Oxidation Communications 38, No 1A, 423–433 (2015)

Educational problems

PRE-SERVICE SCIENCE TEACHERS OPINIONS ABOUT ETHICAL PRINCIPLES AND THE INVESTIGATION OF THEIR MORAL VALUES

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ABSTRACT

In this study were investigated the opinions of pre-service science teachers about some ethical principles and their moral values that were acknowledged by them. For this purpose, this study has been carried out with pre-service science teachers ($N = 275$). Ethical opinions were solicited using a questionnaire which was developed based on a literature review and considering the opinions of experts. The Ethical Position Questionnaire (EPQ) for the purpose of determining moral values was also used. It was recognised that the pre-service science teachers, in several regions have relativistic ideas about their moral values. At the same time, participants from the Mediterranean region, Central Anatolia and South-Eastern Anatolia have idealist opinions. In the assessment of moral values for teachers in terms of their gender, it may be concluded that females had more idealistic opinions than males. This study is important not only in terms of increasing the awareness of pre-service science teachers about ethical issues, but also for drawing conclusions from the overall results.

Keywords: ethics in education, ethics and values, pre-service science teachers, moral values.

AIMS AND BACKGROUND

Morality is about values but moral philosophy or ethics concerns about issues and their structure. It looks for answers to ethical questions such as 'What should l do?', 'Is my behaviour true'[1]. Ethics studies not only moral questions of a human being in his social and individual life but is also concerned with values relating to attitudes and behaviours[2].

To find the impact of moral decisions, we need some abilities such as listening to others, comparing the knowledge available to the consequences of others, and respect

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for different opinions[3]. Also students feel the need to communicate with their teachers and friends for developing their relevant skills. One responsible person concerning this matter is a science teacher who will educate their students and decision-makers of the future.

Within the framework of science education, there are issues related to learning in the fields of science-technology-society-environment. For instance in grade 8, with regards to biotechnology, the Turkish middle school science curriculum suggests that 'students discuss positive and negative impacts of current biotechnology practices that are used in research techniques'. Strong impacts of the educational process and teachers over internationally social and moral conditions increase the significance of this issue.

The family is also important for moral and value education. A mother teaches her child what is right and wrong from babyhood; this situation continues in school life and in society. At this point where social values are justified and individual decisions are made, ethical codes serve as a guide and they assist us to develop true behaviours in the educational process. The role of the school provides guidance for circumstances that are encountered in other occupational and business fields[4].

Recently university students do not seem to be interested in scientific realities of technology and the applied sciences. They seem to be more oriented towards how the social aspect of developments in this field could benefit society[3]. However, they may be required to make choices concerning social aspects of new technologies. In these circumstances, the impacts of moral decisions that should be made have great importance.

In addition, there is a common belief that produced by biotechnological innovations have caused many ethical problems. Instructors recommend considering ethical issues when handling matters such as genetic engineering[5]. New developments rendering human life better and satisfying human desires in the best way are introduced in our lives. However, these technologies cause some discussions accompanied by some questions that lead people to think about their consequences and cause them to sit on the fence. At this point, some of the fundamental issues that bring ethics to our mind are the Human Genome Project (HGP), stem cell research, eugenics, euthanasia, organ transplantation, AIDS, genetically modified organisms, and cloning.

Pre-service teachers, as teachers of the future, have a great role in enabling secondary school students to make more reasonable decisions about ethical issues. Consequently, to enable them to be conscious of these issues, clarifying under which thought system they form these opinions, has great importance. The hypotheses developed for this purpose are as follows:

Ho1: Moral values acknowledged by pre-service teachers do not have any impact over their opinions about ethical principles;

Ha1: Moral values acknowledged by pre-service teachers have an impact on their opinions about ethical principles;

Ho2: Opinions of pre-service teachers about bioethical issues and moral values do not have significant differences in terms of gender and the region where they reside;

Ha2: Opinions of pre-service teachers about bioethical issues and moral values have significant differences in terms of gender and the region where they reside.

