DOCUMENT RESUME

ED 449 586 EC 308 190

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TITLE The Moral Reasoning and Scientific Argumentation of Gifted Adolescents.
PUB DATE 2000-08-00
NOTE 12p.; Paper presented at the ECHA Conference (Debrecen, Hungary, August 2000).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Abstract Reasoning; *Academically Gifted; Adolescents; Case Studies; Foreign Countries; Individual Development; Individual Differences; *Moral Development; *Sciences; Secondary Education
IDENTIFIERS Defining Issues Test; *Finland; Raven Progressive Matrices; University of Helsinki (Finland)

ABSTRACT

This study explored the moral reasoning and scientific argumentation skills of 31 gifted Finnish adolescents participating in a science program at the University of Helsinki. Students were given the Defining Issues Test (DIT) to determine their level of moral reasoning and the Raven test to evaluate their scientific reasoning. The argumentation skills of students who scored exceptionally high on the DIT were then compared with those of students who received average scores in moral reasoning. In qualitative essays and interviews, students were asked to identify moral dilemmas in science and provide solutions for them. Analysis focused on the principles students used in justifying the right moral judgment in science. Findings indicated that the argumentation skills of the pupils who scored high on the DIT differed from those pupils who received average scores. Furthermore, the principles used in solving moral dilemmas in science by high-scoring pupils differed from the ones used by those gifted pupils who received average DIT scores. Two individual case studies contrast the argumentation skills of students with either a high or low score on the DIT. (Contains 18 references.) (DB)

A paper presented at the ECHA conference in Debrecen, Hungary, August 2000.

The moral reasoning and scientific argumentation of gifted adolescents

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Objectives of the study

The purpose of this case study is to explore the moral reasoning and scientific argumentation of Finnish adolescents who are gifted in science. The pupils (N=31) participate in the gifted program at the University of Helsinki. This program provided the opportunity for secondary school pupils to become acquainted with science departments at the University of Helsinki, the Heureka science center, and the URSA astronomical association. During the project the pupils also worked on science projects supervised by the University faculty. Students were given tests to measure their scientific and moral reasoning. This paper reports empirical findings on the scientific argumentation skills of those gifted adolescents who measured exceptionally high on the Defining Issues Test (DIT). Their argumentation skills are contrasted to the argumentation skills of those gifted adolescents who received average scores in moral reasoning. In the qualitative essays and interviews, the pupils were asked to identify moral dilemmas in science and to provide solutions to them. In the analysis, special attention was paid to the principles used in justifying the right moral judgment in science. The arguments used in justifying the right actions were analyzed with the help of technical terms developed by Toulmin (1958). The findings show that the argumentation skills of the pupils who measured exceptionally high on the DIT differed from those pupils who received average scores. Furthermore, the principles used in solving moral dilemmas in science by high-scoring pupils in the DIT differed from the ones used by those gifted pupils who received average scores.

Moral judgment and reasoning

Most of the studies in the area of moral development have based their theory on the cognitive-developmental theory identified by Lawrence Kohlberg (e.g., 1969). The Defining Issues Test is a well-documented measure of moral judgment that has been used all over the world (Rest 1986). The index most frequently used is the "P score," which reflects the principled reasoning (Stages 5 and 6 in Kohlberg's theory) of a person. Kohlberg's procedures have been criticized for lack of diversity in the moral dilemmas that have been used in the interviews (Yussen 1977). The hypothetical dilemmas can also be seen as being too abstract and removed from the daily experiences of most people (Straughan 1975). Recognition of these aspects of hypothetical dilemmas has led educational researchers to study real-life moral problems identified by people (Walker et al. 1987).

