High School Students' Attitudes towards Sustainable Development: An Exploratory Investigation

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─────────── **<Abstract>** ───────────

Sustainable development brings many potential advantages to the society and environment. As such, many educational communities have concentrated on incorporating this concept into their educational programs for the K-12 classrooms. The K-12 technology educators have also exerted efforts to infuse the sustainable development concept into the K-12 national-curriculum level. The purpose of this study was to investigate the high school students' attitudes towards sustainable development. The study participants were 1,073 high school students from six high schools in Gyeonggi province. A self-reported instrument was used to obtain the students' demographic information and to come up with an attitudinal scale towards sustainable development. This study employed statistical ways of exploring the attitudinal level of the South Korean high school students and of describing the subcategories of the sustainable development. The findings described the high school students' attitudes towards sustainable development with regard to three components: (1) cognition of sustainable development; (2) practices in pursuit of sustainable development; and (3) perception of the education for sustainable development. The exploratory factor analysis supported three perspectives of the students' attitudes towards sustainable development. Also, the qualitative data collected and analyzed from the students' responses to the open-ended question posed to them indicated two domains of the students' cognition of and practices in pursuit of sustainable development. These findings were made on the bases of several recommendations regarding the research on and implementation of Education for Sustainable Development(ESD).

Keywords: High school students, sustainable development, technology education

I. Introduction

Sustainable development has gained much attention in the society since the World Commission on Environment and Development (WECD) set policies for sustainable development to address the growing concerns regarding the deteriorated situation of the human environment and natural resources. This concept has clearly been a social issue for ensuring the continued existence of natural systems, resources, and diversity, and is recognized in our society due to its many advantages.

Some efforts have been made in the educational field in line with this trend. For example, K-12 education has offered proper courses related to sustainability. The key goals of ESD (Education for Sustainable Development) in K-12 have been to educate students to advance sustainability knowledge and practices and to change their attitudes and behaviors towards sustainable development(Ahn& Pearce, 2009). Recently, the sustainable development concept began to be implemented in the STEM (Science, Technology, Engineering, and Mathematics) areas to reduce the environmental problems, such as water/air pollution and natural-resource depletion, and to contribute to human prosperity and social development.

Technology and engineering education have naturally accepted the concept of sustainable development in their curricula and textbooks (International Technology Education Association, 2000; Pavlova, 2005; Pitt & Lubben, 2009). Also, ESD research in technology education has concentrated on policy and curriculum development, teaching and learning practices, and teacher training approaches (Pavlova, 2013). Technology education has been interested in the social and environmental impact of technological innovation and invention. Thus, the conceptual-research approach towards sustainable development has been mainly employed (Martin, 2003; Pavlova, 2005; Wicklein, 2001). The teachers' attitude towards and ability to teach the concept of sustainable development is the key topic in the field of technology education(Elshof, 2005; Hill &Elshof, 2007; Wicklein, 2001). There have been no studies measuring the high school students' attitudes towards sustainable development, however, in the field of technology education.

A systematic investigation of the students' attitudes towards sustainable development will provide a sound foundation for the conduct of further studies on ESD. The measurement of the students' attitudes towards sustainable development should be based on the key concepts of sustainable development.

This study was conducted based on the perceived strong need to investigate the

high school students' attitudes towards sustainable development. A proper instrument development process was implemented to measure the high school students' attitudes towards sustainable development. The attitudinal features were identified based on the findings obtained from the literature review, and were tested using a statistical-analysis model. With a robust literature foundation, an instrument for measuring the students' attitudes towards sustainable development could be developed. This survey was implemented for six high schools in a province of South Korea. This study might have a limitation regarding the generalization of the findings to other educational settings.

1. Research Goals

This study was designed to investigate the high school students' attitudes towards sustainable development. The results of the study can contribute to educational-program development and implementation for improving the high school students' attitudes towards sustainable development. In particular, the specific questions of this study were as follows:

1. What are the South Korean high school students' attitudes towards sustainable development?
2. What are the identified factors reflecting the South Korean high school students' attitudes towards sustainable development?
3. Are there statistically significant differences in the South Korean high school students' attitudes towards sustainable development with regard to demographic categories (gender and career path)?