EXPERIMENTAL

Universe and sampling. Pre-service teachers constitute the universe of the research and students attending the Science teaching course in the 2013–2014 study year at the Faculty of Education, Mugla Sitki Kocman University and minor postgraduate students attending the teaching certificate program for teaching physics and chemistry constitute the sample ($N = 275$).

Data collection tools. Views on ethics were solicited using the ethics questionnaire. The moral values of the pre-service science teachers were solicited by administering the Ethical Position Questionnaire (EPQ) consisting of 20 Likert-type items that were developed by Forsyth[7]. The validity and reliability study of this scale for our country was carried out by Yazici and Yazici[6]. The reliability coefficient was reported as 0.90 by estimating the internal consistency for the complete scale on the basis of the Cronbach alpha coefficient. In this study ($N = 275$), the Cronbach alpha value was found to be 0.71.

Forsyth[7] defined individual differences that had an impact over moral decisions with the help of two fundamental factors. The first is relativism, that is rejecting universal moral rules, and the second is idealism which holds that people would direct their behaviours to a true, good consequence. According to Forsyth[7], in both moral aspects, high/low idealistic and relativistic behaviours may be observed. If these two aspects are crossed to produce a 2×2 table (high/low idealism values x high/low relativism values), an ethics thought system with four categories is created. They consist of situationism, absolutism, subjectivism and exceptionalism. The moral values of participants were determined using these dimensions. Participants declared their opinions by selecting one of five responses in the questionnaire: 'Never agree', 'l do not agree', 'Undecided/have no idea', 'I agree' and 'Fully agree'.

Data analysis. In the process of data analysis, the percentage (%), mean (M), standard deviation (SD), *t*-test, one-way variance analysis (ANOVA) and frequency (*N*) were determined using the SPSS 20 statistics software package. The Levene test was used to calculate level of significance which was set 0.05. A *t*-test was used to examine gender differences for the survey and scale items; ANOVA was used in the examination of the regional variable. In expressions where there was no regular distribution in the items of the ethical survey, the Kruskal–Wallis test was used in the analysis.

RESULTS

According to Table 1, responses to the EPQ were examined in terms of region. It was found that pre-service science teachers residing in the Mediterranean, Central Anatolia and Southern East Anatolia regions have idealistic opinions. However, it is recognised that participants from other regions have a relativistic opinion.

Table 1. Values of idealism and relativism averages (M) and standard deviation (SD) for the regions where participants resided ($N = 275$)

Region	N	Idealism		Relativism	
		M	SD	M	SD
Aegean	98	41.4	4.556	34.5*	5.301
Marmara	53	41.49	3.456	35.17*	5.005
Mediterranean	54	42.61*	4.988	35.26*	5.785
Central Anatolia	37	42.51*	4.107	35.25*	6.428
Black sea	10	40.5	5.503	37.98*	5.425
Eastern Anatolia	5	33.8	11.145	34.48*	6.504
Southern East	18	41.94*	5.599	39.57*	7.058

* If idealism M > 41.67, individual is idealistic; if relativism M > 33.58, individual is relativistic.

According to the bioethical survey, some significant differences were found. For responses to the expression 'Usage of embryonic stem cells or proteins are appropriate for geriatric treatments and cosmetic applications' (item 10 of the ethics survey), a significant difference was obtained for the regions where the pre-service teachers resided ($F = 2.338$, $p < 0.05$). Individuals in the Southern East Anatolia region had higher values when responses given were examined in terms of averages.

Also a significant difference was found between the idealistic total points and the regions where the pre-service teachers resided ($F = 3.107$, $p < 0.05$). According to the Duncan test that was carried in terms of demographic variables, this difference originated from participants residing in the Eastern Anatolia region.

