Science Workshop Design Considering Group Works

The case of Maze and Light Workshop at elementally school in Iran

グループワークを主体とした理科学習環境の設計

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Abstract:

学校教育において科学教育、特に物理に関する科目は、児童、生徒、学生に敬遠されることが多い。しかしながら、物理現象は私たちの暮らしの中で、もっとも基本的な自然現象であり、子どもたちにとってもなじみの深い学習課目のはずである。本研究では、ワークショップ形式の学習環境下における、物理現象を題目とした授業を実施し、子どもたちの協調学習に

Key Word: science workshop, realtime documentation

1. Introduction:

Physics is a difficult course for students and most of students are reluctant to it. It seems to be a global issue and is not confined to a specific nation. That is why the target groups of this research are chosen from a developed country and a developing country from two ends of Asia i.e. Japan and Iran. Physics Education Technology Project Team from Department of Physics of University of Colorado at Boulder [1], they did a research on “High-Tech Tools for Teaching Physics: the Physics Education Technology Project”. They introduced a new suite of computer simulations and “demonstrated that simulations are as productive, or more productive, for developing student conceptual understanding as real equipment, reading resources, or chalk-talk lectures. This work has shown that a well-designed interactive simulation can be an engaging and effective tool for learning physics.” Nowadays this software is being used in Iran for teaching physics. Efforts on making games in the field of science and physics and combining it with scientific workshops, will make a chance for children to participate in these games in a wide area, and their motivation in science and physics will be raising up and this motivation will increases their interest and helps them to challenge with science and physics more powerful.

2. Development of “Maze and Light” game

This game is consisted of:
1) Maze pad,
2) Small walls used to make maze pattern,
3) Some pieces as mirrors,
4) Some prisms and lenses,
5) A laser pointer,
6) A goal which is an optical buzzer,
7) Cards with maze patterns.

In this game, player solves the maze with light, instead of pen. Laser pointer is placed in the start point. Players put mirror or prism on proper angles to divert the light beam toward the correct path and repeat it until final goal. When light reaches to the goal, the buzzer sound will announce the successful end of the game.

This game was developed to assist the students to learn about light and getting familiar with reflection and refraction, while doing a game.

This game was initially produced as a product (Fig.2), it was rebuilt with a purpose of using it in a workshop.

In this design, three sets of this game were prepared to let three groups of students compete with each other. In each team one person was responsible for setting laser, one for setting goal and 15 for setting mirrors and lenses.
3. Maze and Light Workshop

This workshop is implemented in Iran so far. This workshop was held in sixth grade of Solaha boys’ elementary school and in sixth grade of elementary school, second grade of junior high school and first grade of senior high school in Roshangar girls’ school (Fig. 3).

The steps of this workshop are planned as follows:
1. Ice break
2. Question time (1)
3. Group work
4. Question time (2)
5. Reflection by RTV
6. Question time (3) which includes questions about students’ experience in the workshop, effectiveness of the workshop in their motivation toward science and physics, suggestion for making a better workshop and so on.

4. Summary

In this research an educational aids device is made in the field of light. According to this game some workshop was held for students in three grades of elementary, junior and senior high school to study the effect of scientific games and workshops on motivating students in science and physics. Three main points about this workshop is concluded: 1) Students instead of studying textbooks and listening to teacher’s explanation, they experienced light lesson in this workshop, and through try and errors, fun and game they learned about this topic. 2) They have the possibility to learn the lesson in a group. Each segment they had discussions for rising up the level of their achievements. 3) They had the possibility of sharing what they have done by the means of RTV. Considering that it’s difficult for students to express their thoughts and fillings by words, while they were pleased by watching their video, students understood good and bad points of what they have done through RTV, that give them the possibility to become better for next steps.

Notes