

Education for Sustainable Development within School Geography: A Proposed Model

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학교 지리에서 지속가능발전 교육: 모델 구안

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Abstract : The purpose of this research is to propose a model for education for sustainable development (ESD) within the geography curriculum. The study consists of two parts. The first part discusses the normal view of a model to assess the curriculum, namely the content and the cognitive dimensions. The ESD component necessitates an action program with skills and citizenship considered as the Objective Dimension. The second part of the paper examines the means for adding the Objective Dimension which follows a taking action approach through knowledge, skills, and citizenship that are consistent with ESD goals. The research procedure applied the methodology of the Delphi process. The theoretical model was initially developed by the researchers based on current practices in geography assessment in South Korea and the U.S . The model was tested using the Delphi technique by high school geography teachers and geography education faculty members in both countries who were recognized experts in their field. The research complements the curriculum and instructional activities that have been under way with the United Nations Decade of Education for Sustainable Development (UNDESD). The model may be used to deliberate proposals for building an ESD component into existing assessment practices.

Key Words : ESD, Objective, Content, and Cognitive Dimension, Delphi technique, Ecological multiple citizenship

요약 : 이 연구는 지리 교육과정에서 지속가능발전 교육을 실천하기 위한 모델을 구안하고 있다. 논문의 전반부에서는 교육과정의 내용 차원과 인지적 차원을 평가하는 모델의 일반적 관점을 논의한다. 지속가능발전 교육은 기능과 시민성 함양을 목표로 하는 실행 프로그램을 필요로 한다. 후반부에서는 목표 차원을 포함시키는 방법을 살펴본다. 목표 차원에서는 지속가능발전 교육 목적과 일치하는 지식, 기능, 시민성을 활용한 실천적 접근이 요구된다. 연구자들은 한국과 미국의 지리 평가의 실제에 근거하여 이론적 모델을 개발하고, 모델은 두 나라 전문가 집단(고교 교사와 대학 교수)에게서 검증되었다. 이 연구는 유엔지속가능발전교육10년 국제이행 계획의 교육과정과 수업 활동을 보완할 것이다. 개발된 모델은 지속가능발전 교육 요소를 기존의 평가 활동에 도입하려는 제안을 구체화하는 데 활용될 수 있다.

주요어 : 지속가능발전 교육, 목표·내용·인지적 차원, 델파이 기법, 생태적 다중시민성

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1. Introduction

1) The Research Questions

The researchers believe that Education for Sustainable Development (ESD) has become a priority goal in many countries. Where does ESD fit into the curriculum? Geographers would claim that much of the information in ESD is also well represented in the geography curriculum. In this paper we look at the relationship between three components that geography, education, and ESD share and the relative importance of each for the future.

The research questions that guided the study were: 1) What is the level of consensus between geography education, assessment, and the emerging ESD goals among geography educators in South Korea and the United States? 2) What is the comparative importance assigned to geography education and ESD within a proposed model of instruction and assessment as appraised by geography educators from South Korea and the U. S.?

2) Research Background

The research study surveyed high school teachers' and faculty members' mindset in South Korea and the U. S. to determine the efficacy of a content and assessment model within geography education that was comprised of objective, content, and cognitive domains (Figure 1). The domains model developed includes an overall structure that can lead to more inclusive attention to ESD within the geography education curriculum and the assessment of student learning. The research provides a background and framework for the development of geography and ESD that may be adopted and applied by schools and individual teachers. The authors were examining sustainability as a relatively new opportunity for inclusion within geography classroom instruction and assessment.

When teachers in elementary and secondary schools consider assessment, they usually are inclined to focus on information as the building blocks of new knowledge. This knowledge is often measured using selected-response questions, short answer, and extended-response questions. Those types of items are the basis

Table 1. Modified Geography Assessment Framework Elements

Content Cognitive	Space and Place	Environment and Society	Spatial Dynamics and Connections
Knowing	Where is the world's largest tropical rain forest?	What mineral resources are often extracted by strip mining?	What factors stimulate human migrations?
Understanding	Why are tropical rain forests located near the equator?	Explain the effects of strip mining and shaft mining on the landscape.	Explain the motivations of modern day Mexicans and Cubans for immigrating to the U.S.
Applying	Support the conclusion that tropical rain forests promote wide species variation	How can both economic and environmental interests be reconciled in an area of strip mining?	Compare current settlement and employment patterns of Cuban and Mexican immigrants in the U.S.
Reasoning (added by authors)	In which regions in tropical rain forests will sustainable living be continued?	Which type of mining will be considered sustainable development in strip mining and shaft mining areas?	State the 2030 situation of Spanish and Hispanic in the U.S. (based on rational grounds)

Source and modified from: (National Assessment Governing Board, 2010)

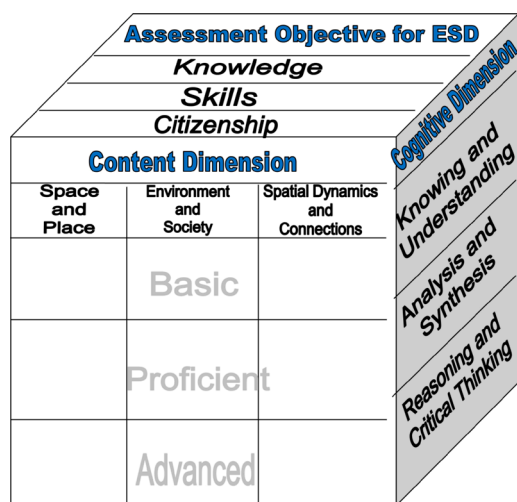


Figure 1. A Proposed Model for Content, Cognition, and Objectives for Geography Education Inclusive of Education for Sustainable Development

for assessing cognitive and content dimensions. In the national assessment of geography used in the U. S., there are two dimensions (Table 1).