Table 2. Classification of moral values acknowledged by participants in accordance with sub-dimensions of idealistic and relativistic average points by region of residence and gender

High	Situationists	Absolutists
	Mediterranean region	
	Central Anatolia region	
	South-Eastern Anatolia region	
	Females	Males
Low	Subjectivists	Exceptions
	Aegean region	
	Marmara region	
	Black sea region	
	Eastern Anatolia region	

It was found (Table 2) that moral values labelled as situationists were displayed by participants residing in the Mediterranean, Central Anatolia and Southern Anatolia regions. These individuals believe that moral behaviours are not applicable to and may not produce the best result in all situations. Participants acknowledging subjectivist moral values consist of pre-service teachers residing in the Aegean, Marmara, Black Sea and Eastern Anatolia regions. These participants are individualistic so they reject moral rules and are less influenced by idealism targeted at humanitarianism[7]. They are not objective about how much moral absolutism or an action could damage others and they make their moral decisions on the basis of subjective and individual judgments. The males have moral values of absolutists who support positive and good behaviours while females have moral values designated as situationists (Table 2). They also support positive behaviours but they are aware that they are unable to exhibit such behaviours in every case.

In item 5 of the survey, for the statement 'I do not agree to donate one of my kidneys to my relatives who is in need as I am unable to take the risk of surgery and expose myself to some long term health problems' ($M_{male} = 2.44$, $M_{female} = 2.14$, $t_{(-2.386)}$, $p < 0.05$) there was a significant difference in favour of females when responses given for the bioethics survey and EPQ were examined in terms of gender. When this variable was examined in terms of EPQ, significant gender differences were obtained in favour of females for the total score for idealism ($M_{female} = 42.20$, $M_{male} = 40.72$, $t_{(2.498)}$, $p < 0.05$).

Table 3. Mean (M), standard deviation (SD) and percentage (%) distributions of the bioethics survey

Survey questions	M	SD	Never agree	I do not agree	Undecided/ no idea	I agree	Fully agree
			(%)				
1	2	3	4	5	6	7	8
S1. A patient who has no possibility of a cure and is living his last days under unbearable pain should have the right to ask for acceleration of his death	3.31	1.283	12.7	14.5	20	34.2	19.0
S2. With reference to my relative who had a disease for which there was no possibility of cure and who is only kept alive only by an intensive medical support in hospital, I support his decision to refuse treatment and to ask for acceleration of his death	2.70	1.321	24.0	22.9	24	17.5	12.0
S3. Organ transplantation is a unique cure for some people, therefore organs of dead people can be transplanted even if they have no permission	2.96	1.345	16.7	25.1	20	21.5	16.7

to be continued

Continuation of Table 3

1	2	3	4	5	6	7	8
S4. If necessary, tissues or organs obtained from animals can be used for humans and they should be allowed to be bought or sold for this purpose	2.96	1.246	17.8	16.7	26.9	29.1	9.5
S5. I do not agree to donate one of my kidneys to my relatives who is in need as I am unable to take the risk of surgery and expose myself to some long term health problems	2.25	1.018	26.5	35.3	26.9	9.1	2.2
S6. Physicians should not share knowledge about patients with others without permission	4.42	0.906	1.5	5.5	3.6	28.7	60.7
S7. A physician whose patient has AIDS should share this information with healthcare personnel for the purpose of protecting them	3.83	1.167	6.5	8.7	12.4	40.0	32.4
S8. The embryo is an individual and should never be used in scientific research	3.39	1.195	4.7	21.8	26.2	24.0	23.3
S9. I support the use of embryos for the purpose of producing stem cells for important studies such as research on the Parkinsons disease	3.26	1.119	8.0	15.6	31.6	31.6	13.1
S10. The use of embryonic stem cells or proteins is appropriate for geriatric treatments and cosmetic applications	2.92	1.137	15.3	17.1	33.8	28.0	5.8
S11. The use of sperm and egg banks is welcome for in-vitro fertilisation	3.28	1.232	12.4	13.1	23.6	35.6	15.3
S12. Scientific and technological applications and developments should be under control by society	3.72	1.110	3.3	14.5	16.0	39.3	26.9
S13. Birth defects may be prevented in line with decisions of parents	3.83	1.186	6.9	10.2	16.0	37.8	29.1
S14. A person should be considered dead when brain death occurs	3.09	1.163	11.3	19.6	27.6	31.6	9.8
S15. No permission should be given for gender selection during pregnancy	3.72	1.210	5.8	12.0	19.6	29.1	33.5
S16. The aforementioned issues should be instructed as a course in primary and secondary school education	3.92	0.878	0.7	7.3	16.7	50.2	25.1

