

Education for Sustainable Development (ESD) and Its Incorporation Into Formal Education in Japan: An Explanatory Case Study

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Abstract

Education for Sustainable Development (ESD) is vital to create sustainable societies. Successive governments in Japan have advocated the incorporation of ESD into its education system. This paper investigates teachers' understandings of Sustainable Development (SD) and ESD and the extent to which ESD has been incorporated into lessons. The current work is an explanatory case study, conducted in a private senior high school. Data collection involved a literature review, looking at international iterations of ESD and its interpretation by relevant Japanese ministries; an interview with the school's curriculum coordinator; and finally the collection of quantitative data. The instrument was designed by the author. The results indicate teachers view SD primarily through an environmental lens. They consider it of vital importance; however, the majority of respondents find ESD difficult to understand. ESD-related themes are integrated into lessons, although this varies by department and its inclusion is determined by the content of textbooks. Inter-disciplinary learning is largely absent. Respondents supported the development of ESD's core competences and values; however, many of the pedagogies used do not aid that development, even though greater use is being made of Active Learning. To implement ESD more effectively, the school needs to adopt a holistic approach. Teachers must be better acquainted with ESD literature and greater use must be made of active learning methods.

Keywords: Sustainable Development, Education for Sustainable Development, Environment, Values, Pedagogies, Transformation

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Acronyms and abbreviations

DESD	The Decade of Education for Sustainable Development
DeSeCo	Definition and Selection of Competencies
EE	Environmental Education
ESD	Education for Sustainable Development
GAP	Global Action Programme
MEXT	Ministry of Education, Culture, Sports, Science and Technology
NIER	National Institute of Education Research
OECD	Organisation of Economic Cooperation and Development
SD	Sustainable Development
SDGs	Sustainable Development Goals
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific, and Cultural Organization

Introduction

Chapter 36, Agenda 21 (1992) set out the central role of education in the creation of sustainable societies. This was reaffirmed in the Johannesburg Declaration, at the World Summit on Sustainable Development, 2002 (UN, 2002: 64), where education was described as ‘critical’ in the attainment of SD.

Successive governments in Japan have provided for the incorporation of ESD into the country’s formal education system. Its introduction was set out in the Basic Plan for the Promotion of Education, 2008 and again in the Second Basic Plan for the Promotion of Education, 2013 (MEXT, undated). ESD is also a core component of the Courses of Study, 2008 and 2009 (MEXT, 2016).

The objective of this work is to investigate teachers’ understandings of SD and ESD and to consider the extent to which the principles of ESD have been incorporated into the senior high school where they work. It is hoped that this study will add to the literature on ESD in Japan and it will help ESD to be more effectively implemented in other educational institutions.

Significance of the study

ESD occupies an important place in the government’s current and future plans on education (Kodama, 2017 and MEXT, 2016). Yoshiyuki (2017) writes, however, there has been a lack

of critical analysis regarding the implementation of ESD into formal education in Japan. Additionally, many of the studies conducted (see, for example, Cotton et al, 2007 and Thomas, 2014) have focused on ESD in higher education, overlooking its implementation in either junior or senior high schools. This study will help to address that deficit.

Structure of the study

There shall first be a literature review which will look at the relationship between SD and ESD, the nature of ESD and the incorporation of ESD in Japan. The work will then move on to the case study and a presentation of the data. This shall be followed by conclusions and recommendations. The paper will finish by looking at some of the limitations of the study.

Literature Review

The literature review will consider, first, the contribution of ESD in the attainment of SD; second, key features of ESD, specifically in terms of competence development and the need for pedagogies with a focus on Active Learning (AL); third, the incorporation and interpretation of ESD in Japan, including: ESD as transformational education, competencies and concepts within ESD, the use of Active Learning, suggested ESD content, and finally a brief description of ‘Zest for Life’ and its connection to ESD

ESD and the attainment of Sustainable Development

It is envisaged that ESD will facilitate the attainment of SD in a number of ways. First, it will ensure that, ‘all learners acquire the knowledge and skills needed to promote Sustainable Development’ (UNESCO, 2020: 14). Learners, having acquired the required knowledge and skills, will then be empowered to, ‘take informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations’ (UNESCO, 2020: 8). The significance of ESD lies in its goal of fostering change agents, who can help society to transition away from unsustainability.