The research conducted in this area shows that the adolescents formulate dilemmas which are very different from the hypothetical dilemmas used by Kohlberg and his colleagues to assess moral reasoning (Yussen 1977, Binfet 1995). Most of the dilemmas formulated by Kohlberg focus on issues of ownership, public welfare and

life-and-death. In Yussen's (1977) study, the moral dilemma themes formulated by adolescents focused most frequently on interpersonal relations. Colangelo (1982) and Tirri (1996) found the same tendency with gifted adolescents.
The studies of moral judgment using DIT scores showed that gifted adolescents as a group scored higher than their peers (Tan-Willman & Gutteridge 1981, Narvaez 1993). However, the data with high-achieving adolescents indicated that the relationship between apparent academic talent and moral judgment scores is more complex. According to the study, high academic competence is necessary for an unusually high P score but it does not necessarily predict it. The high achievers can have average to high moral judgment scores, whereas low achievers cannot be high scorers in moral judgment (Narvaez 1993).

Moral development includes other aspects besides moral judgment measured by DIT scores. The real-life moral dilemmas require moral sensitivity and moral motivation (Narvaez 1993). Before an individual can make responsible moral judgments, he/she needs to identify real-life moral dilemmas in different contexts.

In this paper, the main interest is in investigating real-life moral dilemmas in science as identified by gifted adolescents. A special emphasis is given to the argumentation process and principles used in solving these dilemmas. Furthermore, the theoretical and ethical frameworks behind their moral reasoning are investigated with an effort to explain some of the qualitative differences in their moral thinking.

The methods used in the study

Thirty-one eighth- and ninth-grade students (14-15 years of age) who participated in the gifted program at the University of Helsinki in Finland were given tests measuring their scientific and moral reasoning. The scientific reasoning of these students was measured by the Raven test. The moral reasoning was measured by the DIT instrument. In addition to these tests, the students wrote essays on moral dilemmas in science and provided solutions to them. The method used to analyze the essays was a descriptive content analysis, with the essays being analyzed by their themes. In each story, only one theme was identified. To further add reliability to the study, the students were interviewed about the principles used in their essays. In the interviews, the different principles used in solving moral dilemmas in science were discussed.

The arguments used by the adolescents were analyzed using the technical terms of Toulmin (1958) to analyze arguments in different fields. According to Toulmin, an argument consists of different elements. Data (D) provide the starting point on which the conclusion (C) is grounded, and a mere conclusion without data is not an argumentation. The relationship between data and conclusion can be expressed as follows: "D so C" or "C because D." This process - from data to conclusion - is justified with the help of facts, which are called warrants (W). A warrant provides the general legitimacy of an argument and certifies the soundness of the argument used (Toulmin 1958, 100). The more abstract justification behind arguments is called "backing" (Toulmin 1958, 105). These abstract justifications include theories or values.

Findings

Moral judgment and logical reasoning

The subjects' performance was above average on all tests taken. The average score in moral reasoning (DIT) was 41, which represents the score for eighteen-year-olds (Narvaez 1993). The high variance (SD 15.8) indicated that some of the test scores were excellent and some were only average. This finding is in accord with Narvaez's study in which gifted students obtained average to very high scores in the DIT (Narvaez 1993).

Scientific thinking requires skills in logic. The logical reasoning of gifted adolescents was measured by the Raven test, which is a well-known measure of general intellectual ability. The average score of 53.4 in the Raven test indicated that these adolescents scored within the highest ten percent in their own age group (Raven et al. 1983).