In the case of responses given to the bioethics survey (Table 3), the statements ‘Physicians should not share knowledge about patients with others without permission’ (item No 6), ‘A Physician whose patient has AIDS should share this information

with healthcare personnel for the purpose of protecting them' (item No 7), 'Scientific and technological applications and developments should be under control by society' (item No 12), 'Birth defects may be prevented in line with decisions of parents' (item No 13), 'No permission should be given for gender selection during pregnancy' (item No 15) and 'The aforementioned issues should be instructed as a course in primary and secondary school education' (item No 16) were supported by a large majority of respondents.

DISCUSSION

With reference to the survey items that solicited opinions about bioethics matters, pre-service science teachers responded positively to the statements 'Physicians should not share knowledge about patients with others without permission' (M = 4.42, 89.4%), 'A physician whose patient has AIDS should share this information with healthcare personnel for the purpose of protecting them' (M = 3.83, 72.4%), 'Birth defects may be prevented in line with decisions of parents' (M = 3.83, 66.9%), 'No permission should be given for gender selection during pregnancy' (M = 3.72, 62.6%). Many respondents supported the idea that birth defects may be prevented by a medical practice or intervention (M = 3.83, 66.9%) but they object to selecting a baby gender by means of progressive genetics technologies (M = 3.72, 62.6%). Thus, it is obvious that the opinions of the respondents about bioethics matters differ. In the study performed by Surmeli and Sahin[8] for the purpose of determining bioethics opinions of genetic engineering students, it was found that opinions of students about genetic practices and genetic diagnosis were positive and their relative decisions varied depending on the issues.

Pre-service science teachers supported with great enthusiasm the inclusion of ethics issues in primary and secondary school education (M = 3.92, %75.3). In a study performed by Bakar[3], an assessment was made of science teachers opinions on courses in which biotechnical matters were taught. It was found that teachers were of the view that bioethical education should be compulsory. Mayhew and Murphy[9] studied master students who had taken an ethics course in their fourth year and fifth year classes and compared them with students in the same program who had not been instructed in ethics in order to find out whether ethical instruction would have an effect on ethical behaviour. It was found that ethical instruction was not required for internalisation of ethical values but had an impact on ethical behaviour.

There was high acceptance of the view that scientific and technological developments should be subject to control in society (M = 3.72, 66%). With reference to genetics practices, many participants believed that medical reports containing their genetics data should be confidential between them and their physicians, even though there are circumstances where confidentiality was not observed even in countries where such confidentiality was instituted[10,11]. The need to regulate the ethics of scientific

developments is also recognised in the Human Genome Project allocation of 5% of its budget to ELSI (Ethical, Legal and Social Issues)[12].

The moral values of pre-service science teachers were examined in terms of the region where their families resided. It was found that participants in the Mediterranean, Central Anatolia and South-Eastern Anatolia regions manifested both idealist and relativist opinions, while those in the Aegean, Marmara, Central Anatolia and Eastern Anatolia regions expressed solely relativist opinions. As indicated in the result section an analysis of the items that were agreed on by a majority of those participating in the bioethical survey indicate that the autonomy principle was valued. Individuals subscribing to the idea of autonomy are those who value personal rights. Consequently, it appears that individuals whose value the autonomy principle hold highly idealistic opinions. With reference to the region of residence, the results indicate that female participants in the Mediterranean, Central Anatolia and South-Eastern Anatolia have this thought system (Table 2). Therefore, the Ho1 hypothesis is refuted and Ha1 hypothesis is accepted.

The study also examined the moral values of subgroups according to high and low levels of idealism/ relativism, and found that in our sampling group region of residence seems to have an influence on whether participants were subjectivists or situationists (Table 2). Similarly, Forsyth et al.[13] conducted a study on how much impact these two dimensions of idealism and relativism had on the culture of 30 230 participants from 29 countries. On the basis of Forsyth study[7], people of different grades of idealism and relativism were included with new groups to test the hypothesis that grades of idealism and relativism could be different for different countries. Forsyth[13] found that individuals from eastern and middle east countries were more idealistic than those in the west, and that more people from eastern countries displayed relativistic views than in western and middle eastern countries. Forsyth and his colleagues[13] concluded that exceptionists were more prevalent in western countries, subjectivists and situationists were more prevalent in eastern countries, and that situationists and absolutists were highly prevalent in middle eastern countries.

