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ENHANCING A PROJECT IDEA AND TEACHING STUDENTS NOT TO GIVE UP

Abstract: Project or activity based learning is a process in which students build their own learning rather than passively receiving information. What is more, it is fun for both students and teachers. In this paper, I have described a class activity, in which I guided my students step by step to develop a project. To overcome troubles during setting up the project, I supported them not to give up maintaining the project in any adverse condition.

Introduction

One day when I was cooking I realized that hot gases were rising from the bottom of the pot, and they were burning my hand. Than in my physics class, I asked my students if they have also experienced the same thing. I gave two thermometers and wanted two volunteer students to measure the temperature of these gases at their homes.The volunteers measured the temperature at various points around a potand next lesson,they declared that it wasabout 130-180 degrees of centigrade for a medium cooker.Thiswas higher than the boiling point of water.

Discussions

I desired my students to work cooperatively and produce a physics project. I asked the class if we can benefit (save energy) from these hot gases escaping around the pot. I want my students,firstly, to think slightly for several minutes. Then I wanted them to think loudly. Almost all of them were in agreement with the idea that we can clothe the pot with a cover as shown in Figure 1.I felt that they all propose this solution as a brain wave. All class compromised that a group will conduct the experiment; they will present their data, and the rest of the class will process the results for further discussions. For an initial start,I charged two students two prepare the experiment materials. Then I set upa group of five students (experiment group) that were eager to conduct the experiment.

Figure 1: Pot with metal cover

Trial 1: Two students from the classprovided a cooker, apot and a cover made of steel. Thenthe experiment group took some measurements during their spare time. They encountered a problem such that they couldn't decide about the exact time of boiling. Thus, to resolve the difficulty, they present their obstacle to the rest of the class. After many discussions,some of the bright students said that they were at an altitude at which the boiling point of water is less than 100 °C. That's why for secure results they offer a temperature of 95 °C. So, the conclusion was not to wait until getting the boiling of water, instead, they were going to measure the time until the temperature reaches 95 degrees of Celsius. On the other hand, since the initial temperatures of water each time my change from measurement to measurement, they decided to gauge a time interval for a temperature variance of 65°C. Then the experiment group again got to the work and inserted a thermometer at the top of the pot to measure the temperature change.

For comparison,initially they took five measurements when there was no cover. They calculate an average time of 7,6minutes (let's call it standard duration) for changing the temperature of one liter of water for 65 °C. Then they did the same task when there was cover over the pot. The results were terrible, because their new pot with cover changed the temperature of one liter of water for 65 °C in 8,8minutes, which were 1,2 minutes more than standard duration. We all amazed due to such an unaccepted result.Our brilliant idea didn't work!

Figure 2: The pot with metal cover and holes on the cover

The experiment group presented their surprising results, and a new argument started among the students. At this point, I persuade the students that it is not over yet. I remindedthe class that their friends initially had measured agas of high temperature (130-180°C) moving around the pot. After this motivativespeech, I initiated a discussion for the possible problems. The class arrived the agreement that there must besomething wrong with the experimental design. Then again, after slight and loud thinking, they come to consensus that the cover returns burned gases back, and these burned gases decrease the efficiency of the cooker (This was their conclusion, scientifically it may be wrong or one can offer another explanation for this quagmire). Once more,several bright students proposedto bore holes at the upper part of the cover to circulate the gases andprevent the burned gases to decrease the efficiency of the cooker.

Trial 2: According to therecommendations, the experiment groupgot new data with punctured cover (Figure 2). The result was again unwell. The pot again boiled the same amount of water in a longer duration (8,2 minutes). For once, the experiment group students were disappointed.

After presenting the unforeseen results to the whole class several students dissatisfied and offered to give up dealing with such a project. At this point, I had to convince the students that there was a flow of energy in vain.I told the students that the scientists were making investigations for years. It will not be a good experience for them in the case of giving up. I wanted them to use their inquiry skills. This time the arguments lasted more than ever. Finally, theythought that the cover was touching the pot, and some of the heat energy was taken by it. Thus the experiment groupstudents were satisfied to resume the experiment.

