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Teaching Techniques and Activities for the Education of the Gifted Young Scientist

“If I Were Pascal, I'd do ...” Activity

ABSTRACT: Development of academically gifted students' empathy, research skills and creativity are quite important in terms of their education. In the process of the development of these skills of gifted students, the life's of scientists who are important in the history of science could be used. That the gifted students know these scientists more closely could also be presented as significant models in terms of their moral development. In this activity, a gifted student was asked to write a diary by examining Blaise Pascal, his period of life and his contribution to science. At the end he was asked to write an essay "If I Were Pascal, I'd do ...". It is seen that this activity lasted for 5 weeks contributed to the development of gifted students' scientific creativity, empathy and research skills.

Key words: The young scientist, empathy, scientific creativity, history of science

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INTRODUCTION

In the studies of science and gifted education, one of the major areas is to improve the creativity and especially the “scientific creativity” of academically gifted students (Klahr & Simon, 1999; Liang, 2002; Maker, 2000; Okuda, S. M., Runco, M. A., & Berger, D. E. 1991; Moravcsik, M. J., 1981; Simonton, 1988, 2003, 2004, Majumdar, 1975; Tortop, 2013; Hu & Adey, 2002). Creativity, creative productivity or scientific creativity are some of the important issues which are dealt by theorists for giftedness (Stenberg & Zhang, 1995; Renzulli, 1978; Stenberg, 1997). Creativity, with the most general sense, is to put forward useful ideas and be appreciated by a person at least (Sak, 2011). In the education of academically gifted students, creativity fostering activities which improve the creativity, providing students to produce new ideas and new and different ways of solving to problems should be an inseparable part of their education (Maker, 2001; Maker & Schiever, 2005; Sak, 2001, Tortop, 2013). Thus, it is important that students should be faced with the situation of problem solving and idea generating. The educators’ the academically gifted students, should foster creativity activities and environments to provide them.

Moral development of gifted students is one of the important areas that should not be neglected. In fact, many gifted education programs aim to gains outcomes of this field (SACs, 2007, Sak, 2010, Tortop, 2013). Besides, by taking into account the relationship between moral development and cognitive development, moral development of gifted students differ

from their peers, their education should be designed (Reoper & Silverman, 2008; Hokelecli & Gunduz, 2007). To ensure this, it can be done that gifted students should understand the scientists and their lives, struggles in their lives, their dignity and altruism, and their contributions to society and their environment (Sak, 2010; Tortop, 2013). On the other hand, of course, while doing this, routine readings, research or direct expressions may be ineffective. That gifted students should examine these scientists, the periods of their lives and all the aspects of these periods with the help of empathy is quite important in terms of achieving these objectives.

In this article, it was provided that a gifted student more closely got acquainted with Blaise Pascal who was a great scientist. The student did research with all aspects to become more familiar with Pascal. Then, as a result of his research, changes in his thoughts were observed by his diaries. In the end, the gifted student was asked to write an essay about “If I Were Pascal, I'd do ...”. Through this activity, it was tried to put forward the contributions of this activity to gifted student’s research, empathy skills and creativity.

Implementation of the Activity

First of all, to create interest or curiosity in the history of science, gifted students are given flash cards including the scientist stories or excerpts from the history of science. Gifted students’ attentions are drawn by starting a discussion about how knowing of the history of science benefit for understanding of scientific discoveries and their processes.