The cognitive dimension includes knowing, understanding, and applying steps. The content dimension consists of space and place, environment and society, spatial dynamics and connections. In order to add ESD to the model, we propose that reasoning using the information from the content dimension is necessary. The geography framework for the 2010 National Assessment of Educational Progress displayed three cognitive areas. These cognitive areas are defined as knowledge, understanding, and applying (each covers a broad range of thinking skills). The authors' goal was to have respondents further differentiate between analysis/synthesis and reasoning/critical thinking and their role in ESD.

Reasoning skills enable pupils to take reasoned positions regarding opinions and actions, to draw inferences using both inductive and deductive processes, to use precise language to explain their positions on an issue, and to make judgments and decisions informed

by thoughtful use of evidence (Leat, 2001). Critical thinking is the ability to control your cognitive process. It both enhances and relies on metacognition, thus allow the person to critically consider how he or she arrived at certain ideas, concepts, and thoughts. It is a reflective process that helps improve an individual's control over his or her thinking process and learning (Brown and Green, 2006). A third element is citizenship, or taking the role of a responsible member of society and applying the predispositions to take action in real life issues, to apply the skills of public discourse, and to validate one's informed position with environmental knowledge from geography and other physical and social sciences. This element may be viewed as the taking action element of the objective dimension. It represents the crosscutting link between the content, cognitive and objectives necessary to respond to communicating sustainability in and across societies (Figure 1).

Geography as a field of knowledge has a particular role within teaching about sustainability. The discipline bridges the physical sciences and the social sciences since it deals with the spatial perspective on nature and interactions of both the natural environment and humans. The topic being examined in this paper, ESD entails balancing the use of the natural environment, including natural resources, so that a positive legacy remains for future generations of Earth's inhabitants. It is a topic that has gained considerable international recognition for its futuristic viewpoint and focus on Earth as an ecological system.

Sustainability topics have an increased visibility in the curriculum as a result of the United Nation's Decade of Education for Sustainable Development (UNESCO, 2005), which is intended to provide leadership and practical measures of ways that the educational process (pre-school through post schooling public engagement) may be engaged in sustainability of Earth and its resources. The first five years of the

work addressing sustainability were largely devoted to needs assessments, curriculum development, professional development of teachers, and instructional materials design. Little was devoted to the assessment of impact of the decade long project. The greatest attention to assessment of the impacts of the decade will be at the local level as classroom teachers begin to implement the educational development and preparation work of the past decade. That position has been extended to geography classroom teachers through the Lucerne Declaration on Geographical Education for Sustainable Development (Reinfried, 2009). The Declaration substantiates both the close relationship between geography education and sustainable development and the means to incorporate ESD through the geography curriculum.

The U. S. and South Korea have professional educators engaged in ESD, and there are geographers in both countries that specialize in sustainability study and research. The present research study is an initial step in determining the level of agreement there is with ESD and its implementation in South Korea and the U.S. Perhaps the research will benefit other countries engaged in the curriculum change debate since the current research provides a model for determining priorities and applications of geography assessment elements towards ESD. The project was initiated with a review of the current research on the topic of ESD and the practice of including ESD within geography education in the school curriculum. The ultimate goal of the research is to develop a model that represents the relative proportions of attention to objectives, content, and cognition that a curriculum might follow. The relatively wide spread of ESD within several regions of the world and its incorporation within geography education have alerted the authors to the need to not only review the basis for ESD, but to also propose a model for the instruction and assessment of ESD. We are proposing that the geography is a highly suitable home for

both.

Considerable work has been completed in many disciplines regarding the approaches to engaging pre-K-secondary level schooling, post-secondary education, and general public engagement in the goals set by the Decade for ESD. Geography education has been deeply engaged through similar types of activities that have mainly involved curriculum development, instructional materials design, and content selection. The segment of the decade plan that continues to need improvement is the assessment of success of ESD at the classroom and public engagement levels. ESD differs from geography education in that it has a prominent attachment to citizenship education and skills necessary to take action. The goals of ESD do not end with knowledge acquisition, but extend to applying the knowledge using appropriate skills and taking action with knowledge and skills. It is the extension to taking action that engages students in ESD.

This project represents the proposition that a model may be proposed as the overarching framework for the design of curriculum and assessments applicable at the classroom and public engagement level of ESD. In this study the researchers collaborated using South Korea and the U.S. as the locations for observing the components of geography and ESD among teachers at the high school and university levels.