Trial 3: The experiment group placed a material in between the cover and the pot that had a low heat transfer property (Figure 3). The students repeated the measurement and brought the results joylessly. What was gratifying was that the boiling time was neither longer nor shorter than the standard time. After many trials, getting such a result disturbedsome students from the experiment group students.They felt that they had trifled away their time.However, after many discussions some sedulous students thought completely different. I support them, and we encouraged the experiment group to continue withthe experiment after taking some time off. I did know that most of them were going to think about the reason of failure. No more than a week some students said that they had found solutions. Among all the proposed thoughts, the idea that the hot gases were not swapping the top of the pot was accepted. That is to say,the cover was preventing the hot gases to pass over the top of the pot and because of this; the top of the pot was in contact with the cool air.

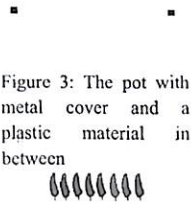

Figure 3: The pot with metal cover and a plastic material in between

Trial 4: Hence the experiment group designed thecover such that it touched the pot at three points and channeled the hot gases toward to top of the pot (Figure 4).The final trial's results were wonderful; the new constructed pot was changing the temperature of one liter of water65 °Cin 6,3 minutes.So, my 10th grade physics class did an excellent work, I appreciated them and told them that I wasproud of them.

Thus, I and mystudents comprehended that the hot gases risingfrom the pot is making a natural warm cover. In our first three trials, our cover was taking some of the heat energy along with preventing the hot gases to reach to the top of the pot. Finally, we realized that the hot gases are making a natural cover around the pot. What we achieved was that we oriented the hot gases toward the top of the pot, more gases moved over the top then before and thus the pot was heatedalso from the top.

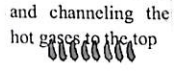

Figure 4: The pot with metal cover and channeling the hot gases to the top

Conclusion

The project enhanced here was implemented at a private collage in a physics course during the spring 2009 semester. The students generally responded quite enthusiastically to this collaborative-developing structure. I think my students, especially the experiment group, developed expertise in the use of this project based learning activity in which they acquired information and build skills while investigating a real-world issue. In fact, it can be considered as a semi-collaborative activity since not all students actively participated in conducting the experiment.

Other instructors can try this activity. Withthe same starting point,but depending on class discussions they can follow another path and can end up with another solution. What I want to emphasize is that with such activities, teachers can prepare their students for project competitions. Moreover, we have to teach our students, if we are sure about a problem, we have to struggle until we get desired solution.

On the other hand, this experience can be considered as a complete collaborative learning activity. The teacher can introduce the problem; the students can discuss possible solutions,and the teacher can set up groups, and then assignsproposed solution to the groups. Once each group brought their results they can discuss the conclusions and decide about the best solution. Finally, this project based activity can be conducted with 5E learning cycle.

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ЖОБА ИДЕЯСЫН НЫҒАЙТУ ЖӘНЕ СТУДЕНТТЕРДІ БЕРІЛМЕУГЕ ҮЙРЕТУ

Андатпа: Жоба негізделген оқыту, немесе оқу-ірекетке негізделген процессі, енжар ақпарат алудан гөрі, оқушылардың өз оқуын салу процессі болып табылады. Оның үстіне, ол студенттер мен оқытушылар үшін де қызықты болып табылады. Бұл мақалада оқу-ірекетке негізделген процессін сыныпта сипаттай отыра, студенттерді жобаны дамытуында қадам қадам бағыттандырдым. Жобаны құру кезінде қиындықтарды жеңуге, еш берілмеуге үйрете отыра, кез келген қолайсыз жағдайларда жобадан бас тартпауға қолдау бердім.

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УСИЛЕНИЕ ИДЕИ ПРОЕКТА И ОБУЧЕНИЕ СТУДЕНТОВ НЕ СДАВАТЬСЯ

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