

Secondary School Students' Perceptions about Biological Issues in South Korea

Jung-Hyun Kim, Kew-Cheol Shim, Shin-Cheol Song, Kyoungho Kim, Nam-Il Kim, Jinho Bae, and Keum-Hyun So

Abstract—The purpose of present paper was to investigate perceptions of Korean secondary school students about social issues related to biological sciences. Twenty issues were selected based on topics of articles in the newspaper from 2005 to 2010. The issues were categorized into biotechnology, health-disease and environment domains. Subjects were 541 high school students (male 253 and female 288). On the survey, students were asked to answer on 5-point Lickert scales how they thought of the effect of biological phenomena or events related to biological issues on the individual life and the society. They perceived that the biological issues would be more effectible on the society than on the individual life. Female students had a little more perceptions than males.

Keywords—biological issue, biological sciences, perception, secondary school

I. INTRODUCTION

THE topics related to biological sciences are getting popular, because citizens confront almost daily with biological issues through various mass-media. Recent biological phenomena or events made them feel anxiety of ecosystem, human health and survival, and so they think the issues are concerned with their lives [1]-[5]. Some of them would be issued socially to debate or make a decision [3]-[4]. The biological issues related to not only socially controversial problems, but also human survival and moral values.

In school science education, there is a demand on teaching students scientific topics concerned about science and technology in the society to enhance scientific reasoning as well as to learn effectively scientific knowledge [6]-[7]. Moreover learners need to be taught to depend on not rumors of and feelings about scientific social issues, but to express own their opinions of them [6], [8]-[9]. Few studies have been conducted to investigate positive or negative perceptions about the effect of scientific issues on the daily life and society, because previous research has surveyed students' interest, attitudes, and perceptions some topics of biotechnology and environment [1]-[6].

J. H. Kim is with the Department of Biology Education, Kongju National University, Gongju, Chungnam, 314-701 South Korea .

K. C. Shim is with the Department of Biology Education, Kongju National University, Gongju, Chungnam, 314-701 South Korea (corresponding author to phone: 82-41-850-8287; fax: 82-41-850-8842; e-mail: skcshim@kongju.ac.kr).

S. C. Song is with Shingil High School, Ansan, Kyounggi, 425-120 South Korea.

K. Kim is with the Department of Science Education, Gongju National University of Education, Gongju, Chungnam, 314-711 South .

N. I. Kim is with the Department of Science Education, Chuncheon National University of Education, Chuncheon, Gangwon, 200-703 South Korea .

J. Bae is with the Department of Science Education, Busan National University of Education, Busan, 611-736 South Korea.

K. H. So is with the Department of Science Education, Busan National University of Education, Busan, 611-736 South Korea.

It would be necessary to study on perceptions about socio-biological issues, and to investigate the thought of the relation among socio-biological issues, their own daily life and society.

The objective of this research was to investigate the perception of high school students about the effect of social issues related to biological sciences on individual life and the society, and to examine the difference between perception levels of males and females.

II. METHODS

A. Participants

Participants consisted of 541 eleven-grade students (253 males and 288 females) from three provinces containing 1 metropolitan city, South Korea.

B. Instrument

In this research, the perception of high school students about biological issues was examined. 18 biological issues were selected from articles of newspapers from 2005 to 2010, which were carried news items many times related to biological sciences. They consisted of three components, which were 'Health and Disease', 'Biotechnology' and 'Environment'.

Biological issues related to 'Health and Disease' were 'SI (Swine Influenza or Swine Flu)', 'AI (Avian Influenza or Avian Flu)', 'BSE (Bovine Spongiform Encephalopathy)', 'SARS (Severe Acute Respiratory Syndrome)', 'AIDS (Acquired Immune Deficiency Syndrome)', 'Diabetes', 'Dementia (Alzheimer's Disease)', 'Super Bacteria', and 'Cancer'. The issues related to 'Biotechnology' were 'Brain Science', 'Embryonic Stem Cell', 'HGP (Human Genome Project)', 'Medical Robotics', 'GMO (Genetically Modified Organism)', and 'Life Cloning'. The issues related to 'Environment' were 'Species Extinction', 'Biological Magnification', and 'Endocrine disrupter'.