2. Definition of Terminologies

The variety of definitions of "sustainable development" has been a well-known issue and is on account of the fact that sustainable development can be defined based on different perspectives in various areas. Wals(2009) pointed out that the precise definition of sustainable development persists as a topic of worldwide debate. This study supports the definition of "sustainability" prepared by the World Commission on Environment and Development in its report "Our Common Future." In this report, sustainable development meets needs of the present without compromising the abilities of the future generation (WCED, 1987).

Ⅱ. Review of Relevant Literature

1. Education for Sustainable Development

The concept of sustainability has gained much attention in line with the efforts to enable all global citizens to meet their basic needs, and to improve human lives. This concept has provided many benefits, such as ensuring the continued existence of natural systems and resources, and that the diversity upon which they depend is maintained and enhanced for the future generations (Michalos et al., 2012; WCED, 1987). Sustainability has been widely recognized in both the global and domestic societies because of the benefits of pursuing sustainable development.

Sustainability can have different definitions based on different perspectives and on the needs of various areas. This study supports the definition of "sustainability" prepared by the World Commission on Environment and Development in its report "Our Common Future." In this report, sustainable development meets needs of the present without compromising the abilities of the future generation (WCED, 1987). This concept mirrors three perspectives: the social, environmental, and economic impacts on human prosperity and development(Vare& Scott, 2007; UNESCO, 2009; WCED, 1987).

Education for sustainable development is based on the concept of sustainable development. Continuous efforts to entice educators to participate in ESD have been made in both the global and domestic levels (Blewitt, 2005; Park & Sung, 2007; UNESCO, 2004; 2006; 2009; 2012; Vare, Scott, 2008; Wals, 2009). The Bonn Declaration, which was accepted by the UNESCO(2009) World Conference on Education for Sustainable Development in Germany, emphasized the abundance of ESD. Two articles of the Bonn Declaration touch on the ESD concept: Article8 and 9, as follows (UNESCO, 2009):

> 8 ESD is based on the values of justice, equity, tolerance, sufficiency, and responsibility. It promotes gender equality, social cohesion, and poverty reduction and emphasizes care, integrity, and honesty, as articulated in the Earth Charter. ESD is underpinned by principles that support sustainable living, democracy, and human well-being. Environmental protection and restoration, natural-resource conservation, and sustainable use, addressing unsustainable production and consumption patterns, and the creation of just and peaceful societies, are also important principles underpinning ESD.

9 ESD emphasizes creative and critical approaches, long-term thinking, and innovation and empowerment for dealing with uncertainty and for solving complex problems. ESD highlights the interdependence of the environment, economy, society, and cultural diversity from the local to the global levels, and takes into account the past, present, and future.

Unlike the public awareness in the level of environment education, sustainable development is a broad concept that pervades the philosophical areas of freedom, justice, and democracy as well as human well-being and pursuit for the next generation (Agyeman & Evans, 1995).

2. Students' Attitudes towards Sustainable Development

ESD has been used for making the educational experience more sustainable through systematic ways like the educational program, curriculum development, and campaigns for educational communities. To accomplish successful ESD, comprehensive support should be provided by diverse groups like schools, governments, and local institutes. Studies investigating the teachers' perceptions of sustainable development have been actively conducted in diverse areas from the elementary school level to the post-secondary level(Choi, Lee, & Kim, 2010; Ju & Lee, 2011; Jung, 2010; Lee, 2013; Lee et al., 2006). There are insufficient studies, however, surveying the students' attitudes towards sustainable development.

The key goals of ESD contain integrated features of knowledge, attitude, and relevant competency. In other words, ESD aims to develop the future global citizens' knowledge and skills for sustainable development(National Strategy on Education for Sustainable Development, 2007). Park and Sung(2007) stressed that ESD should make a connection between the students' cognition and behavioral transition. One clear trend regarding ESD implementation is to make it broad by reorienting the curricula from preschool to the university, and by reforming education(Michalos et al., 2012). The recent emphasis on ESD research is the development of the students' practical competency for sustainable development(UNESCO, 2009). In other words, the ultimate goal of ESD is to develop the students' knowledge, attitudes/values, and actions/behaviors as needed to build a sustainable world. Also, the key scopes of the ESD learning contents can be described in three perspectives: social, environmental, and economic(Kang, 2011; Park & Sung, 2007; Lee et al., 2006).