When the moral values of the pre-service teachers were examined in terms of gender, it was found that more females were idealists than males. Males moral values were those of absolutists who supported positive and desirable behaviours while females moral values were found to be those of situationists. Situationist people reject moral rules and interest in the actions of a certain case whether the best results possible. Also they supported positive behaviours as well but they believed that they were unable to display such behaviours under all circumstances. So they have high idealistic and also high relativistic opinions. In another study, it was found that female students had higher ideals than male students[14].

In this study, the finding of significant differences in moral values in terms of gender and residential regions suggests that environmental factors and regional culture has an influence on moral values and, consequently, on ethics decision making.

Accordingly, hypothesis Ho2 is refuted and hypothesis Ha2 is accepted. This conclusion is supported by the findings of other researchers. Wuensch et al.[15] found that the process of making ethical decisions is influenced by the gender, females tend to make more ethical decisions than males, a finding reported by other studies[14–16]. The research literature on the effect of environment on moral values supports our conclusion that cultural life and people environment exert an influence over their ethical decisions[13–17].

CONCLUSIONS

This study has found that the views of pre-service teachers about bioethical issues were mainly governed by on autonomy principles. İt was also found that they support the inclusion of a course on ethical issues in primary and secondary school education.

Pre-service teachers living in the Aegean, Marmara, Central Anatolia and Eastern Anatolia regions were found to have moral values classified as relativist, while participants in the Mediterranean, Central Anatolia and South-Eastern Anatolia regions were found to hold both idealist and relativist views. We also found that pre-service teachers were subjectivists and situationists with high and low levels of idealism/relativism depending on their region of residence.

In this study, we discovered significant differences in moral values in terms of gender and residential region. Females tend to have more idealistic views than males. From these results, it is clear that pre-service science teachers have different views about ethical principles, and their views vary according to gender. Their moral values are also different depending on region of residence, which is to be expected since values develop from childhood to adulthood. Family and teachers therefore have an important part to play in shaping ethical views and moral values, and should pay more conscious attention to the development of ethical values in the children under their care.

RECOMMENDATIONS

There is no compulsory course directly instructing ethical issues when we examined the undergraduate curriculum of pre-service science teacher programs although, as noted in the Introduction, it is generally presumed that ethics formation of students should be provided by science teachers. At the undergraduate level of teacher education, some ethical issues are addressed in certain courses (for instance, social, ethical and legal dimensions of genetics practices in 'Special topics in Biology' and 'Genetics & Biotechnology' courses in the undergraduate curriculum of science teachers). However, teaching these ethics topics in a separate course may influence pre-service science teachers to be more conscious of ethical issues and to make better decisions on matters of ethics.

In addition, since science teacher candidates should be highly aware of contemporary scientific and technological innovations as a desired requisite of their occupation, it is important for them to engage in discussions about the social dimension,

the human-environmental impact and the positive and negative aspects of scientific progress. With this in mind when opportunities arise in science-technology courses to engage with ethics issues, scenarios could be created to involve students in a discussion of the good and harmful aspects of a scientific development. Student teachers in this study expressed strong agreement with the idea of including ethics issues in the curriculum.

In the light of the results of this study, a wider study may be carried out to explore ways of effectively teaching ethics in the science and technology curriculum. Educating the next generation to care about the rights and freedoms of individuals, to be concerned about the impact of technology on the biotic and abiotic environment, and to be aware of the ethical dimension of biotechnology advancements should be the goal of ethics education. And also being aware of environmental ethics, which is part of the broader concept of bioethics, ethics education suggests ways to live in line with nature by developing positive attitudes and constructive behaviour[18].

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Received 25 March 2015
Revised 10 April 2015