ESD: key features

The key features of ESD are that it is holistic, value driven and transformative. (UNESCO, 2014). It requires the use of Active Learning pedagogies rather than more traditional teaching methods (Howell, 2021). There is a focus on the need to develop a set of core competencies (Leicht et al, 2018) and the content of ESD must be related to the 17 SDGs (UN, 2015) and it must be relevant to the context in which teaching and learning is taking place (Leicht, 2018). The literature review conducted for this study focused on two of these features: competence development and the use of Active Learning pedagogies.

From the second half of the DESD, competences occupied an increasingly prominent place in ESD (Mochizuki and Fadeeva, 2010; Rieckmann, in Leicht, Heiss and Byun, 2018; UNECE, 2011). Caravita and Clement (2014) write, however, that definitions of competence remain controversial. According to the authors, however, it is the OECD’s definition of competency that has succeeded in achieving some consensus. According to the OECD, a competency involves, ‘the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context’ (OECD, 2005: 4).

Different sets of competences have been set out for teachers and educators (ESD competences) and students (sustainability competences) (Cebrian et al, 2020). The focus of this work is on sustainability competences. UNESCO (2017b) sets out eight key competences that need to be developed, and these are presented below.

UNESCO: Sustainability Competences	
1. Systems thinking competency	2. Anticipatory competency
3. Normative competency	4. Strategic competency
5. Collaboration competency	6. Critical thinking competency
7. Self-awareness competency	8. Integrated problem-solving competency

Source: UNESCO, 2017b: 10

Cebrian et al (2020) write that developing sustainability competences among all levels of education is critical to the development of sustainability literacy, which is a precondition for people to become positive change agents. Stibbe and Luna (2009: 11) define sustainability literacy as, ‘... a wide range of practices people are empowered to participate in, through having skills in using language in particular ways.’ The authors further state that by acquiring sustainability literacy skills people will be ‘...empowered to read society critically, discovering insights into the unsustainable trajectory that the society is on and the social structures that underpin this trajectory’ (2009: 11).

The development of sustainability competences is facilitated through the use of appropriate pedagogies. The International Implementation Scheme (UN, 2006: 31) stipulates that ESD must be interdisciplinary and that ‘...a range of pedagogical techniques that promote participatory learning and higher-order thinking skills’ must be used.

Lozano et al (2017) note, however, that little research has been conducted on the connection between pedagogies and the development of sustainability competences. To address this gap, the authors conducted a meta-analysis mapping pedagogical approaches to the competences that they might develop. The majority of the pedagogies identified by Lozano et al (2017) (Appendix 1) as being likely to foster sustainability competences can be classified as a part of an active learning methodology.

ESD and Japan

The Ministry of Education, Culture, Sports, Science and Technology (MEXT, 2016) sets out three goals for ESD:

- to provide everybody with the benefits of a high quality education
- to, ‘incorporate the principles, values and behaviours necessary for sustainable development ...
- to transform, ‘...values and behaviours in order to bring about a sustainable future...’

Moving on to its key features, first ESD is supposed to be transformative. According to

MEXT, the purpose of ESD is to enable everyone to affect a, ‘positive societal transformation’ (IGES, 2009: 55). Yoshiyuki (2017) writes ESD as transformational education is at the heart of ESD in Japan.

Second, there is a focus on the development of competencies. MEXT (2016) identifies seven competences and attitudes that need to be fostered (see table 1). According to MEXT (2016), however, schools must have the autonomy to define new competences and attitudes as well as to select and tailor the different competences so that they are relevant to local circumstances and the developmental stage of students.

Table 1: Competencies and attitudes to be emphasised in ESD	
1. Ability to think critically	2. Ability to plan with anticipation of a future scenario
3. Multidimensional and integrative thinking	4. Communication skills
5. Ability to cooperate with others	6. Respectful of relations and connections
7. Proactive participation	

Source: MEXT, 2016: 7

Additionally, according to MEXT (IGES, 2009), attention had to be paid to developing learners who are able to think globally and act locally; who respect their connection to other people, society and the environment; and who are able to both visualize a future society and then act upon those plans. In *Japan’s ESD Implementation Plan, 2006* (cited in MEXT, 2016) thinking globally and acting locally was presented as a form of learning that would enable learners to develop new values and behaviours that would pave the way for more sustainable futures.