2. Perspectives from ESD and Geography Content and Assessment Elements

1) Focusing on the Spatial, Ecological and Value Perspectives from ESD

Attention to the location or pattern where events occur activates the spatial perspective in individuals.

The ways in which people and other organisms interact with the physical environment is the ecological perspective. ESD embraces an action and skill dimension that may be described as citizenship. The International Geographical Union Commission on Geography Education has proposed the introduction and structure of ESD in schools and universities through the Lucerne Declaration on Geographical Education for Sustainable Development (Haubrich, Reinfried, & Schleicher, 2007). Considerable research and reporting of ESD initiatives have originated in the United Kingdom, especially England and Wales. In 2000, the National Curriculum of the U.K. (DfEE/QCA, 1999) was adjusted to include sustainable development as a central theme. The principles of sustainability became the integrative component for key stages 1, 2 and 3, as they are referred to in the national curriculum context. The increased concern with sustainable development at the time and subsequent adoption of ESD in other countries has demonstrated the synergetic relationship between geography and ESD. Westaway (2009) has noted that the human environment relationship bonds the key concepts and processes/elements of geography and ESD and results in a more than curious coincidence. It appears that the two are related due to the very structure of the knowledge they pursue and the methodologies they apply are common to both geography and ESD.

The British academic, Huckle (2001) has written numerous treatises on the relationship among geography, sustainability, and citizenship, which incorporates the values of shared responsibility and social equity. He proposed that economic development became unsustainable from lack of environmental knowledge (geography) and the delicate balance with nature necessary to achieve sustainability. Lack of scientific knowledge related to sustainability is sometimes accompanied by political and cultural conditions that impact negatively the economic and ecological future

of a country or region, often at great cost to the latter. The Geographical Association (2009) of England and Wales issued a manifesto for geographical education including increased attention to sustainability with values important to democratic citizenship. International programs for ESD have also taken center stage in different parts of the world. The sustainability perspective of the United Nations was invigorated by the Rio Declaration and Agenda 21 (Sitarsz, 1993) and the Rio Plus 20 renewal conference (United Nations Conference on Sustainable Development, 2012).

Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations system, governments, and the public and private sectors in every area in which human inhabitants impact the environment. Similarly to individuals, countries have differing capacities to follow sustainable development paths as determined by the cultural resources, the population, and citizen based institutions as well as by its ecological and geographical conditions. It is the long term plan of AGENDA 21 for national governments, non-governmental organizations, and educational authorities to identify priorities and determine the means for building the capacity to implement ESD programs that integrate knowledge, skills, and democratic values of citizen participation. In the twenty one years since the sustainability concepts and principles of Agenda 21 were proposed, there have been wide variations in their implementation. In 2002, there was a reaffirmation of the essential nature of the sustainability concepts and principles of positive citizen action during the World Summit on Sustainable Development (<http://sustainabledevelopment.un.org>).

In support of Agenda 21, the United Nations General Assembly adopted Resolution 57/254 declaring the period 2005-2014 as the United Nations Decade of Education for Sustainable Development (UNDESD), emphasizing the critical role of education in achieving

sustainable development, and designated UNESCO to lead the Decade long activity. The purpose of the UNDESD was to help countries make progress toward and attain the Millennium Development Goals through ESD by providing new opportunities to incorporate ESD into education through reform efforts. In addition, there were other Non-Governmental Organizations (NGOs) that were proponents of ESD, including the International Geographical Union and its Commission on Geographical Education. For example, the Lucerne Declaration on Geographical Education for Sustainable Development was issued in 2007 and supports the aims of the UNDESD. The Declaration is a proposal to integrate sustainable development into the teaching of geography at all levels and in all regions of the world (Haubrich, *et al.*, 2007). The document recommends the principles and concepts expected within geography education that may be used to integrate ESD. The IGU's concept of ESD is reflected in the following statement from the Lucerne Declaration.

Sustainable development refers to the sustainability of nature, economy and society. It is a contentious issue since nations, cultures, groups, and individuals interpret the definition to suit their own needs. In some cases, the emphasis is placed on economic sustainable development as they seek to attain unpleasant environment of consumption levels. Others emphasize environmental sustainable development as they seek to conserve threatened species. Sustainable development and consequently ESD are culturally defined. Sustainable development of the natural environment means the consumption of resources at a rate with which they can be renewed (Haubrich, *et al.*, 2007).

As is suggested in the Lucerne Declaration, the meaning of sustainability is largely dependent on the

context of place. This results in a many and varied perspective of the global meaning of sustainability, and thus the reason for the necessity by the supranational organizations, such as the United Nations and the IGU-CGE to take a leadership role.

There are two major points in the rationale for geography's incorporation of ESD in the curriculum. The first is timetable availability for geography as a disciplinary study. The second is the selection of content and skills that complement the course timetable. There are many other considerations that are important regarding the topics included within ESD. Among them are the roles of kinship, happiness, social harmony and positive relationships between the environment and human populations within the ESD context, or extension of citizenship and social processes. Geography's traditions as an Earth science, social science, and humanity are a positive perspective from which to address those ESD concerns. ESD represents a new challenge in the organization of the curriculum since it has the effect of requesting additional space and time or readjusting those aspects of the curriculum that is already overcrowded.