Archeological research in graves as a moral dilemma in science

The gifted adolescents participated in an intensive, week-long science day camp. During this week, they were asked to write essays dealing with scientific moral issues which they had identified. The adolescents were allowed to use the topics discussed in the camp or any other scientific moral issue that came to mind. They were encouraged to write essays every day. In each essay, one moral issue was identified. In our previous study we found that these gifted adolescents used different kinds of principles in solving moral dilemmas in science and moral dilemmas in everyday life. Moral reasoning was shown to be very content- and context-specific. The arguments used in justifying the moral judgment were shown to be very field-dependent. The same person can use different principles and different ethical backgrounds in backing his/her moral reasoning depending on the moral dilemma in question (Tirri & Pehkonen 1999). The theme most often written about by the adolescents (twelve students out of thirty-one) dealt with archeological research in graves. The moral dilemma identified in this context concerned the scientific knowledge gained from this research versus the rights of the dead to rest in peace. In this paper, we limit our investigation to this dilemma and the process of argumentation used by adolescents to solve it. The principles used to solve the dilemma concerned the benefits this research offers to our generation by adding new knowledge to science. The arguments used to oppose the research in graves included religious principles and perspectives related to the rights of the relatives of the dead to make the decision concerning research in graves. In the context of science, the principles used in the moral reasoning of gifted adolescents were closely tied to utilitarian ethics, which advocates the greatest happiness for the greatest number of people. The adolescents were in favor of making personal sacrifices for the benefit of mankind. In the personal interviews, the adolescents were asked to tell about the principles they used in evaluating the moral issue of archeological research in graves. The following quote illustrates the principle of scientific profit used in justifying this research:

"If the research in graves brings real scientific profit, new knowledge in science, I think it is justified. I don't think it is justified only for the benefit of a single person or for making money." (Larry)

The adolescents acknowledged the negative consequences of archeological research. The main negative consequence mentioned was the emotional strain this kind of research can cause to the relatives or friends of the dead. Some adolescents used religious principles and the sacred nature of graves as reasons for opposing this kind of research. The adolescents identified conditions that would make the decision to do the research more justified. The most important condition was that the relatives of the dead were also dead. The age of a grave could be identified as the most important criterion in making decisions. The following quotes illustrate this criterion well:

"There are situations in which it is not right to do research in the graves. The most important things to consider are the relatives. If they are alive (especially the children), I don't think you are allowed to go to the graves without permission." (Sam)

"If the grave is more than 1000 years old, the dead cannot have any living relatives. Then it is OK to do the research. However, if the age of the grave is 50 or 70 years, the dead have relatives and friends who are still alive." (Tina)

"I wouldn't care if somebody dug in my grave, but I could not tolerate somebody digging in my mother's grave." (Laura)

Students' argumentation and justification for archeological research in graves

We have analyzed students' arguments and justifications for doing archeological research in graves with the help of technical terminology developed by Toulmin (1958). All the students ended up with the conclusion that the research in the graves is morally justified. However, those students who gained the highest scores in the DIT reflected on the dilemma with different justifications and values than the students who attained only average scores. Furthermore, girls and boys differed qualitatively from each other in their argumentation process. In this paper, we present two cases of the argumentation process in the dilemma concerning archeological research in graves. Case 1 presents the argumentation process of a girl with a high score in the Raven test and a very high score in the DIT. Case 2 is an example of a boy with the highest score in the Raven test and a below average score in the DIT.

Case 1. Tina

Tina is a 14-year-old gifted girl whose main interest is chemistry. She ranked among the top five students in her DIT (56) and her score in the Raven test (55) was above the mean of the group tested. She has always been very good at school, and her giftedness has provoked jealousy and envy among her classmates. Tina was harassed during elementary school until she changed to a new school. The gifted program was a great chance for her to meet other gifted girls with the same interests. Tina has reflected in her diary on several moral dilemmas, including abortion, sterilization, rain forests, nuclear war and archeological research in graves. Her writing is fluent, and

she expresses herself very well in the interview. In addition to logical reasoning and verbal fluency, she expresses her emotions and feelings concerning the moral dilemmas. Tina is the only adolescent who considers the disadvantages before the advantages in her reflection on archeological research in graves. Figure 1 shows the layout of Tina's argumentation with both the disadvantages and the advantages of doing archeological research in graves.