In addition to competences, MEXT (2016) sets out six concepts (see table 2), which it describes as being important when ESD is being integrated into lessons. It is the responsibility of teachers, when planning lessons, to consider which of the concepts will guide the lesson’s socio-emotional dimensions.

1. Diversity (variety exists)	2. Interdependence (relating to each other)
3. Limitation (limits exist)	4. Fairness (valuing everybody)
5. Cooperation (cooperating with others)	6. Responsibility (taking responsibility)

Source: MEXT 2016: 6

Regarding pedagogies, MEXT (2016) states that traditional teaching techniques will not prepare students for the challenges that they will face. In accord with the position espoused in the *Roadmap for Implementing the Global Action Programme on Education for Sustainable Development* (UNESCO, 2014), MEXT advocates the adoption of active learning methodologies. Active learning was, in fact, described as being the ‘main pillar’ of the 2018 revision of the Course of Study (McMurray, 2018). Giving specific advice on how to incorporate ESD into classrooms, MEXT (2016: 14) calls for teachers to ‘Apply a participatory approach that emphasizes experience and feelings’, and teachers ought to ‘Develop a participatory attitude and problem-solving skills’. These pedagogies echo those identified by Lozano et al (2017) as being conducive to the development of core competences within ESD.

The themes that are to be addressed within ESD, are presented by MEXT in a concept map (figure 1) and there are areas of both convergence and divergence with international iterations of ESD. Further direction was given by MEXT (IGES, 2009), according to which among developed countries, programs had to be promoted in which there was an emphasis on environmental conservation, which, concurrently addressed the integrated development of the environment, economy

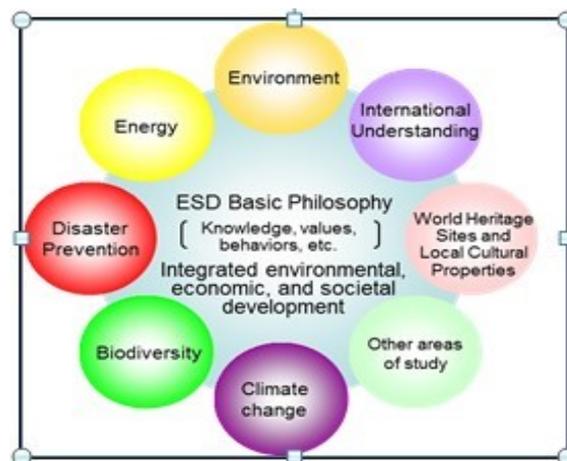


Figure 1: Content areas for ESD

Source: Japan National Commission for UNESCO, 2012: 1

Finally, in terms of Zest for Life, y Nakayasu (2016) writes this is one of the basic goals of current educational practice. The author states there is significant overlap between zest for life and the key competencies defined in the OECD's DeSeCo project. Kimura and Tatsuno (2017) detail the main elements of zest for life as: having solid academic prowess, to be rich in humanity and to be healthy and fit in order to lead a vigorous life.

Case Study

Included in this section are: the three research questions; an explanation of the methodology used for data collection; a description of the site and its ESD policy; and finally the findings.

Research Questions

Three Research Questions were set out to address the question posed in the title:

1. How do teachers conceptualize sustainable development?
2. What is teachers' understanding of ESD?
3. To what extent does teachers' classroom practice support the stated goals of ESD?

Methodology

The data collection methods are a literature review and a questionnaire.

Literature Review

The literature review was conducted to, 'establish a rationale for the research questions or hypotheses' (Creswell, 2014: 62) and to identify the central issues in the field. The literature that has been presented draws heavily on UN, UNESCO and Japanese government policies so that the results of the case study can be located within broader discussions of national and international ESD policy, which can then be understood within broader debates on the nature of sustainable development.

Questionnaire

The questionnaire was developed by the current author. Concepts of SD and ESD, as described in the literature, were rephrased as statements, thus ensuring a high degree of content validity, described by Cohen, Manion and Morrison as the extent to which the instrument, 'comprehensively covers the domain or items that it purports to cover' (2015).