2) Sustainable School Geography

Should activities that rely on extracting from or altering Earth's environmental system be split off from mankind's existence on Earth? To answer this question, we can use three factors: a. materialism, b. neo-liberalism, and c. citizenship. Materialism is based on the capitalism and neo-liberalism is socially and economically dominated by capitalism. Citizenship in its different forms is challenged by neo-liberalism. Materialism induces people to split off from nature. Capitalism and neo-liberalism tempt people to be indifferent to the role of the environment on our lives.

Development education, popular in the 1990s, was concerned with promoting a better understanding of

the patterns and process (both at home and overseas) affecting the present state and future human living standards. In encouraging global awareness and international understanding, as well as concern and empathy for others, development education actually shares many of objectives and values with the discipline of geography (Binns, 1995). Over the past 30 years education in England has been reformed to render it an improved vehicle of economic productivity, the enterprise economy and global competitiveness. The result is that schooling and neo-liberal capitalism have been tightened so that schools are expected to produce a differentiated and flexible workforce for the knowledge economy (Huckle, 2009). The genius of humanity has evolved science continuously since the industrial revolution. Considering critical epistemological awareness for humanity, recent political, economical, societal, and environmental issues has shown that scientific myths and errors based on materialism have become a deterrent to a more sustainable future.

The regard for and opportunities offered humanity comes from the spirituality, social values, and knowledge accumulated and applied by humans. Examples come from throughout the Anthropocene, but the advances in rapidly changing technologies in recent decades have left gaps in the discussions of impacts. The global technology transitions underway, especially with regard to information technology related to sustainability, must be extended to permit participation of those not served at present by existing methods. Learners in all regions need the opportunity to thoughtfully engage in the ways that evolving relationships between science, largely knowledge, and spirituality, largely values, are inherent in school geography that includes sustainability topics. The process of emphasizing learners' spirituality, or social values, in school geography can promote decision making to counter balance the geography curriculum that emphasizes the materialistic view. Students who regard

the problems of poverty, hunger and disease as capability-deprivation, meaning of lack of choice and ignorance, will have the opportunity to take reasoned positions regarding the influences of financial resources, basic sanitation, medical services, and a greater range of choices for improving the sustainability of both people and the environment. In stepping away from predetermined individual values, group interests, and restricting and repressive institutional conditions that may be reflected in a contemporary curriculum, learners need to retrieve their humanistic capacities and the opportunities for further capacity available through ecological multiple citizenship. Ecological multiple citizenship¹⁾ in multicultural societies provides networks of opportunities that encourage learners to enhance skills and modify or change their values and attitudes. We define that conception as the application of a multi-scalar sense of place and the cognitive formulation of behaviors leading individuals, groups, and countries to practice social equity and environmental justice and a sustainable future of humankind.

The opportunity is needed for students to develop an ecological multiple citizenship comprised of social equity and environmental justice, with a commitment to environmental reciprocity and honoring the resilience of Earth's environmental system to respond positively to sustainability practices by human. This opportunity can be achieved without infringing on reasonable freedoms, national identity, or one's sense of place or value to a community. It is believed that these latter elements of responsible, engaged citizenship will be enhanced through the citizen element of the objective dimension of the model being proposed. An awakening of spirituality in conjunction with the science of geography, students will have the opportunity to learn about the interrelationships, to judge the interdependencies, and to experience the harmony between nature and people. Furthermore, they will have the knowledge, skill, and dispositions based on values and attitudes to take ac-

tion through informed decision making towards a sustainable future.

3) Geographical Perspectives Applied to an Assessment Model for Sustainability

Both spatial and ecological perspectives are needed to comprehend Earth as the home of people (Gallagher & Downs, 2012). Sustainable development, therefore, relies on the systematic process and flows that embed each of the environmental and human actions into a functioning, enduring relationship. The importance of geography in the era of globalization and environmental sustainability has raised the visibility of the discipline among teachers, policy makers, and the general public. During this period of positivism regarding the discipline, it seems apparent that geography has an opportunity to demonstrate its viability and utility by engaging ESD as a natural inclusion within the discipline's human-environmental relationship tradition.

The ESD Decade declared by the United Nations presents opportunities for geography education to apply its tradition of human-environment relationships with a renewed content rigor. Content standards and assessment are the two anchors on the instructional continuum, with instruction occupying the midsection. The empirical research completed for this paper has concentrated on three components of geographical education: content objectives, instructional methods, and assessment.

Within the geography curriculum, assessment is the means to measure students' skills of cognition and content understanding. The cognitive dimension includes knowing, understanding, and applying knowledge and skills of geography. The content dimension consists of space and place, environment and society, spatial dynamics and connections. That framework was used by the National Assessment of Educational Progress in the U.S. What is needed when ESD is

introduced is an accommodation for the values and citizenship attributes of ESD. The authors have proposed a model whereby the ESD dimension represents the knowledge, skills, and all important citizenship values and action that is necessary for achieving a sustainable global environment (Figure 1). Note that the Content Dimension represents geography, the Cognitive Dimension represents Learning, and the Objective Dimension represents ESD.