Ⅲ. Research Design and Methodology

In this study, a quantitative design was employed for investigating the South Korean high school students' attitudes towards sustainable development. A self-reporting survey was conducted to obtain the high school students' demographic information and to determine their attitudes towards sustainable development. Also, in relation to the high school students' attitudes, several statistical analyses, such as descriptive statistics, independent t-test, and factor analysis, were performed to identify the meaningful implications of the study findings on education for sustainable development.

1. Participants

The population for this study consisted of high school students who took the Technology Education class within the Technology and Home Economics subject in Gyeonggi province in fall 2012 and spring 2013. This study employed purposeful sampling for selecting the participants. In three middle-eastern regions of Gyeonggi province, the researcher called three administrative representatives of the provincial educational offices to obtain the names of the high schools that were offering the Technology Education program. Each recommended relevant high schools, and a list of 10 high schools was come up with. The researcher sent an invitation e-mail to each school's technology teacher and confirmed the consented participation of six high schools.

Five schools completed the survey in fall 2012, but one school completed the survey in spring 2013 due to the school's administrative procedure. A total of 1,073 high school students from six institutes participated in this study, as presented in <Table 1>.

<Table 1> Participants Information

Institute	Male	Female	Total
A High School	34	82	116
B High School	251	0	251
C High School	245	0	245
D High School	91	110	201
E High School	142	39	181
F High School	45	34	79
Total	808	265	1073

2. Instrumentation

This study adopted and modified the instrument developed by Ahn and Pearce (2007). Such instrument was developed for measuring construction contractors' knowledge of the sustainable development concept, and was revised to fit the educational setting. Also, prior studies associated with education for sustainable development were reviewed to complete the survey items in this study. The instrument that was to be used in this study was reviewed and modified through an expert group discussion. The expert group consisted of two high school technology teachers, two sustainable development researchers, and three teachers' educators during the instrumentation process. Finally, the instrument consisted of three categories: (1) demographic information; (2) high school students' attitudinal scale towards sustainable development; and (3) a questionnaire consisting of open-ended questions related to sustainable development.

The first category collected demographic data like the study participant's gender, future career path, and preference for the technology subject. In the preference section, an item on future career asked the students to write their future career, and the researcher converted the career into two categories (STEM and non-STEM areas). Also, an item on the preference for the technology subject asked the students to identify the level of their preference for the technology education area within the Technology and Home Economics subject based on a 7-point Likert scale, from "strongly disagree" (1) to "strongly agree" (7).

The second category was initially made from prior studies (Ahn& Pearce, 2007; Michalos et al., 2012; Tinker et al., 2004). Thirteen items were created based on three perspectives: (1) the students' cognition of sustainable development; (2) the students' practices in pursuit of sustainable development; and (3) the students' perception of ESD. The developed instrument asked the students to identify their level of agreement to each item based on a 5-point Likert scale (strongly disagree, 1; disagree, 2; neutral, 3; agree, 4; strongly agree, 5). Also, a process of determining the content/face validity through a panel of experts was employed in this study. The panel confirmed the consented-to survey after an in-depth discussion process. Based on the findings obtained from the expert group meeting, two items were modified for clarification purposes, and three items that were not valid were deleted. Ten items were finalized for a complete survey. Also, the final survey items related to three perspectives of sustainable development are presented in <Table 2>. The final items were tested on 30 high school students in Daejeon, as a pilot study. The

reliability of the instrument for the pilot test was 0.798,based on Cronbach's alpha. The third category of this instrument was the students' perceptions of sustainable development in their technology education classes, which were determined using an open-ended questionnaire, where the students were asked to write their experiences in relation to sustainable development in their technology education classes.

<Table 2> Items for Students' Attitude toward Sustainable Development

Survey Items	Construct
1. I am familiar with key ideas of sustainable development.	Cognition toward SD.
2. I recognize the government/national policy related to the sustainable development.	
3. I can explain key practical policies toward sustainable development in our school.	
4. I am participating in several activities for sustainable development in our school.	Practice toward SD.
5. I will buy environmental friendly houses or systems even though the item is more expensive than normal one.	
6. Technological innovation (efforts) can solve environmental problem(s) our world has faced.	
7. The sustainable management after the creation of the environmental friendly houses or systems is the significant factor for sustainable society.	
8. In my opinion, my school curriculum has actively included key ideas of sustainable development.	Perception toward ESD (Education for SD)
9. Our K-12 school has taught basic knowledge associated with the sustainable development.	
10. Our school system help students develop sound attitude toward sustainable development.	