The questionnaire contains 62 questions in total (60 closed and 2 open). When the questionnaire was piloted, it took respondents, on average, 15 to 20 minutes to complete. The items were measured using a five-point Likert scale. The questionnaire was in Japanese to ensure that it was readily understandable. Finally, in terms of its implementation, the instrument was administered in hard copy. While it was the intention of the author to use a Computerized Self-administered Questionnaire (CSAQ), this method was rejected by the school.

Sampling Method

The unit of analysis chosen for the current study is the school at which the researcher works. The rationale upon which the case was selected was its intrinsic interest, a choice supported by Creswell (2007).

Moving on to the sampling methods for the units of observation, the current author did not attempt to delimit a portion of the population (Etikan, Musa and Alkassim, 2016), i.e. the teachers employed at the site. Because ESD is supposed to be both interdisciplinary and holistic it was the intention of the author to gain as wide a range of views as possible.

Description of the Site

The study was conducted in a private senior high school, close to the center of Tokyo. There are 100 teachers: 56 full time, 40, part time and four Assistant Language Teachers (ALTs). There are roughly 1,500 students currently enrolled, ranging in age from 15-18.

Like many other private schools in Japan, the institution is part of an escalator system. In the escalator system 'a school corporation' provides education often from pre-school all the way through to university, with primary and lower secondary schools being affiliated to senior high schools and universities.

ESD Policy

The position of the school with regards to ESD was presented by the curriculum coordinator in a recorded interview. He describes ESD as being 'very important'. However, he went on to state that the school does not have either a formal ESD policy or calendar.

According to the curriculum coordinator, the school's priorities in relation to ESD are to focus on global issues, such as poverty and environmental problems. It is hoped that this approach will enable students to develop a global mind, which, as has been described above, is one MEXT's ESD objectives.

Regarding pedagogies, two years ago the school started to encourage teachers to transition away from lecturing to a more active approach, which is more likely to develop ESD's core competencies. The ratio of lecturing to more active approaches stands at roughly 80:20. The school, for instance, encourages increased use of project and problem-based learning, identified by Lozano et al (2017) as developing the competences required for ESD.

Looking at the competencies that the school is trying to develop among students, these can be located within the set of competencies identified by MEXT. The competencies identified by the school's management were:

- critical thinking,
- collaboration,
- communication,
- the ability to plan with the anticipation of a future situation
- and proactive participation.

The ability to plan with the anticipation of a future situation and to independently identify and solve problems was described as a key competence, which will enable students to survive in a rapidly changing and increasingly globalized world.

Finally, in terms of transformative learning, the interviewee asserted that the school is focused on meta-cognition and second order change. This approach was described by Sterling (2010) as being reformative rather than transformative. It seeks to examine and change assumptions rather than to affect a paradigm change. Balsiger et al (2017), however state what is required for transformative learning is third order learning, described by Sterling (2010: 23) as being learning that affords learners ‘the experience of seeing [their] worldview rather than seeing with [their] worldview’ and that will lead to a paradigm change.

Findings

The findings will be presented, moving from teachers’ attitudes to Sustainable Development to their understandings and implementation of Education for Sustainable Development, with regards to the inclusion of ESD-related content and the use of Active Learning pedagogies.

Attitudes to Sustainable Development

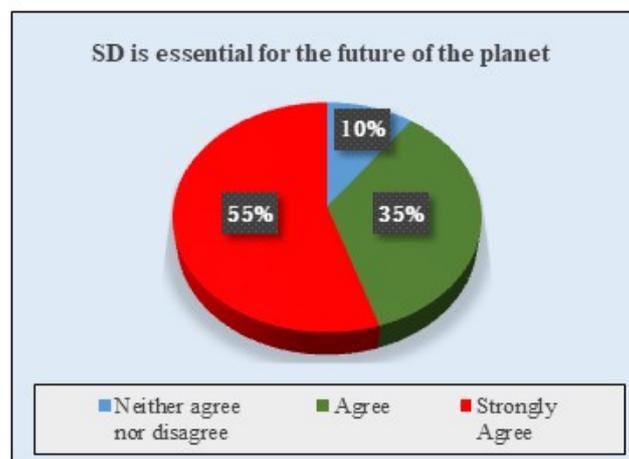


Figure 2: SD is essential for the future of the planet
($n = 20$, $Std. = .687$, $\mu = 4.45$)

A significant majority of respondents see sustainable development as being essential for the future of the planet (figure 2). This view was entirely expected, as few people are likely to say that they want development that is not sustainable!