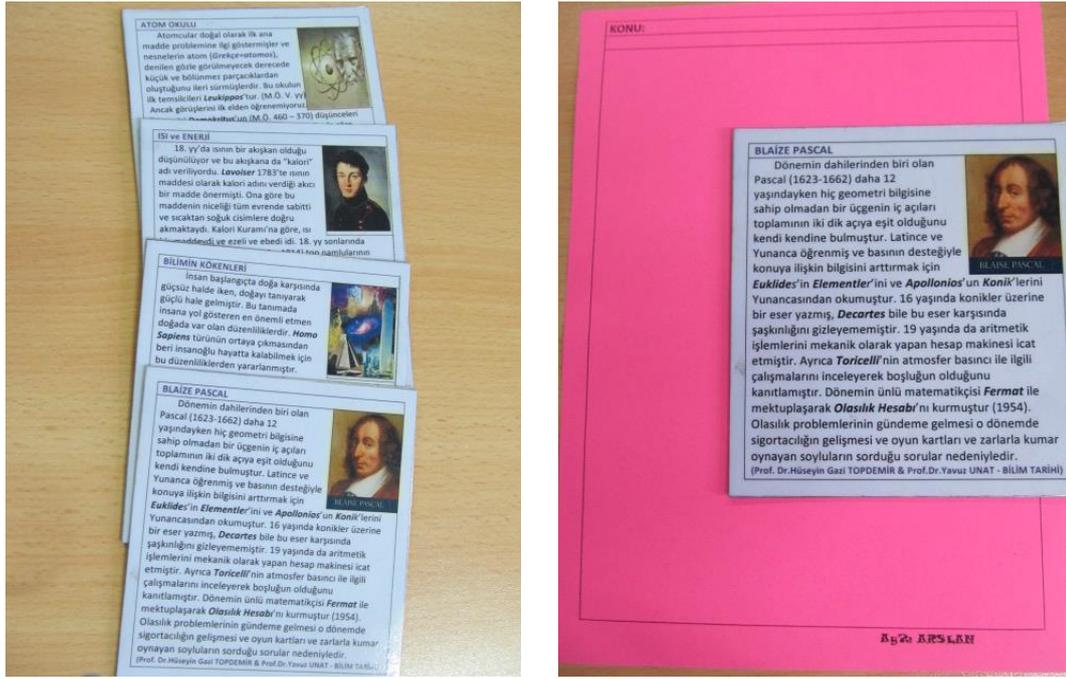


Figure 1. The delivering of scientist flash cards to the students

Before starting the activity, for creating a positive attitude towards the subject leading questions are asked. Such as, how does scientist an invention?, How important is the environments of scientists in their studies?. That gifted student's encounter Pascal in other lessons (e.g. Pascal Triangle in Math) shows that Pascal is a sophisticated scientist. That the scientific development in the period Pascal's life is the same as today's science and mathematics at secondary school level made us think that it would be appropriate to study on Blaise Pascal with 7–11 age group of gifted children. The

student, who was selected for the implementation of the activity, is 8th grade level, 13 years old and enrolled at a Science and Art Center in Turkey.

After determining the scientist for this activity, gifted students need to know the scientist (Pascal) and the period of Pascal's life with all aspects to write an essay which is entitled “If I Were Pascal, I'd do ...” by putting forth his creativity. At this point, 4-week work schedule which includes History, Sociology, History of Science, is prepared for gifted student to do research in this period (see Table 1).

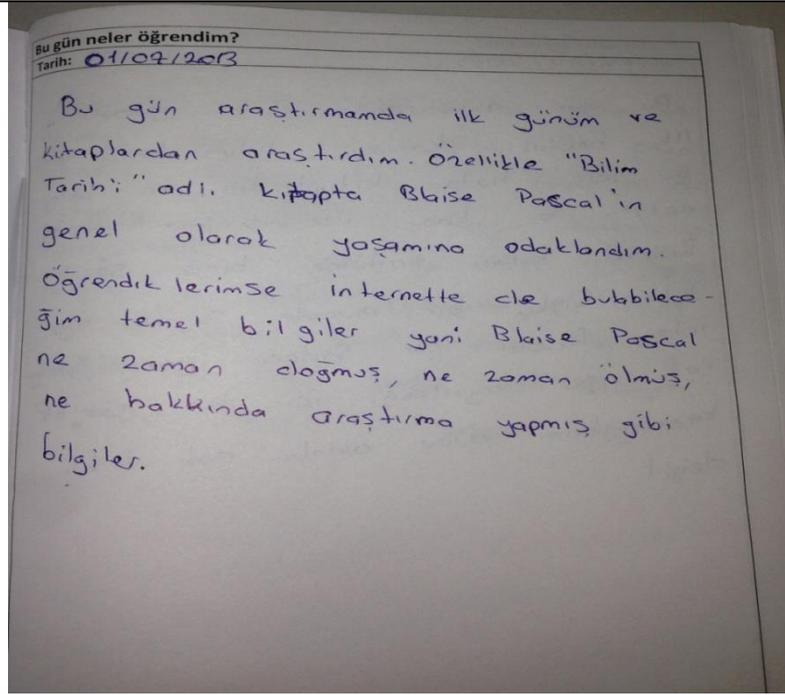
Table 1. The study schedule for “If I were Pascal, I'd do ...” activity