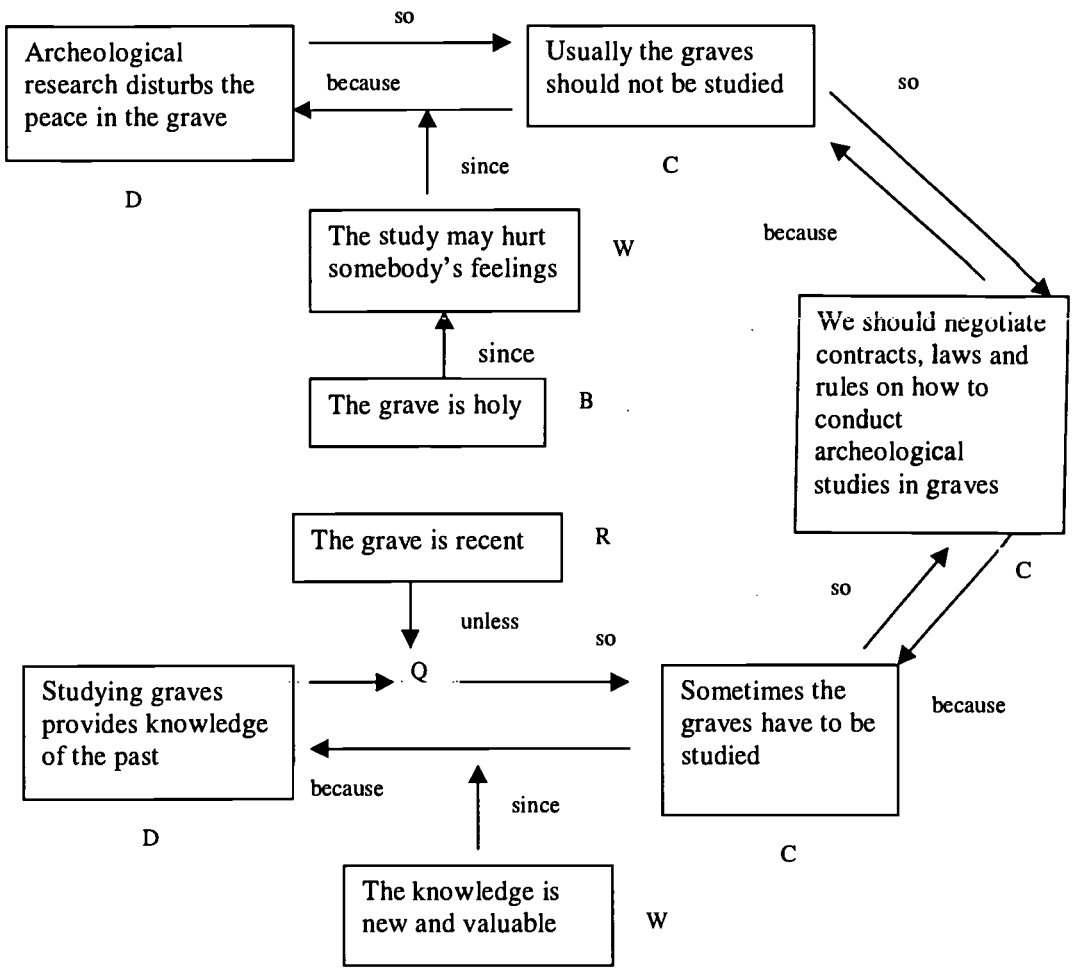

Figure 1. The layout of Tina's argumentation of the disadvantages and advantages of doing archeological research in graves

The data (D) Tina provided for the disadvantage of this research can be formulated thus: "Archeological research disturbs the peace in the grave." For this data Tina made a conclusion (C): "Usually the graves should not be studied." She justified her conclusion with the warrant (W): "The study may hurt somebody's feelings." For a more abstract principle behind her argument, Tina uses "The grave is holy" as a backing (B.) Tina's argumentation for the disadvantages of studying graves reflected emotional and spiritual sensitivity. Tina didn't restrict her thinking to the scientific and logical aspects only. She considered the feelings and values related to scientific research as well. Daniel Goleman (1995) has suggested that a new kind of intelligence – emotional intelligence - gives us awareness of our own and other people's feelings. It gives us empathy, compassion, motivation and the ability to respond appropriately to pain or pleasures. Goleman has pointed out that EQ is a basic requirement for the effective use of IQ. If the brain areas with which we feel are damaged, we think less