3. Research Content and Method

The Delphi Methodology was used for the research. It provided empirical evidence regarding the professional educators' view of the cross cutting interactions of geography education and ESD at the classroom level. The second research question examined the efficacy of a model that would guide the development of classroom based assessments relative to ESD and geography education in both South Korea and the U.S.

In order to attain the intended results of the research, the authors have blended Asian and United States value systems in the discussions at times and at other times the comparison of ESD is separately addressed in each of the two educational settings. The empirical data includes a comparison of the U.S. and South Korean samples with specific reference to ESD and geography education that may be replicated by other researchers collecting data in different countries. The intent of the empirical research was to propose and apply a process of identifying the critical elements necessary for the inclusion of ESD within geography education. In other words, what elements of geography and ESD should be included in an empirical model?

Using a Delphi Technique, the researchers sampled two groups of teacher scholars (high school and higher education) who have been engaged in geography edu-

cation for sustainable development to determine the priorities that should be set within a model for ESD inclusion. The Delphi method was used to obtain a consensus of geography content expert's opinions on the alignment between geography education and ESD. Data were collected over two rounds of item content standard and assessment reviews since 2010. During the first round, the respondents each received the model and were requested to rank in order of importance the three components in each of the content, cognition, and objective dimension of the model. The order was based on their view of the importance of the component. The results of the first round were returned to each respondent for a second round. The second round permitted the respondents to modify their responses after reviewing the collective responses of round one in a graphic summary. The results of the two rounds provided an estimate of consensus on the geography education and orientation for ESD.

The Delphi technique is a research method that makes three assumptions. First, it assumes the best people to provide responses to particular types of research questions are those people recognized as notable experts in the field. Respondents were selected for their expertise. Second, expert opinion improves if responses are independent and anonymous. Third, the method permits positions on an issue to be altered after receiving feedback on how the rest of a group has responded to a research question. Several rounds of questionnaires and feedback of results are usually adequate to bring about a consensus of opinions (Sproull, 2002). For example, to achieve a consensus definition on the role of critical thinking in the education of nurses, the research panel selected ten habits of mind (affective components) and seven skills (cognitive components) related to critical thinking. The process in that research took five rounds of input (Scheffer & Rubinfeld, 2000). The current research methodology was planned as a Delphi anticipating three to four rounds,

but consensus was reached in two rounds. The Delphi procedures for the U. S. and South Korea each had the following rounds and steps.

Round 1 of the Delphi was administered simultaneously following the same procedures for the U. S. and South Korea and employing the following steps.

Step 1: The sample of respondents was drawn from an expert population in each country. The population of experts from higher education was identified as those professionals recently researching or applying geographic content to content selection and assessment of students at the national or state levels. Experts for secondary geography education were selected using a similar procedure. The initial lists identified an adequate number of respondents so necessary alternative expert respondents could be randomly selected from the population if any experts in the research sample were not able to participate.

Step 2: The invitations to participate were extended to both the university and secondary education experts in a random order until 10 high school teachers and 10 university faculty members in each country accepted the invitation.

Step 3: Participants in the expert panel were sent the survey by email that was designated Delphi Method Round One. It requested the respondents to rank three statements in each of three categories designated by the researchers. The ranking was to reflect the order of importance of each statement within the context of geographical education and the components of ESD. Thus, there were a total of 12 statements in four sets and the items in each set were ranked by the respondents. The sets had to be ranked clearly 1, 2, and 3 numerically reflect the individual's attachment of importance to the statement.

Step 4: The outcomes of Round 1 were analyzed for common patterns and the results were prepared in tabular form. The patterns were further used to deter-

mine the cross cutting agreements and disagreements in responses (National Center for Education Statistics, 2011). The terminology was consistently used from the National Assessment model since 1994. The terminology was judged to closely approximate the curriculum discussions held on a periodic basis in South Korea.

4. Validating the Model for ESD in Geography Education

There were two aspects of the study that were of particular interest to the researchers. The first was the survey data from both the U.S. and South Korea. Since ESD intended to have international participation, the survey was a good opportunity to compare two countries. The second aspect of the study was the inclusion of high school teachers and higher education faculty. High school teachers were included because they represent the grade levels where ESD is being systematically implemented, and where classroom assessments are a regular practice. Higher education faculty members were included because they are the source for research and expertise necessary to judge both the content and the assessment objectives for ESD as a component of Geography Education. In countries that have moved forward to implement ESD, it is the normal pattern for high school teachers and higher education faculty to focus on mutually designed course materials, curriculum, and assessment.