Date	Activity	Available Resources
01.07.2013 / 05.07.2013	Examining the period from a historical perspective	Books ➤ Bilim Tarihi [History of Science]; Authors; Yavuz UNAT, Gazi TOPDEMİR ➤ History of Science; Author; Colin A. RONAN ➤ “History of World” documentary film
06.07.2013	Writing scientific diary or drawing picture	

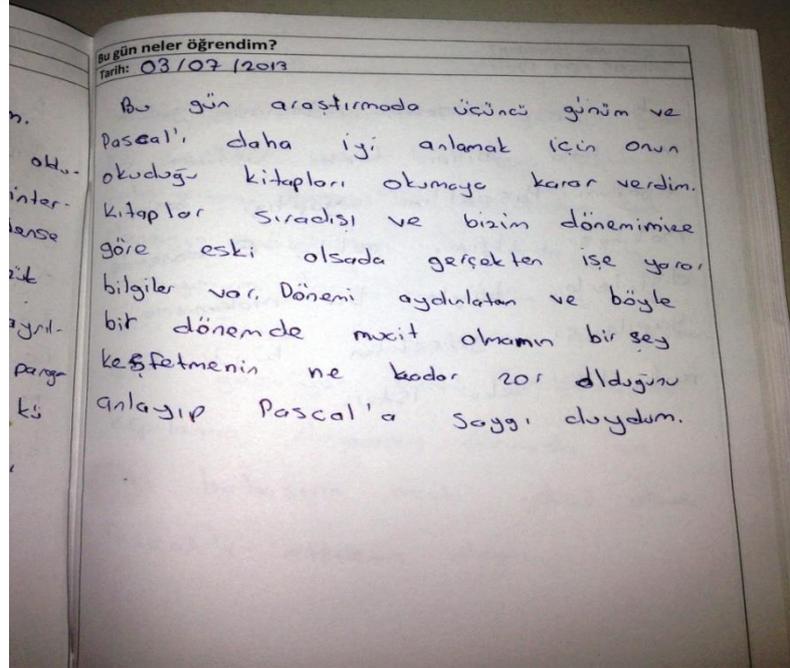
08.07.2013 / 12.07.2013	Examining the period from a sociological perspective	Related Web Site ➤ http://www.frmtr.com/tarih-ve-inkilap-tarihi/2683368-17-ve-18-yuzyillarda-avrupadaki-yenilikler.html ➤ Novels reflecting that period
13.07.2013	Writing scientific diary or drawing picture	
15.07.2013 / 19.07.2013	Examining Blaise Pascal's family structure and education	Related Web Site ➤ http://www.uralakbulut.com.tr/wp-content/uploads/2012/12/pascal.pdf ➤ http://www.turkcebilgi.com/ansiklopedi/blaise_pascal
20.07.2013	Writing scientific diary or drawing picture	
	Examining of Pascal's contributions to science	Related Web Site ➤ http://www.projedersi.com/index.php/bilim-kuetuephanesi/bilim-insanlari/405-blaise-pascal-1623-62-hesap-makinesi ➤ http://www.tubitak.gov.tr/sites/default/files/content_files/iletisim/edergi/99.pdf ➤ http://www.answersingenesis.org/articles/cm/v20/n1/pascal ➤ http://lecture.eingang.org/pascal.html ➤ http://www.politics.ankara.edu.tr/dergi/pdf/60/2/7_adil_korkmaz.pdf E-books ➤ http://eogrenme.anadolu.edu.tr/eKitap/tar224u.pdf ➤ http://www.egelisesi.k12.tr/dosyalar/editor/file/4.pdf
22.07.2013 / 26.07.2013		
27.07.2013	Writing scientific diary or drawing picture	
29.07.2013 and after	Writing the essay about "If I were...., I'd do"	