effectively (Goleman, 1995). Empathy and role-taking skills are very important aspects of EQ, and all these abilities are needed for adopting a care-oriented moral judgment. Zohar and Marshall (2000) have introduced a third kind of intelligence: spiritual intelligence. According to them, SQ helps us to assess the most meaningful course of action. With SQ we address and solve problems of meaning and value. (Zohar & Marshall, 2000). Tina's argumentation reflected both emotional and spiritual intelligence in her role-taking skills and understanding of the sacred nature of a grave.

The data (D) Tina provided for the advantages of doing archeological research in graves can be formulated thus: "Studying graves provides knowledge of the past." For this data, Tina made a conclusion (C): "Sometimes the graves have to be studied." To make this conclusion, Tina needed a qualifier (Q). The task of the qualifier is to justify the conclusion of the argument. The rebuttal (R) indicates circumstances in which the general authority of the warrant would have to be set aside. In Tina's argumentation, the age of the grave served as the rebuttal for the warrant (W): "The knowledge is new and valuable." According to Tina, archeological research in graves is morally justified if it provides new and valuable knowledge. However, the grave must be old enough for the researchers to make this kind of conclusion. Tina's argumentation for the advantages of archeological studies in graves demonstrated her understanding of the reasons why this kind of study is necessary. Tina provided a concrete example of finding evidence for a crime as a legitimate reason to open and study a grave. However, she constantly reminded us that the knowledge gained by this kind of study needs to be new and valuable.

For the final conclusion, Tina states that "We should negotiate contracts, laws and rules on how to conduct archeological studies in graves." Tina's final conclusion reflects the difficulties in making mature moral judgements in sensitive moral issues. We need more moral discourse and negotiations with scientists to be able to establish some guidelines that would consider all the important aspects involved. Tina is a good example of a young female scientist with high intellectual ability and sensitivity to the emotional and spiritual aspects as well.

Case 2. Alex

Alex is a 14-year-old gifted boy whose main interest is chemistry. He received the highest score in the Raven test (59) of all the gifted students in our sample, by lacking only one point from a perfect score. His score in the DIT (27) represented a result below the average of the group studied. The gifted program was an opportunity for him to meet other boys who shared his great interest in science. During the program, he has discussed several scientific problems with boys who enjoy scientific inquiry. Alex did not enjoy writing the diary very much, and he has reflected on only two topics. In addition to the moral dilemma of archeological research in graves, he has considered the moral dilemma of pollution. His writing is not as fluent as his verbal expression in the interview. Alex makes jokes during the interview and evidently enjoys the chance to entertain the interviewer. He laughs and uses funny examples to show his point. However, he discusses the moral dilemma of archeological research in graves with interest and provides several arguments to highlight his main concern related to this issue. Alex is a good example of a very independent thinker who considers unique and different aspects in his reflection on archeological studies. He

strongly advocates archeological research in graves, and the disadvantages he identifies concern the researcher, not the graves or the other people involved. Figure 2 shows the layout of Alex's argumentation with both the advantages and the disadvantages of doing archeological research in graves. The data (D) Alex provided for the advantage of this research can be formulated thus: "Studying graves provides knowledge of the past." For this data Alex made a conclusion (C): "Studying in graves is important." He justified his conclusion with the warrant (W): "Knowledge is more important than the preservation of graves." For a more abstract principle behind his argument, Alex uses "Mankind is more important than an individual" as a backing (B.) However, Alex needed a rebuttal (R) to indicate the circumstances in which the warrant does not qualify any more. In Alex's argumentation, researchers need to respect the possible emotional bondage of the relatives to the grave. However, if the dead is unknown, these emotional aspects are not relevant any more.