3. Data Collection and Analysis

An invitation e-mail was sent to the technology teachers of ten preliminary high schools obtained from the local supervisors of Technology Education. A week later, a follow-up process via e-mail and phone call was conducted to check if such teachers could participate in the survey process. As a result, six high schools confirmed their participation in the study. Also, 1,073 usable survey responses were received by mail from the technology teachers. The quantitative data collected from the survey were analyzed via descriptive analysis, factor analysis, and t-test using SPSS version 21. The qualitative data obtained from the students' responses to the open-ended questions in the survey questionnaire were analyzed via theme analysis.

IV. Findings and Interpretations

1. Demographic Description

This study investigated the high school students' attitudes towards sustainable development. A total of 1,073 students (75.3% male,24.7% female) participated in this survey. They were all first year high school students at the time of the survey. To investigate the level of their preference for the technology area within the Technology and Home Economics subject, this study asked the students to identify the level of their preferences for technology, science, and mathematics based on a 7-point Likert scale. "Preference for technology" meant the level of their preference for the technology area within technology and home economics education. The findings indicated a medium-level preference for the technology area, as presented in <Table 3>.

<Table 3> Preferences toward School Subjects

	N	Min	Max	Mean	S.D.
Mathematics	1073	1.00	7.00	4.2106	1.78833
Science	1073	1.00	7.00	3.9683	1.80146
Technology	1073	1.00	7.00	3.8406	1.56565

The findings regarding the preference for the technology area were also compared by participant's gender and career pursuit using independent t-test, as presented in <Table 4>. In the comparison by career pursuit, the students were asked to identify their future career, and the students' answers were converted into two categories: STEM-related careers and non-STEM careers.

<Table 4> Comparison of the Preference Means by Gender & Career Pursuit

	Group	N	Mean	S.D.	t
Gender	Male	808	4.0582	1.53774	8.818***
	Female	265	3.1774	1.46249	
Career	STEM	333	4.6126	1.45931	11.476***
	Non-STEM	740	3.4932	1.48651	

*** $p < 0.0001$

The male students presented significantly higher mean scores than the female students (t=8.188, p=0.000) with regard to the level of their preference for the technology subject. Also, the mean scores of the group pursuing STEM-related careers with regard to the level of their preference for the technology subject were significantly higher than those of the other group (t=11.476, p=0.000).

2. Exploratory Factor Analysis

This study employed an exploratory factor analysis strategy to identify the sub-constructs associated with the high school students' attitudes towards sustainable development. The strategy was operated via principal component analysis using SPSS version 21. The findings of SPSS (*principal component analysis and Varimax rotated with Kaiser normalization*) provided an overall feature regarding the measurement of the high school students' attitudes towards sustainable development. The findings presented three factors, as shown in <Table 5> and <Table 6>.

<Table 5> Finding from Principle Component Analysis

Factor	Eigen Value	Percent of Variance	Cumulative Percent
1	3.458	34.580	34.580
2	1.744	17.437	52.017
3	1.299	12.989	65.006
4	.773	7.731	72.736
5	.631	6.314	79.050
6	.596	5.959	85.010
7	.472	4.721	89.731
8	.383	3.829	93.559
9	.333	3.330	96.890
10	.311	3.110	100.000

<Table 6> Rotated Matrix from Principal Component Analysis

Items	Rotated Matrix (Varimax)		
	Factor 1	Factor 2	Factor 3
Q1	.233	.161	.804
Q2	-.002	.129	.888
Q3	.308	.043	.571
Q4	.737	-.064	.250
Q5	.620	.005	.124
Q6	.744	.275	-.035
Q7	.785	.157	.169
Q8	.063	.818	.166
Q9	-.032	.868	.124
Q10	.250	.794	.029

The criterion for reasonable factor loading in this study was .40. There were three clear factors indicating reasonable factor loadings in the model that was used. Also, in this study, three factors were named as cognition of sustainable development, practices in pursuit of sustainable development, and perception of ESD, and the obtained results were consistent with the framework of the literature background. The Cronbach's alpha values for the constructs were .717(cognition), 735(practice), and .796(perception of ESD).

