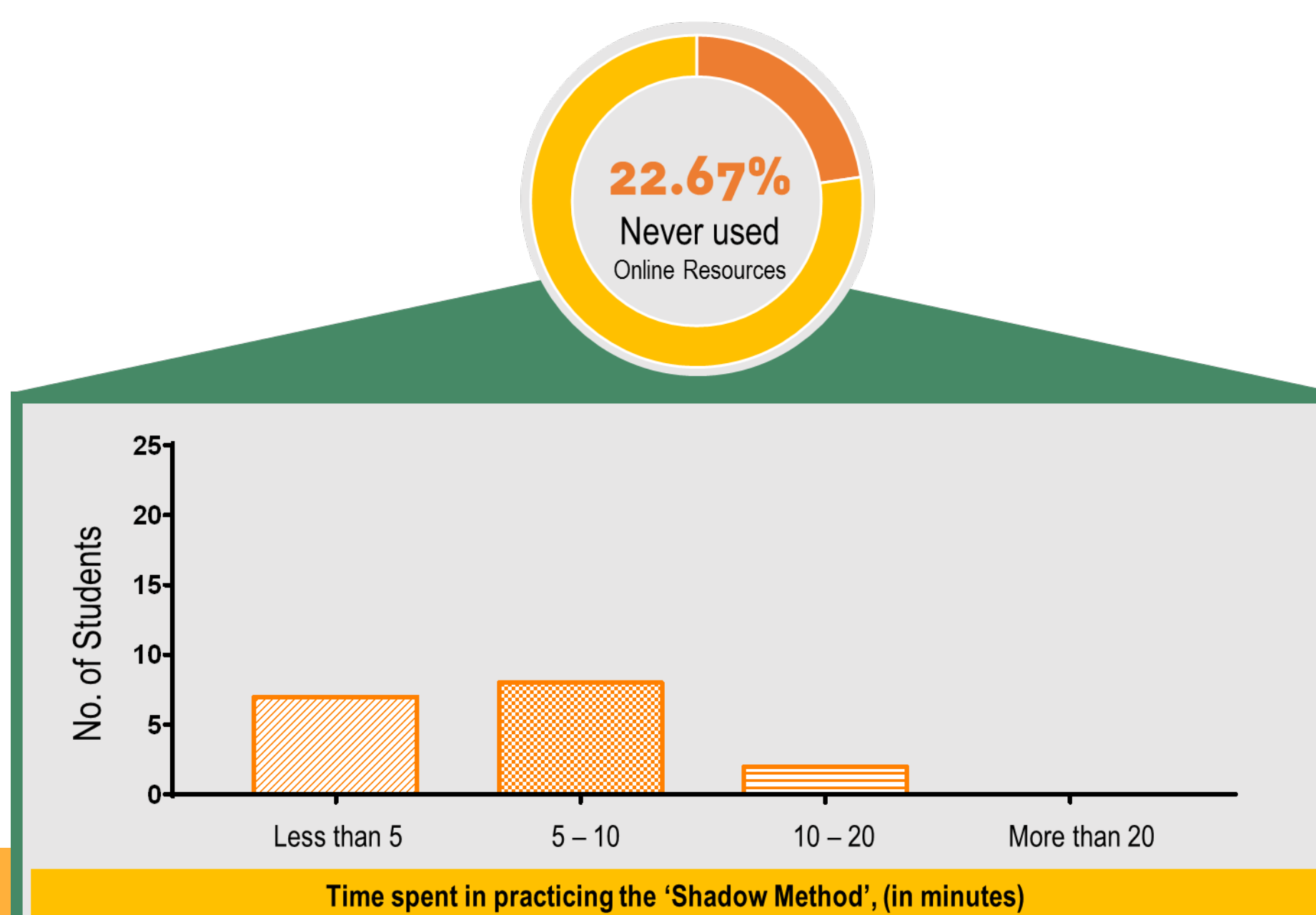
Method and Tools

The website was written in Hypertext Markup Language (HTML), dynamic Hypertext Pre-Processor (PHP) and Javascripts, using appropriate mathematical formula to generate random mathematical problems under a specific category. Since a large number of students access their learning contents from mobile devices and tablets, the website was created responsive, i.e., capable of gaining suitable dimension and font size based on the device. Appropriate care was taken to confirm that unacceptable numbers are not generated (e.g., negative weight or extremely high specific gravity). The site was pre-tested in the local server before hosting at www.rxcal.org/practice location. Students see only the question when the page first loads (fig 1, left part of the screen). The correct answer to the problem may be displayed or kept hidden upon clicking the ANSWER button. Also, the step-by-step explanation of the problem is presented upon clicking the EXPLANATION button. All numbers displayed in the question match those in the original question. A similar question with unchanged text but different numbers is presented if the page is refreshed by pressing F5.