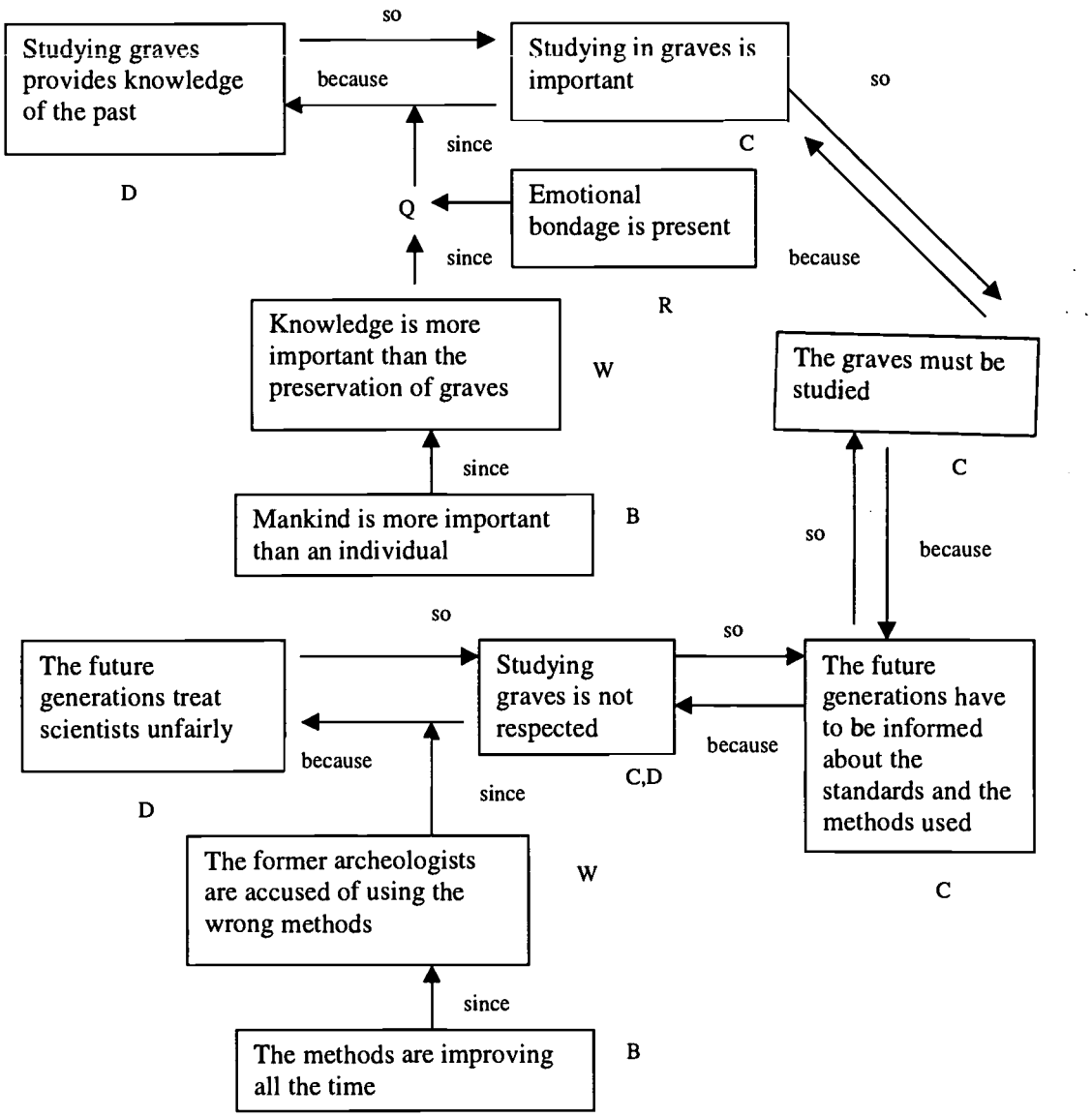

Figure 2. The layout of Alex's argumentation of the advantages and disadvantages of doing archeological research in graves

The data (D) Alex provided for the disadvantages of doing archeological research in graves can be formulated thus: "The future generations treat scientists unfairly." For this data Alex made a conclusion (C): "Studying graves is not respected." He justified his conclusion with the warrant (W): "The former archeologists are accused of using the wrong methods." For a more abstract principle behind his argument, Alex uses "The methods are improving all the time" as a backing (B.)