High school students were asked to answer on 5-point Lickert scales how they thought of that biological phenomena or events related to issues to effect on individual life and on society following questions:

1. How do you think of the effect of biological phenomena or events related to the present biological issue on your life? (1: not effectible, 5: very effectible)
2. How do you think of the effect of biological phenomena or events related to the present biological issue on our society? (1: not effectible, 5: very effectible)

III. RESULT

Table I shows the perception of high school students about the effect of biological phenomena or events related to biological issues on the individual life and the society. They perceived that the effect of biological issues would be more on the society than on the individual life.

Among 9 biological issues related to 'Health and Disease', 'Cancer' was the most effectible both on the individual life and the society. However, 'AI(Avian Influenza)', 'SARS(Severe Acute Respiratory Syndrome)', 'AIDS(Acquired Immune Deficiency Syndrome)' and 'Super Bacteria' were little effectible on the individual life. Among 6 biological issues related to 'Biotechnology', the most effectible issue was 'Medical Robotics' on the individual life and 'Life Cloning' on the society. And high school students perceived that 'Endocrine Disrupter' was the most effectible on the individual life and 'Species Extinction' was the most on the society among 3 biological issues related to 'Environment'. 'Biological Magnification' was little effectible on the individual life among them.

TABLE I

HIGH SCHOOL STUDENTS' PERCEPTIONS ABOUT THE EFFECT OF BIOLOGICAL ISSUES ON THE INDIVIDUAL LIFE AND THE SOCIETY

Biological issue	individual life		society	
	Mean	S.D	Mean	S.D.
Health and disease				
SI(Swine Influenza)	3.06	1.15	3.73	1.09
AI(Avian Influenza)	2.78	1.09	3.49	1.05
BSE	3.10	1.15	3.79	1.08
SARS	2.71	1.10	3.24	1.15
AIDS	2.72	1.19	3.43	1.22
Diabetes	3.29	1.10	3.23	1.12
Dementia	3.39	1.11	3.35	1.13
Super Bacteria	2.65	1.15	3.12	1.25
Cancer	3.53	1.15	4.02	1.10
Total	3.03	0.76	3.49	0.77
Biotechnology				
Brain Science	3.16	1.16	3.59	1.12
Embryonic Stem Cell	3.25	1.19	3.93	1.17
HGP	3.09	1.19	3.68	1.20
Medical Robotics	3.47	1.16	3.95	1.10
GMO	3.33	1.21	3.78	1.15
Life Cloning	3.24	1.24	4.00	1.17
Total	3.25	0.90	3.82	0.91
Environment				
Species Extinction	3.21	1.23	3.78	1.20
Biological Magnification	2.83	1.18	3.14	1.23
Endocrine Disrupter	3.42	1.20	3.59	1.21
Total	3.15	0.94	3.51	0.96

Fig. 1 shows gender differences of perceptions about the effect of biological issues related to 'Health and Disease' on the individual life. Fig. 2 shows perceptions about the effect of issues related to 'Health and Disease' on the society by gender. Females had higher perceptions about the effect of biological issues related to 'Health and Disease' on both the individual life and the society. Both females and males perceived that 'Cancer' was the most effectible on the individual life and the society.

Fig. 3 and 4 show gender differences of perceptions about the effect of biological issues related to 'Biotechnology' on the individual life and the society. Males perceived that 'Embryonic Stem Cell' among 6 issues related to

'Biotechnology' was the most effectible on the individual life and the society, whereas females perceived that the most effectible biological issue was 'Medical Robotics'.

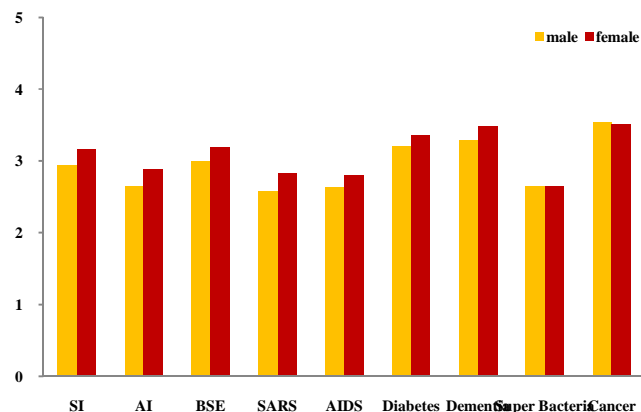


Fig. 1 Gender differences of high school students' perceptions about the effect of biological issues related to 'Health and Disease' on the individual life