3. Key Features of the Students' Attitudinal Status

The three factors identified in the exploratory factor analysis were compared by gender and career pursuit using independent t-test, as presented in <Table 7>. The students' cognition of sustainable development was statistically significant by gender and career pursuit. The male students' cognition was greater than that of the female students(t=4.408,p=.000), and the students' cognition of the STEM career pursuit was greater than their cognition of the non-STEM career pursuit(t=5.149,p=.000).Also,the students' practices in pursuit of sustainable development were statistically significant by career pursuit. The students' practices in pursuit of sustainable development for the STEM career pursuit was greater than that for the non-STEM career pursuit(t=4.912,p=.000).

<Table 7> Mean Comparison of the Attitudinal Score by Gender and Career

Group			N	Mean	S.D.	t
Gender	Cognition toward SD	Male	808	3.1058	.72748	4.408***
		Female	265	2.8767	.75427	
	Practice toward SD	Male	808	3.5957	.70028	.544
		Female	265	3.5679	.78493	
	Perception for ESD	Male	808	2.8828	.82406	-.396
		Female	265	2.9057	.78275	
Career Pursuit	Cognition toward SD	STEM	333	3.2207	.69306	5.149***
		Non-STEM	740	2.9721	.74856	
	Practice_SD	STEM	333	3.7485	.67328	4.912***
		Non-STEM	740	3.5170	.73179	
	Per_ESD	STEM	333	2.8819	.76752	-.178
		Non-STEM	740	2.8914	.83421	

*** p<0.0001

The qualitative data obtained from the study participants' responses to the open-ended questions posed to them ("Describe sustainable development and give

relevant examples for the concept") were analyzed via content analysis. The number of written responses that could be used for this analysis was 211(19.6%). Some students gave improper responses or did not answer some questions. The findings from the content analysis were categorized into two perspectives: the students' cognition of sustainable development and the students' practices in pursuit of sustainable development.

In the students' cognition perspective, there were three themes: social importance, economic reasons, and environmental issues. The students perceived sustainable development as an indicator of social prosperity and wealth and as an innovative way of gaining financial benefits. They also recognized it as a way of solving diverse human problems, such as environmental pollution, limited resources, and ecological imbalance.

Joosoon : In my opinion, the key concept of sustainable development is sustaining our society in a prosperous way. Today, sustaining something is a necessary concept for our society. It's a simple example, like solving the problem of environmental pollution. Also, balancing our ecological development and human advancement can be a good example for describing the concept.

Jaehyun : We can sustain our financial status. Sustainable development surely gives us huge benefits from the economic perspective. For example, if we can solve our social/environmental problems in sustainable ways, we can gain financial benefits by saving and meeting our economic needs.

Jihye : We should concentrate on identifying the final goal of sustainable development. First of all, I think the goal of sustainable development is "to sustain our society properly, without any loss." Take a look at the limited resources that we currently possess! I think we have to do something to sustain our current social status.

Min : Sustaining our environmental status! We have suffered much from environmental pollution. I think we should keep our environment "clean" to sustain our development. It will be meaningful for our society to have a satisfactory economic advancement without environmental pollution or loss.

With regard to the students' practices in pursuit of sustainable development, there were three themes: school waste recycling systems, technological hands-on activities,

and school-level campaigns. It turned out that the students' practices were the recycling-related activities in each school. Also, they considered sustainable development in their technological problem solving and school-level campaigns.

Jeongyoon : We practice sustainable development every day. Doing school waste recycling work is a good example of this. We should possess the practical ability of recycling our given resources. Proper recycling will make our society, including our environment, sustainable by increasing the economic benefits and decreasing the environmental burdens.

Gyutae : Our school had a semester campaign entitled "Anabada: Saving, Sharing, Exchanging, and Reuse." This event provided a practical experience for sustainable development.

Hyerim : In the technological problem solving activity, we pursue sustainable development by finding strategies for increasing the efficiency of using materials and tools. For instance, we should consider using the minimum level of materials for accomplishing problem solving activities.

V. Summary, Conclusion, and Recommendation

The inclusion of the sustainable development concept in the field of technology and engineering education has been a global trend(Elshof, 2009; ITEA, 2000; Pavlova, 2013; Wicklein, 2001). Considering the significance of sustainable development, education for sustainable development (ESD) has been a significant educational issue for sustaining the society and environment.