As we can see in Table 1, on one hand, gifted student get great knowledge deepening about Blaise Pascal, on the other hand he/she is asked to write a diary every week to observe the changes in their views and thoughts. Moreover, if there are errors or misconceptions in the diaries, the teacher tries to correct them with the gifted student during discussion session. So, in the education of gifted students, observing the developments in certain areas in students is an

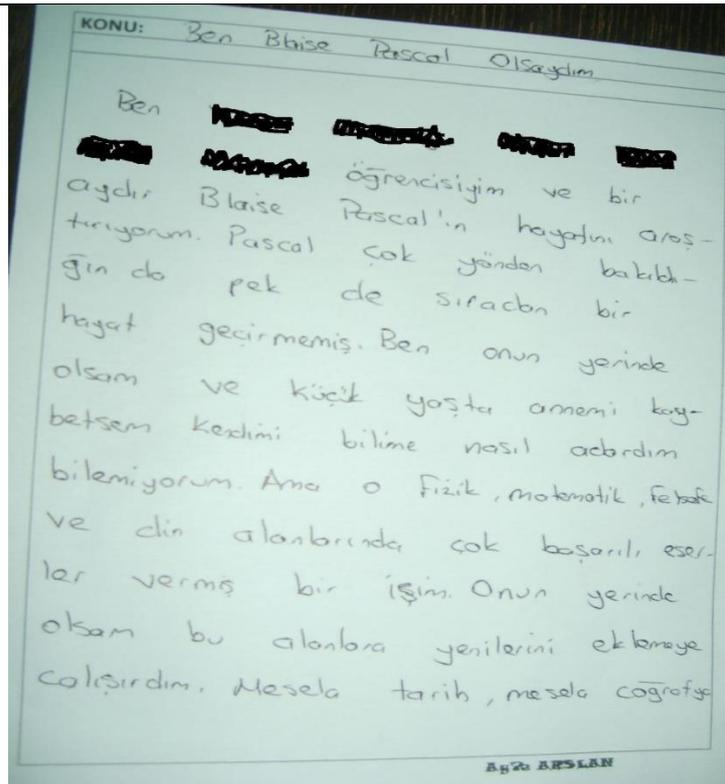
important process. In the case of implementation of this activity in the younger age group, because of documentaries or movies and stories; in order to observe the ideas of the gifted student, gifted student can be asked to draw a picture. He/she can draw picture at the same time he/she can write diaries. That pictures are important sources in the transfer of the student's thoughts and feelings is quite important for monitoring from teachers.