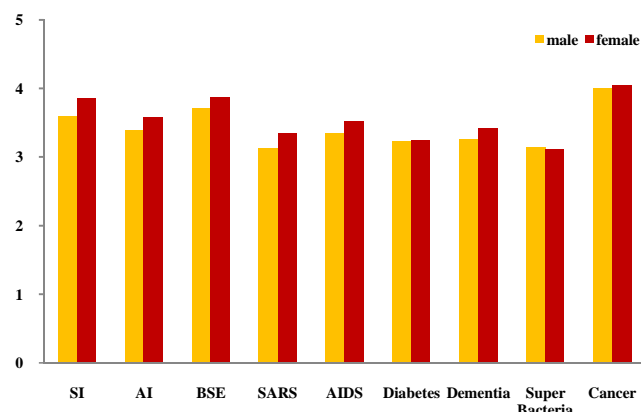


Fig. 2 Gender differences of high school students' perceptions about the effect of biological issues related to 'Health and Disease' on the society

Fig. 5 shows gender differences of perceptions about the effect of biological issues related to 'Environment' on the individual life and the society. Except the effect of 'Biological Magnification' on the individual life, females showed higher perceptions about the effect of biological issues related to 'Environment' on the individual life and the society than males. On the individual life, both females and males perceived that the biological issue about 'Endocrine Disrupter' was the most effectible. However, on the society, they perceived that the biological issue about 'Species Extinction' was the most effectible.

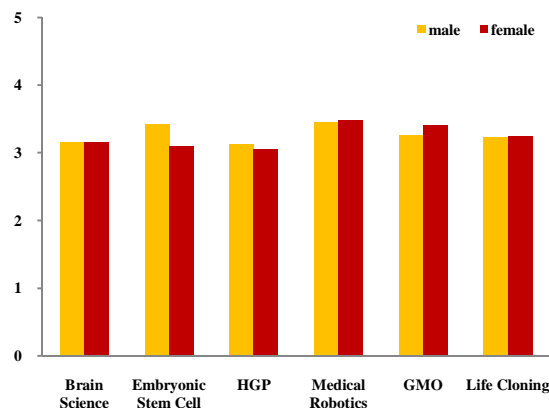


Fig. 3 Gender differences of high school students' perceptions about the effect of biological issues related to 'Biotechnology' on the individual life

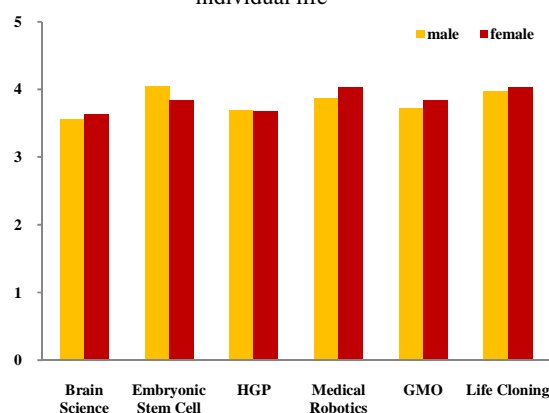


Fig. 4 Gender differences of high school students' perceptions about the effect of biological issues related to 'Biotechnology' on the society

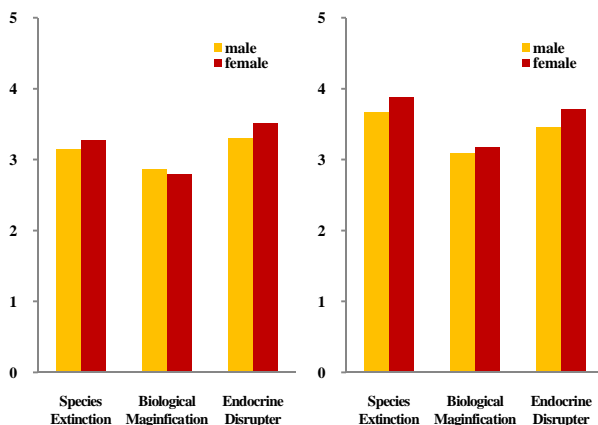


Fig. 5 Gender differences of high school students' perceptions about the effect of biological issues related to 'Environment' on the individual life (left) and the society (right)