Seventy-four P1 students of ACP were provided access to this website who practiced as per their wish during the course of Pharmaceutical Principles, where Calculation was an integral section. The students evaluated themselves in the scales of both how often they take help from online learning resources for calculation, and also how much approximate time they spent to practice shadow problems from the provided website. Also, this new learning tool was then assessed based on the (1) Graphic Representation, (2) Readability of the texts and (3) Level of explanation. The survey form received students' responses either as Multiple Choice Question or numerical entry in the scale of 0-100. The assessment parameters were grouped as per the students' category and presented in the result section. The questions have been presented below.
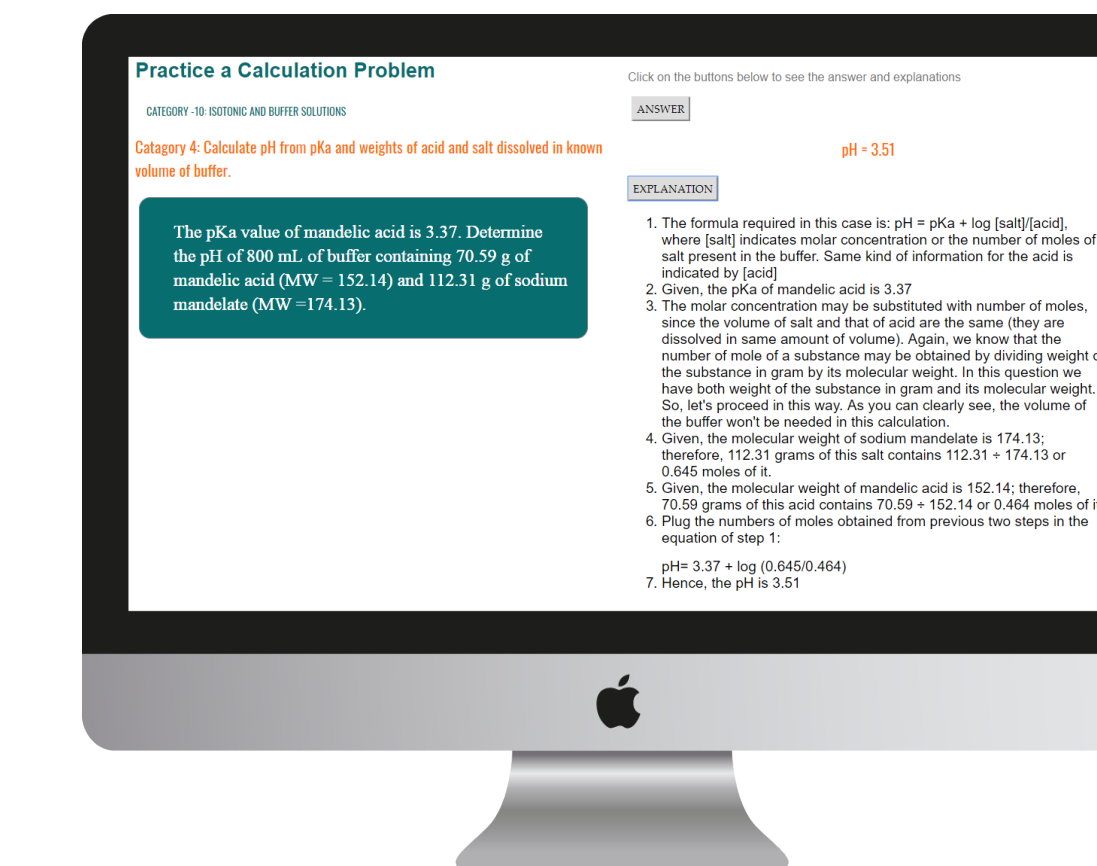

Figure 1: Interface of the Web-based self-paced auto generative Calculation practice site, rxcal.org/practice. The interface is device adaptive.