Table 2. Examples of "If I Were Pascal, I'd do ..." activity student's diaries

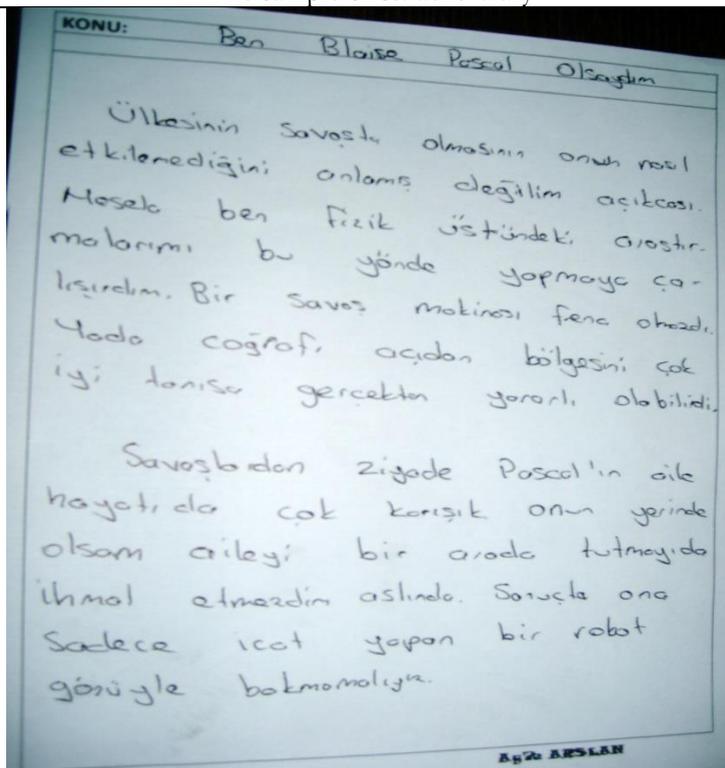
The sample of student' diary



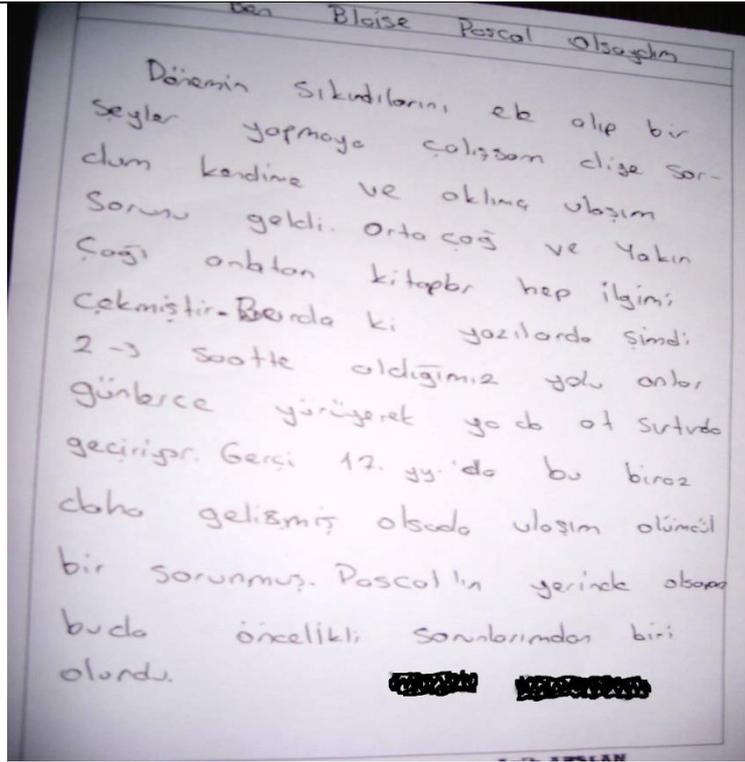
The sample of student' diary



The sample of student' diary



The sample of student' diary



The sample of student' diary

In Table 2, it was seen the diaries that the gifted student write his opinions and thoughts as a result of the examination of the period of Pascal's life with all aspects. Also, at the end of this process, it was seen student's essay in which the student recognizes Pascal with all aspects and evaluates him and explain "what he/she'd do, If he were Pascal?".

DISCUSSION AND CONCLUSION

Also in this event, the student can be asked to make a calculator in the same form of Pascal's calculator (Pascaline). Moreover, the student can be asked to research and find examples about what technical and technological developments Pascal's principles lead to at the present time. These conditions have also quite importance for gifted students to understand that as well as how a scientist contributes to science, he also contributes to the period of his life and the future.

The history of science is one of the important tools for gifted students to understand the science and scientific development better. In this activity, not only examination of Pascal's scientific aspects, but also examination of him with all aspects and student's trying to put himself into Pascal's place will contribute to the development of empathy skill (Dokmen, 2005). Also, this situation will

ensure to show ethical sensitivity for that time. For example, "that student makes no sense of war and wants to stop the war" and "wishes to regulate the complicated family life" is very important for their moral development. In the activity, the situation of students' wishes to stop the war in the period of Pascal's life and wishing to do his best about the family structure of Pascal can be explained by **high and strong sense of justice** of gifted student (Reoper & Silverman, 2008). Beside this, with a pragmatic approach, the student's approach "I would do a war machine" is a situation worth watching carefully, of course.

At the end of the activity, the student's view and opinions about the period which was examined thoroughly and its contributions to scientific knowledge are very important in the development of scientific creativity. Inadequate aspects related to scientific studies will contribute to not only the development of thoughts about which one is more scientific, the philosophy of science and the nature of science, but also will contribute to the development of the student's scientific creativity. In the future, the lives of scientists and the history of science-based activities' influence in the development of scientific creativity of academically gifted students' can be researched.

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