FAN_TESTICK KIT: TOOL TO ASSIST STUDENTS IN MEMORISING AND UNDERSTANDING CHEMICAL TESTS INVOLVING ORGANIC COMPOUNDS

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ABSTRACT

Organic chemistry is a challenging subject for students as there are many terms, symbols and processes involved in understanding the subject. A specialised learning tool is needed to facilitate learning and scaffold student understanding. Fan_TESTick kit, a colour-coded hand fan made from everyday material is one such tool. It allows students, teachers and users to make quick references on organic chemistry tests, observations and equations. A usage study which involved 22 students was conducted. Pre and post-tests and questionnaires were used to collect data. The students' average pretest score was 16% whereas after the toolkit was introduced, the posttest score increased to 87%. Results obtained from a questionnaire found that 100% of the students agree that the use of this kit brings various positive effects towards their learning and understanding on chemical tests. From the answer of the open-ended questions of 21 students, 18 gave positive feedback, 1 gave neutral, 2 no feedback at all and no negative feedback. From the pretest, posttest and questionnaire analysis, we concluded that Fan_TESTick kit is a powerful learning tool in assisting students to understand and memorize chemical tests related to organic compounds. This toolkit is user-friendly in terms of its size, lightness, compactness and portability.

Keywords: fan TESTick kit, chemical tests, learning tool

1. INTRODUCTION

Chemical tests in organic chemistry are qualitative analysis performed in the laboratory to visualize evidence of a chemical reaction. Based on lecturers' experiences and students' worksheets from previous sessions, it was found that students had difficulties to memorize various chemical tests to the extent that they are unwilling to revise on the said subtopic. This results in students' poor performances in class. In this case, teaching tools may facilitate students in mastering chemical tests. Therefore, we developed Fan_TESTick kit to help students to overcome the difficulties, focusing on memorizing and verifying the presence of organic compounds in a sample. The objectives of constructing the tool are to ensure students are able to:

1. determine the purpose of each of chemical tests
2. choose an appropriate chemical test to distinguish the class of organic compounds
3. write a correct chemical equation
4. remember the appropriate observation of a chemical test

2. METHODS

The tool kit is made of laminated A4 papers and a paper fastener. These materials are crafted into an attractive color-coded hand fan. A study was carried out on 22 students to investigate the effectiveness and suitability of the tool kit by using questionnaire, pre-tests and post-tests. The questionnaire is used to gather students' views on the usage of the tool kit, which covers the aspects of comprehensiveness, attractiveness and its user-friendliness. The questionnaire comprises of 4-point Likert scale questions and open-ended questions on students' experiences while using the tool kit.

3. FINDINGS AND ARGUMENT

The average students' score in the pre-test was 16% whereas, the average post-test score increased to 87% after the tool kit was introduced. A significant difference of 71% indicates that this tool kit is found to be helping students understand the chemical tests involved in organic chemistry. Students' lowest score in the pre-test was 4% and the highest score was 43%. In contrast, the lowest score in the post-test was 75% while the highest score was 100%. Throughout the study, we also collected students' opinions on the usage of the Fan_TESTick kit. 100% of the students agreed that this tool kit brings various positive effects towards their learning and understanding on chemical tests. Some feedback from students in short interviews are as follows:

"*Practical and easy to be carried around. The colour codes made it easier to remember the observation. The information in the QR code helps me to understand the test much better".*
"All chemical tests that I need are in the kit. The colour code for each type of chemical test makes it easier to distinguish different classes of organic compounds".

4. CONCLUSION AND SUGGESTION

Students achieved a mean score of 16% in pre-test and 87% in post-test. The growth indicates that the teaching and learning tool helps to enhance students' understanding. The standard deviation for pre-test is 10.54 while for post-test is 8.94. The increase in value shows that the learning gap, which exists between the students has been successfully reduced. The features of the tool kit attract students to utilize it while reviewing their lessons. It is convenient in terms of size, lightness, compactness and portability, and the color codes are an added value to the tool kit. High scores on all items in the questionnaire proved the ability of this tool kit in assisting students throughout the process of learning organic chemistry particularly on chemical tests. In future, the kit should be tested to the first and second year students of chemistry courses at universities.

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