IV. DISCUSSION

In this research, totally South Korean high school students perceived biological issues would effect on the individual life and the society. Especially, the effect of biological issues more effectible on the society than on the individual life. However, for 'AI', 'SARS', 'AIDS' and 'Super Bacteria' among social

issues related to 'Health and Disease', contrary to that high school students had higher perception level of the effect of them on the society, they were lower effectible on the individual life. That is because they perceived that they have been little concerned with daily life, and only socially troublesome, even though they have concerned about human health and disease [10]. Females were more perceptive of the effect of biological issues related to 'Health and Disease' on both the individual life and the society than males. That is because females were more concerned about the health than males [1], [10]. Perceptions about the effect of biological issues related to 'Biotechnology' on both the individual life and the society were little differences between females and males except 'Embryonic Stem Cell'. There was higher perception about the effect of biological issues on both the individual life and the society. That is because high school students had much interests in and concerns with the biotechnology [10]-[12]. For biological issues related to 'Environment', females were more perceptive of the effect of them on both the individual life and the society than males. It was correlated to that female students have more environmental perceptions than males [5], [10]. Most of high school students have perceived that biologically social issues were little related with their daily life. It is necessary to educate students that biological topics that were issued in a society strong relation to their own daily lives.

REFERENCES

- [1] K. C. Shim, "Study on Perception of Pre-Service Biology Teachers about Biotechnology", *The Korean J. of Biol. Educ.*, vol. 39, no. 1, pp. 126-134, Mar. 2011
- [2] H. Duan and R. W. Fortner, "Chinese College Students' Perceptions about Global versus Local Environmental Issues", *The J. of Environ. Educ.*, vol. 36, no. 4, pp. 23-32, Summer 2005.
- [3] T. J. Hoban, "Public Attitudes towards Agricultural Biotechnology", ESA Working Paper 04-09, May 2004.
- [4] R. Lock, C. Miles and S. Hughes, "The Influence of Teaching on Knowledge and Attitudes in Biotechnology and Genetic Engineering Contexts: Implications for Teaching Controversial Issues and the Public Understanding of Science", *School Science Review*, vol. 76(276), pp. 47-59, Mar. 1995.
- [5] M. I. Jung, K. H. So, K. C. Shim and S. H. Yeau, "A Study on Middle School Students' Perception of Global and Local Environmental Issues", *The Environ. Educ.*, vol. 20, no. 3, pp. 63-75, Sep. 2007.
- [6] M. K. Kim, J. L. Hong and N. K. Chang, "Development of the Instrument for Assessing the Degree of Ambivalence of the Attitudes of High School Students", *The Korean J. of Biol. Educ.*, vol. 29, no. 1, pp. 27-33, Mar. 2001.
- [7] R. Yager, "STS : Thinking Over the Years", *The Science Teacher*, vol. 57, no. 3, pp. 52-53, Mar. 1990
- [8] C. K. Johansen and D. E. Harris, "Teaching the Ethics of Biology", *The American Biology Teacher*, vol. 62, no. 5, pp. 352-358, May 2000.
- [9] P. Reis and C. Galvao, "Teaching Controversial Socio-Scientific Issues in Biology and Geology Classes: A Case Study", *Electronic J. of Sci. Educ.* vol. 13, no. 1, pp. 1-16, Mar. 2009.
- [10] S. C. Song and K. C. Shim, "Study on Perception of High School Students of Biotechnology", *The Environ. Educ.*, vol. 23, no. 1, pp. 99-111, Mar. 2010.
- [11] H. J. Lee, J. K. Lee, Y. S. Min, J. Y. Choi and K. C. Shim, "Perception of Elementary School, Middle School and High School Students about Genetically Modified Organism", *The Korean J. of Biol. Educ.*, vol. 38, no. 1, pp. 52-62, Mar. 2010.
- [12] J. L. Hong, K. C. Shim, and N. K. Chang, A study of Korean Middle School Students' Interests in Biology and Their Implications for Biology Education, *International J. of Sci. Educ.* Vol. 20, no. 8, pp. 989-999, Sep. 1998.