The model (Figure 1) was then subjected to validation using the Delphi Method described earlier with both South Korean and U.S. geographer educators. The consensus for the model was achieved after the second round. The methodology first entailed contacting faculty members in both countries to obtain their agreement (consent) to participate in the project. Once the sample size had been reached, the Round 1 survey

was completed. Approximately four weeks later, the Round 2 survey was completed. In Round 2, the original sample of respondents received the model of Assessment for ESD in Geography that incorporated the results of Round 1. Round 2 completed the data collection since the changes from round one did not justify completing a third round of the Delphi method. The researchers then processed the information received in Round 2.

Potential Delphi survey participants were contacted directly by the researchers from each country and invited to participate. Those who agreed to participate were entered into a sampling population. Once the sampling invitation reached saturation with no more volunteers, the invitation was closed. Following closure, a sample of twenty potential participants was identified through a stratified, random selection process. Once ten individuals in each of the four sample groups had agreed to participate, then the samples to be used in the Delphi method were closed. All contacts and surveys were completed using email.

The sample included: ten high school geography teachers from South Korea; ten high school geography teachers from the U. S.; ten university level geography education faculty members from South Korea; and ten university level geography education faculty members from the U. S. The South Korean high school teachers were selected from membership in the Korean Geography Teachers Association. The U.S. high school teachers were selected from the National Geography Alliance Network. The South Korean university faculty members were selected from the membership of the Korean Association of Geographic and Environmental Education. The U.S. university faculty members were selected from the membership of the National Council for Geography Education. In the case of the university faculty members, they were selected based on their expertise in sustainability of the environment and geography education. An expert academic focus is often

declared by individuals as part of their membership profile in the professional/academic.

1) Two Rounds of the Delphi Method

Two round of the Delphi Method were required to reach independent consensus among the respondents from the U.S. and South Korea. Consensus is achieved when the changes submitted from one round to the next do not exceed a set criterion level. The criterion level is necessary since absolute agreement among all respondents is necessary. For this study, the authors set an attainment criterion of 70% agreement. The criterion level was reached from round 1 to round 2 for the respondents. The criterion level means that fewer than 30 percent of the respondents altered their assignment of importance to the components of the mode. This was considered the measure of acceptable consensus (Hsu & Sandford, 2007). Had less than 70% agreement been achieved, or more than 30 percent changing their judgment of importance, then it would have required a third Delphi round, but proved to be unnecessary due to the attainment of consensus.

The relationship of the three components within each dimension was then evaluated by the researchers. Theoretically, each dimension should receive the same overall preference rating in the Delphi, all things being equal. That was avoided by requiring the respondents to make a forced ranking. They were instructed mark their highest priority item among the three components of each of the three dimensions as 3, the next highest as 2, and the third as 1. A basic proportional that included the ranking was then used to determine the value for each of the components, shown in parentheses on each of Figures 2-5. The interaction of subjectivity and objectivity in making the rankings pulled the dimension in particular directions for each individual. Thus consensus tended to the rankings together and slight differences tended to push them

apart. The rating instructions permitted no numerical ties within the components of each dimension. The raters were forced to assign each of the components a value of 1, 2, or 3, with no other response being accepted (such as 1.5 or 2.5). The relative importance of each component within each dimension was thus calculated with a maximum of 45 and a minimum of 16.6. Rounding resulted in each group's total rating of importance across all components with scores of 99.9 with two exception.

2) Analysis of the Observations

The analysis of the observations for South Korean high school teachers is presented in Figure 2. The numerical value is a descriptive empirical observation rather than a statistical process since the Delphi Method does not require inferential statistics. While the Delphi lends itself well to statistical analysis, the authors elected to calculate a preference ratio from the percentages of respondents showing preference for a particular component within each dimension (Hsu & Sandford, 2007). The percentages in the models represented by Figures 2-5 are the relative indicator of importance assigned by the Delphi respondents to the components within each of the three dimensions. The values represent proportional values of importance, such as a 40 is rated more important by the Delphi consensus than a 34.5. There was no test of the significance of the difference between ratings due to the small sample. However, the absolute values provide indicators of relative importance for the components in the model.

The data for Korean high school teachers suggested the following (Figure 2):

1. On the content dimension, teachers expressed consensus that the both Environment and Society (36.6) and Spatial Dynamics and Connections (35)

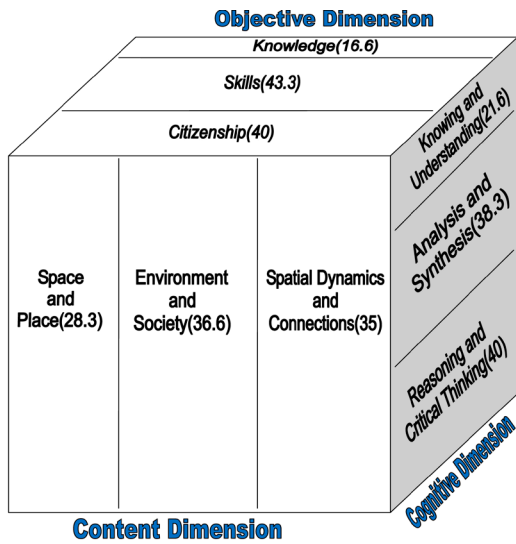


Figure 2. Relative Importance for the Theoretical Model Components from the Delphi for South Korean High School Teachers