Alex's main concern about the disadvantages of archeological research dealt with the rights of the scientists. Evidently, he identified himself with these scientists and emphasized the frustrations they face in being accused of using the wrong methods or acting unmorally. Alex had the interest of an engineer, and he discussed the possible tools that can be used in the archeological research in graves, ranging from a shovel to a future tool using nuclear technology. Alex found it very important for the scientists' rights to inform the future generations of the standards and methods used in archeological research. He was so involved with the rights of the scientists that he provided a chain of arguments to prove his point of view. The argumentation chain in Figure 2 shows Alex's conclusions about the disadvantages of studies in graves. Alex's point of view ignored the disadvantages of this kind of research for the relatives of the dead or for those people who value the sacred nature of graves. Alex's argumentation represented "engineer-like" thinking with an emphasis on tools and methods rather than on people with feelings and values.

As the final conclusion, Alex states that "The graves must be studied." For Alex, the question whether or not to do the research in graves was not a moral question. He found the rights of the scientists to be a much more important and accurate moral dilemma concerning research in graves. Alex represented a young male scientist with high rational and logical ability. Furthermore, he observed moral dilemmas from unique and fresh points of views. In the future, Alex may invent tools and methods that are innovations in science. However, he lacked emotional and spiritual sensitivity in evaluating the final answers to the scientific issues involving moral dilemmas.

Reflections on the results

The two case studies presented above reflect some general trends in the argumentation pattern of the whole group studied. Tina is a good example of a gifted girl whose argumentation is logical and elegant and who provides theoretical and ethical backings for her arguments. Furthermore, she demonstrates emotional and spiritual sensitivity in her reflection on moral dilemmas in science. Previous studies using the Toulmin model reveal some gender differences in primary pupils' mathematical argumentation. The empirical results indicate that girls are more able to use elegant mathematical reasoning than are the boys, who base their argumentation more often on their own expertise (Pehkonen 1999). Furthermore, girls in grade six and in grade nine are shown to reflect on moral dilemmas with more empathy and role-taking skills than the same grade-level boys (Tirri 2000). Tina's argumentation for the disadvantages of archeological research in graves is based on her moral sensitivity in respecting other people's feelings and values. She doesn't limit her arguments to rational and scientific evidence only. Tina considers the sacred nature of the grave and understands the religious concept of holiness. The backings she uses are based on ethical values of respecting things that are considered holy by some people. Tina

demonstrates very good judgment in her reflection on the advantages of archeological studies as well. She admits that sometimes the graves have to be studied. However, the reasons need to be valid and the grave must be old enough. For the final conclusion, Tina states that we should negotiate contracts and laws on how to conduct archeological studies in graves. Compared to the whole group of gifted students, Tina's argumentation is outstanding, including critical thinking, logic and moral sensitivity. Her final conclusion provides some concrete but not naïve ways to approach this dilemma. It is no surprise that Tina ranked at the highest level of post-conventional moral reasoning in the DIT.

