THE USE OF INQUIRY METHODS IN THE STUDY OF INTERMOLECULAR FORCES EFFECTS BETWEEN LIQUID MOLECULES VIA VPBP KIT

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ABSTRACT

Learning the effect of intermolecular forces on vapour pressure and boiling point of liquids among students in Matriculation Programme. The difficulties to understand the abstract concepts is related to the students' ability to visualize the phenomena. Therefore, it is important to address those problems and challenges with the right approach. The purpose of this study is to improve the students' understanding of the concepts through discovery inquiry method by utilizing the VPBP kit as a learning tool. The research use the 5E discovery inquiry approach which involving five phases, namely: engage, explore, explain, elaborate and evaluate. There were 38 science stream students from two different Matriculation College were selected as respondents. Group A from Kolej Matrikulasi Selangor and Group B from Kolej Matrikulasi Negeri Sembilan. Students were taught the relationship of intermolecular forces with vapour pressure and boiling point of a liquid during tutorial session. After the lesson, students were required to construct the concepts of vapour pressure and boiling point of liquids and gaseous state by using the VPBP kit with reference to different strength of intermolecular forces. Quantitative data were collected through pre-test and post-test and were analyzed by percentage. The analysis of results showed that there was a significant difference in students' performance with percentage increase up to 81.1% for group A and 57.8% for group B. Based on these findings, using discovery inquiry method enhancing students' understanding to describe the intermolecular forces on vapour pressure and boiling point.

Keywords: discovery inquiry method, understanding, abstract concept, intermolecular forces

1. INTRODUCTION

From teaching and learning session, we found that students were less interested in this topic because it was too abstract and boring. Students' interest in this topic will decline if the teaching approach does not emphasize microscopic concepts. This is because learning an abstract concepts requires learner to visualise the concepts, which usually inhibits their understanding of the microscopic world. Therefore, this study focused on hands-on activities that allowed students to construct, so they can imagine microscopic process of science. Five phases of the approach involved are engage, explore, explain, elaborate and evaluate. By using this method, students can build their own knowledge and understanding through manipulation and application based on available knowledge. The sample taken of 38 science stream students from two different Matriculation College.

2. OBJECTIVE

The main objective of this study is to improve students' understanding of the effect of the intermolecular forces on vapour pressure and boiling point through discovery inquiry method by using the VPBP kit as a learning tool.

3. MATERIAL AND METHOD

3.1. Materials of Innovation Tool

The VPBP Kit is a model used by students to outline the concepts of how the intermolecular forces of a liquid molecules affect the vapour pressure and boiling point. This model consists of magnetic ping pong balls, plasticine, ruler and question and answer cards. The cost for each set of VPBP Kit is RM 10 only. It is easy to be used, simple and attractive.

3.2. Implementing VPBP Kit

The 5E discovery inquiry method has been streamlined with VPBP Kit such as Table 1:

Table 1. Steps of application of 5E discovery inquiry method

Inquiry method	Strategy
1. Engage	●Students were asked some questions related to phenomena of evaporation and boiling process to encourage their involvement during lesson.
2. Explore	●Students explore the material provided (VPBP Kit) to construct a concept on how to explain the relationship between intermolecular forces with vapour pressure and boiling point.
3. Explain	●Each group of students are given 15 minutes to present their group work by using the VPBP Kit as a tool to explain the concepts.
4. Elaborate	●Students are require to watch a video carefully and understand the content of the video. Students will be asked related questions of the intermolecular force.
5. Evaluate	●After the lesson, students are required to answer post-test questions.

4. RESULTS AND DISCUSSION

The data collected from the pre-test and post-test were analysed using descriptive analysis by percentage. The pre-test results revealed that most students get low test scores. Most of them were able to determine the compound with high boiling point based on the value of vapour pressure given, but they were unable to explain the phenomena that related to the strength of intermolecular forces of the compound. After conducting the lesson using 5E discovery inquiry approach, the post-test results showed a percentage increase up to 81.1% for group A and 57.8% for group B. The achievement test revealed that the 5E discovery inquiry based learning assisted by the VPBP kit helped to improve students' understanding of the effect of intermolecular forces on vapour pressure and boiling point. Besides, we found that the lesson conducted via VPBP kit makes the students actively involved during group discussions and presentations. The implementation of this method educate students to think critically, communicate effectively and be able to relate theory in daily life.

5. CONCLUSIONS

Discovery inquiry method based learning via VPBP kit as a learning tool had successfully assisted students to explore and construct abstract to concrete concepts. The VPBP kit enhancing students' understanding by helping them creating a connection between the microscopic and macroscopic behaviour of matter observed. Instead of using the kit to explain liquid phenomena, the VPBP Kit also has the potential to be used on the other topic such as gas and solid. Therefore, students experienced building abstract to concrete concepts.

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