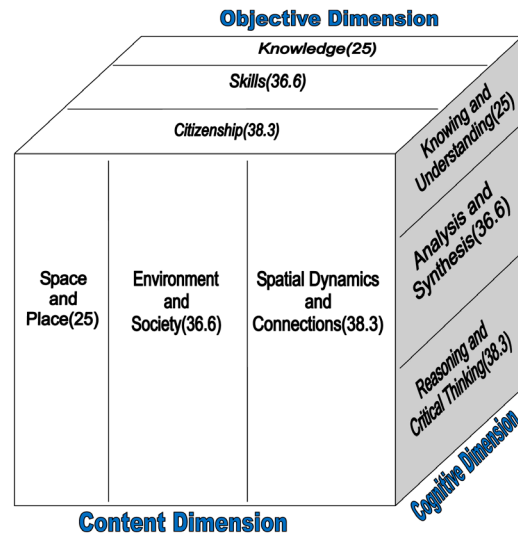


Figure 3. Relative Importance for the Theoretical Model Components from the Delphi for South Korean University Faculty Members

were nearly the same in the attention they should be given in the assessment model for ESD learning. Space and Place received a lower rating (28.3).

2. On the cognitive dimension, teachers expressed consensus regarding the importance of Reasoning and Critical Thinking (40) and Analysis and Synthesis (38.3). Knowing and Understanding (21.6) received the lowest rating of importance within the model.

3. On the Objective Dimension, teachers expressed consensus that Skills were a top priority (43.3), with Citizenship (40) and Knowledge with the lowest rating of importance (16.6).

The data for Korean university faculty members revealed a somewhat different rating of importance on the three dimensions (Figure 3):

1. On the content dimension, university faculty members expressed consensus that Spatial Dynamics and Connections (38.3) and Environment and Society (36.6) were nearly the same in the attention they should be given in the assessment model for ESD learning. Space and Place received a lower rating (25)

in its relative importance.

2. On the cognitive dimension, university faculty members expressed consensus regarding the importance of Reasoning and Critical Thinking (38.3) and Analysis and Synthesis (36.6). Knowing and Understanding (25).

3. On the Objective Dimension, university faculty members expressed consensus that Citizenship (38.3) and Skills were a top priority (36.6), and Knowledge received the lowest rating of importance (25).

In summation, among Korean high school teachers and university faculty member there was agreement with the importance of Environment and Society and Spatial Dynamics and Connections, with moderate differences in the rating either within or between the groups. Space and Place was given a lower rating of importance within and between both groups. The preferences perhaps reflect the action oriented implications of concepts such as environment, society, spatial dynamics, and connections, compared to the more static perception of space and place. The more dynamic

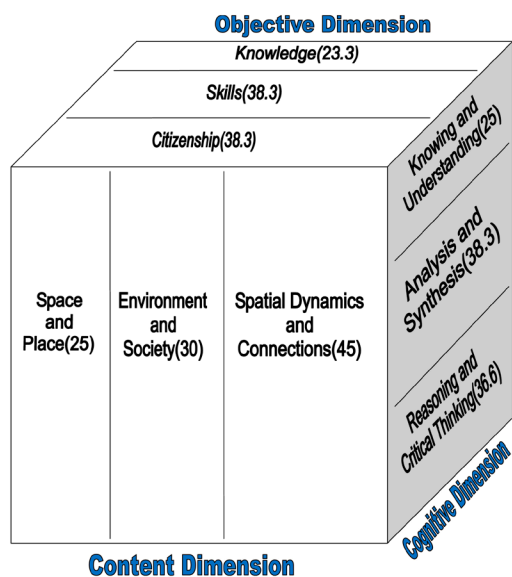


Figure 4. Relative Importance for the Theoretical Model Components from the Delphi for United States High School Teachers

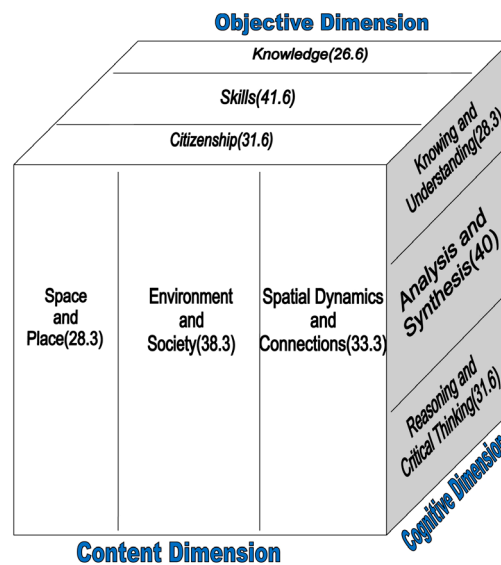


Figure 5. Relative Importance for the Theoretical Model Components from the Delphi for United States University Faculty Members

and action oriented positions in the content and cognitive objectives favored ESD, which was reflected in the citizenship and the action taking orientation of the assessment model. The Delphi consensus by the both groups of Korean experts gave preference to ESD that was oriented to skills followed by citizenship for active involvement in social and environmental issues.