Specific Questions

Before being introduced to the RxCal.org/Practice website, how often were you using online resources for practicing pharmaceutical calculation?
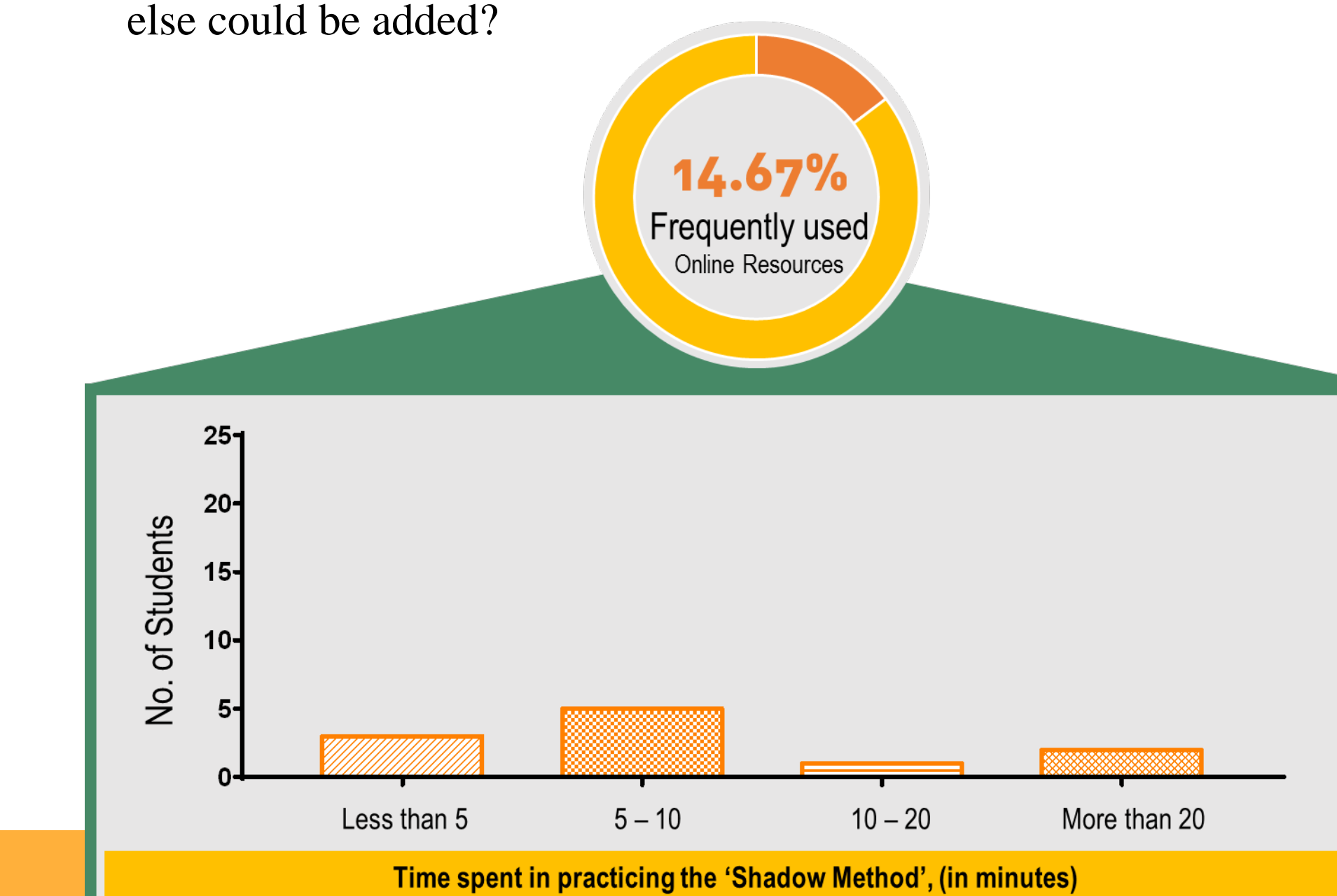   □ Never used   □ Very rarely used □ Used quite frequently □ Always used

Approximately, how many times have you used the RxCal.org practice site since you were first introduced to it?
    □ Less than 5 times   □ 5-10 times   □ 10-20 times   □ More than 20 times

Numerical entry or Essay type questions
✓ Please grade the questions 4-6 in the scale of 0 (poorest) to 100 (best).
✓ How well is the graphical presentation of the calculation problem and solutions?
✓ How well is the readability of the texts in the website?
✓ How well is the level of explanation in the website?
✓ What is your suggestion about improving this practice website? What else could be added?

Results

Figure 2: (Above) The evaluation of the learning website by various groups of students (NU, students never used; RU, Rarely used; FU, frequently used and AU, always used online resources for learning practice) according to (A) Graphical Interface, (B) Text readability and (C) Extent of explanation provided to the website.

(Bottom row) Tendency of P1 students to use the practice site based on their frequency of using online resources.

22.67% Never used Online Resources

57.33% Rarely used Online Resources

14.67% Frequently used Online Resources

4% Always used Online Resources