Alex's argumentation for the advantages of archeological research in graves was typical of the whole group of gifted students. The majority of the arguments students used to justify conduct in science were based on utilitarian ethics. The new knowledge in science was identified as the leading value that brings the greatest benefit to people. However, in most cases the students acknowledged the need to provide some exceptions to this rule. Even in science, the researchers should pay attention to the feelings of those people who are affected by the research. In our study, archeological research in graves was advocated, with the exception of those graves that are so new that the relatives of the dead could still be alive. Alex's argumentation for the disadvantages of archeological research in graves was not typical of the whole group of gifted students. His strong identification with the scientists led him to consider scientific moral dilemmas only from the scientists' point of view. This emphasis made him neglect the relatives and other people who may have different values concerning studies in graves. Alex's score in the DIT was below average compared to the whole group of gifted students. Compared to his almost perfect score in the Raven test, we can claim that his logical reasoning is more developed than his moral reasoning. The qualitative study of his argumentation may reveal in part the reasons for his only average score in the DIT. Alex's thinking lacks universal principles in his reflection on the disadvantages of doing research in graves. He considers the dilemma only from his own, partial standpoint. However, the ability to use universal moral judgments by an impartial moral agent is considered to be the most mature moral reasoning, according to Kohlberg's procedures (Strike 1999, 21-36).

The results of our study reveal that there are qualitative differences in the moral reasoning of gifted adolescents. A high intellectual ability does not predict mature moral judgement. Furthermore, responsible moral judgements for the moral dilemmas in science require moral motivation and moral sensitivity. Teachers and educators should nurture the moral growth of future scientists by exploring and discussing the ethical aspects of doing scientific studies. The argumentation model presented here can serve as a pedagogical tool for teachers in reflection on moral dilemmas in science with their students.

References

Binfet, J. 1995. Identifying the themes in student-generated moral dilemmas. A paper presented at the annual meeting of the American Educational Research Association, April 18th, 1995, San Francisco, CA.

Colangelo, N. 1982. Characteristics of moral problems as formulated by gifted adolescents. Journal of Moral Education, 11, 4, 219-232.

Goleman, D. 1995. Emotional intelligence. New York: Bantam Books.

Kohlberg, L. 1969. Stage and sequence: The cognitive-developmental approach to socialization. In D. A. Goslin (Ed.) Handbook of socialization theory and research. Chicago: Rand McNally.

Narvaez, D. 1993. High achieving students and moral judgment. Journal for the Education of the Gifted, 16, 3, 268-279.

Pehkonen, L. 1999. Gender differences in primary pupils' mathematical argumentation. In the Proceedings of the 23rd Conference of the International Group for the Psychology of Mathematics Education, pp. 41-48.

Raven, J. C., Court, J. & Raven, J. 1983. Manual for Raven's Progressive Matrices and Vocabulary Scales. London: H.K. Lewis & CO. LTD.

Rest, J. 1986. Moral development: Advances in research and theory. New York: Praeger.

Straughan, R. 1975. Hypothetical moral situations. Journal of Moral Education, 4, 3, 183-189.

Strike, K. 1999. Justice, caring, and universality: In defence of moral pluralism. In M. Katz, N. Noddings, & K. Strike (Eds.), Justice and caring. The search for common ground in education (pp. 21-37). New York: Teachers College Press.

Tan-Willman, C. & Gutteridge, D. 1981. Creative thinking and moral reasoning in academically gifted secondary school adolescents. Gifted Child Quarterly, 25, 4, 149-153.

Tirri, K. 2000. The development of empathy and role-taking skills in pupils from grade six to grade nine. To appear in Educational Research and Evaluation. An International Journal on Theory and Practice (in press).

Tirri, K. 1996. The themes of moral dilemmas formulated by preadolescents. Resources in Education ED 399046.

Tirri, K. & Pehkonen, L. 1999. The moral reasoning of adolescents gifted in science: a case study. Resources in Education ED 429398.

Toulmin, S. 1958. The uses of argument. NewYork: Cambridge University Press.

Walker. L., de Vries, B., & Trevethan, S. 1987. Moral stages and moral orientations in real-life and hypothetical dilemmas. Child Development, 58, 842-858.

Yussen, S. 1977. Characteristics of moral dilemmas written by adolescents. Developmental Psychology, 13, 2, 162-163.

Zohar, D., & Marshall, I. 2000. SQ Spiritual Intelligence the Ultimate Intelligence. London: Bloomsbury.

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