The analysis of the results U. S. high school teachers is presented in Figure 4. As with the Korean high school teachers, the numerical value is a descriptive empirical observation rather than a statistical process since the Delphi Method does not require inferential statistics.

The data for U. S. high school teachers suggested the following (Figure 4):

1. On the content dimension, teachers expressed consensus that the Spatial Dynamics and Connections (45) received considerable more weighting in the assessment model for ESD learning. Environment and Society (30) and Space and Place (25) received lower

ratings, but were empirically close in the consensus regarding their role in ESD.

2. On the cognitive dimension, teachers expressed consensus regarding the importance of Analysis and Synthesis (38.3) and Reasoning and Critical Thinking (36.6). The role of Knowing and Understanding (25) received a lower rating.

3. On the Objective Dimension, teachers expressed consensus that Skills were a top priority (38.3), with Citizenship (31.6). Knowledge (23.3) received the lowest rating of importance.

The data for United States university faculty members revealed a somewhat different rating of importance on the three dimensions (Figure 5):

1. On the content dimension, U.S. university faculty members expressed consensus that Environment and Society (38.3) and Spatial Dynamics and Connections (33.3) were the most favored components of ESD when considering the assessment model. Space and Place (28.3) received a lower rating in its relative im-

portance.

2. On the cognitive dimension, U. S. university faculty members expressed consensus regarding the importance of Reasoning and Critical Thinking (31.6) and Analysis and Synthesis (40). Knowing and Understanding (28.3).

3. On the Objective Dimension, U. S. university faculty members expressed consensus that Skills (41.6) were the most important component, followed by Citizenship (31.6) in the rating of importance. Knowledge (26.6) received the lowest rating with reference to ESD and assessment.

5. Conclusions

In summation, among United States high school teachers and university faculty members there was lack of agreement with the importance of Environment and Society and Spatial Dynamics and Connections. The between groups comparisons of the observations revealed that high school teachers were more inclined to place emphasis on Spatial Dynamics and Connections, while university instructors placed greater importance on Environment and Society. Space and Place was given a lower rating of importance by both groups. The preferences perhaps reflect the action oriented aspects of environment and society for university faculty members. They perhaps view the knowledge, skills and citizenship orientation to have a greater responsiveness to environmental issues and social responses relative to the attainment of sustainable development. The observations suggest the linkages between those topics have greater importance due to the role of society in sustainability issues. The more dynamic and action oriented positions in the content and cognitive objectives seem to favor ESD, which was reflected in the citizenship and the action taking

orientation of ESD. The Delphi consensus by the both groups of U.S. experts gave preference to ESD that was oriented to citizenship and the skills for active involvement in social and environmental issues.

The 2nd round results of the Delphi also validated the rationale of procedures in each dimension. The proposed model may serve as a guideline for teaching, learning and assessing ESD within what is viewed as the traditional geography curriculum. The research for this paper was completed to answer two questions: 1) What is the level of consensus between geography education, assessment, and the emerging ESD goals among geography educators in South Korea and the U.S.?.; and 2) What is the comparative importance assigned to geography education and ESD within a proposed model of instruction and assessment as appraised by geography educators from South Korea and the U.S.?

The conclusion for research question 1 is that there is a considerable degree of empirical consensus regarding the importance of the dimension of geography education, assessment, and ESD that relate to the goals as expressed in the theoretical model. There were few major differences between the South Korean and the U.S. One of the most notable was the differences in the importance of citizenship as a component of the objective dimension. It seems that Korean and U.S. secondary teachers place a greater emphasis on the action orientation citizenship than do university faculty member. The importance of skills assigned by U. S. university faculty member was also a notable difference from the other components. Both citizenship, which could have been considered as environmental citizenship, and skill were indicated as more important than knowledge in the ESD category.

The importance of each of the dimensions for future assessment that would incorporate ESD within geography education will undoubtedly follow the consensus trends. It is difficult to separate the specific

reason for the high rating of citizenship among both groups of South Koreans and the U. S. High School teachers, with a lesser indicator of importance among U. S. University Faculty members. This discontinuity in the trend among the responses may be due to the focus on content related to geography at the university level, with a lesser attention to the action orientation that generally accompanies citizenship in its broader context.

Note

1) Ecological citizenship differs significantly from traditional citizenship in three important ways. First, ecological citizenship is an inter-personal relationship among strangers founded on responsibility, compassion and social justice, and most importantly captured in the principle: When I live my life I affect others, and to these others I have obligations (regardless of whether or not I know them). Second, the political space of ecological citizenship is not bound to a specific political territory as is traditional citizenship, but is rather defined by the extent to which the behavior of citizens affects others negatively. Third, why citizens should protect the ecological resources? The main reason for ecological citizenship is a responsibility to minimize their negative ecological impact on others (Jagers, 2009). But, the process of 'becoming a citizen and a nation' can be conceptualized through theoretical association within ecological multiple citizenship. This re-conceptualization consists of social equity and environmental justice, recognition of reciprocity, guarantee of non-domination freedom, national identity and sense of place (Sim, 2013).

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