The education for sustainable development (ESD) research in technology education has emphasized three topics: policy and curriculum development, teaching-learning practices, and teacher training approaches(Pavlova, 2013). Also, it has covered the social, environmental, and economic perspectives(UNESCO, 2009). The goals of ESD are to develop the students' knowledge of, attitudes towards, and practical abilities in sustainable development(Park & Sung, 2007). The prior studies presented an insufficient research trend for measuring the students' attitudes towards sustainable development.

This study investigated the high school students' attitudes towards sustainable

development. The study participants were 1,073 high school students(75.3% male,24.7% female) in Gyeonggi province. A self-reporting instrument was utilized for obtaining the students' demographic information and for coming up with their attitudinal scale towards sustainable development. The quantitative data obtained from the responses to the instrument items were analyzed via descriptive statistics, exploratory factor analysis, and independent t-test using SPSS version 21. Also, the qualitative data obtained from the responses to the open-ended questions in the survey questionnaire were analyzed via theme analysis.

The participants indicated a medium-level preference for the technology area within the Technology and Home Economics subject. The findings from the independent t-test by gender and career pursuit were that the mean scores of the male student and STEM career pursuit groups were significantly higher than those of the other groups in terms of the level of preference for the technology area. The exploratory factor analysis model presented three constructs: cognition of sustainable development, practices in pursuit of sustainable development, and perception of ESD. Also, the responses to the open-ended questions in the survey questionnaire indicated two domains of the high school students' cognition of and practices in pursuit of sustainable development. The students perceived sustainable development as an indicator of social prosperity and wealth and as an environmental problem solving strategy. Also, their practices in pursuit of sustainable development in the school setting consisted of several types of school waste recycling activities, technological hands-on activities, and school campaigns. Their cognition of sustainable development showed three themes: social importance, economic reasons, and environmental issues.

This study came up with several recommendations for the research on and implementation of ESD. First of all, the high school students' cognition of sustainable development is meaningful only if they practice sustainable development in their daily lives. With this in mind, the ESD educational program and curriculum should consider the key goals of ESD: developing the students' knowledge of, attitudes towards, and practice ability towards sustainable development. Second, technology education practitioners and researchers should give more attention to the development and implementation of sustainable hands-on activities in the K-12 technology education setting. Also, further empirical studies on ESD research in the perspective of technology education should be conducted to attain the key values and philosophy of ESD.

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<국문요약>

지속가능한 개발에 관한 고등학생의 태도 : 탐색적 연구

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　지속가능한 개발은 우리 사회와 환경에 많은 잠재적인 혜택을 가져오고 있다. 따라서 여러 교육 기관들이 초중등학교를 위한 교육 프로그램에 지속가능한 개발의 개념을 도입하는데 큰 관심을 보이고 있다. 또한 초중등학교 기술교사들은 그 교육과정이나 교육프로그램에 지속가능한 개발의 개념을 받아들이려고 많은 노력을 해오고 있다. 이 연구의 목적은 지속가능한 개발의 개념에 관한 우리나라 고등학생들의 태도를 조사하는 것이다. 이 연구의 참가자는 경기도에 있는 6개 고등학교의 1073명의 고등학생이다. 지속가능한 개발을 위한 태도 척도와 인구통계학적 정보를 조사하기 위해 설문지를 사용되었다. 이 연구는 지속가능한 개발에 관한 고등학생들의 태도 수준을 알아보기 위해 통계적 분석을 하였으며 이를 통해 지속가능한 개발과 관련된 하위 개념을 규명하였다. 그 결과 지속가능한 개발에 관한 고등학생들의 태도를 다음의 세 가지로 규정하였다. (1) 지속가능한 개발에 대한 인지, (2) 지속가능한 개발에 대한 실천, 그리고 (3) 지속가능한 개발을 위한 교육에 대한 인식. 탐색적 요인분석의 결과는 이런 지속가능한 개발을 위한 세 가지 측면과 일치했다. 또한 개방형 질문에서 얻은 질적인 자료는 지속가능한 개발에 대한 인지와 실천의 영역을 말하고 있다. 이러한 연구결과는 지속가능한 개발을 위한 교육의 연구와 실천과 관련되어 몇 가지 제안들을 하고 있다.

　주제어: 고등학생, 지속가능한 개발, 기술교육

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