Consequently, teachers’ views had to be explored in more detail, as there are conflicting views on how SD can be achieved and what degree of change is required to facilitate it. Figures 3-6 look at teachers’ views on SD in more detail.

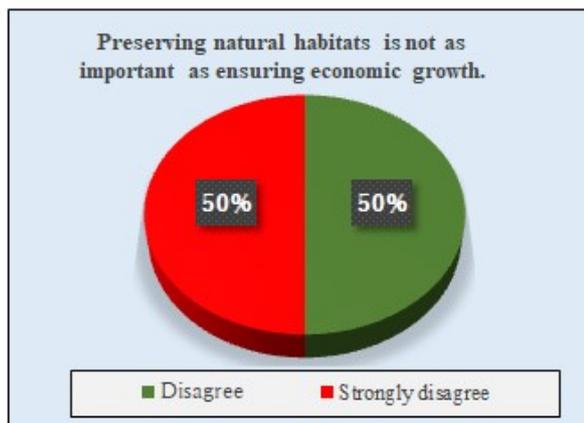


Figure 3: Preserving natural habitats as Important as ensuring economic growth
($n = 20$, $Std. = .513$, $\mu = 1.5$)

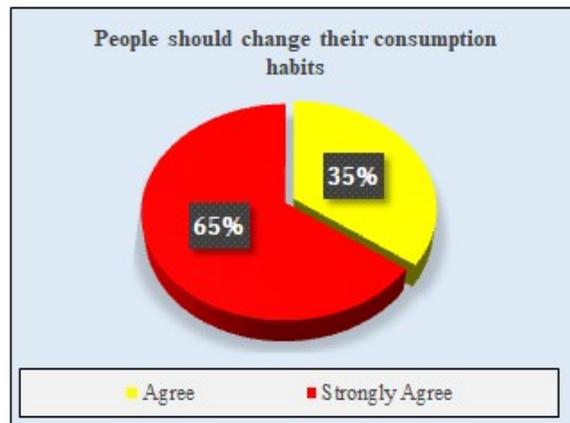


Figure 4: People should change their consumption habits
($n = 20$, $Std. = .489$, $\mu = 4.35$)

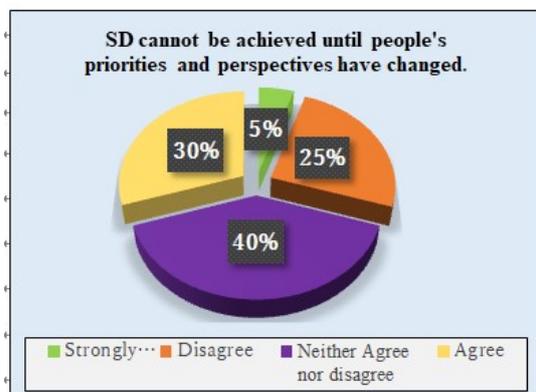


Figure 5: SD cannot be achieved until People's priorities and perspectives have changed
($n = 20$, $Std. = .887$, $\mu = 3.60$)

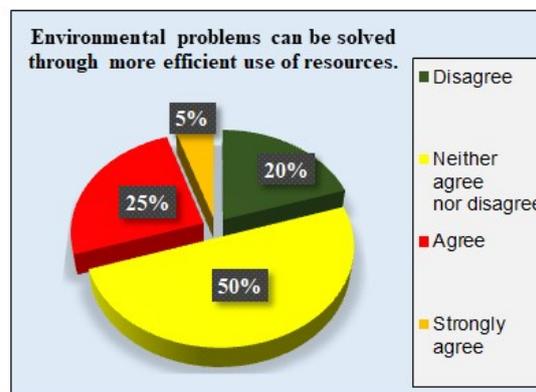


Figure 6: Environmental problems can be solved through more efficient use of resources
($n = 20$, $Std. = .813$, $\mu = 3.15$)

The data presented above suggest that respondents attach considerable importance to the protection of the environment and they are prepared to accept some reduction of economic activity in order to attain it (see figures 3 and 4). However, figure 5 indicates that, in general, respondents do not believe that a paradigm change is necessary. Further, the majority of respondents who expressed a definite opinion stated that environmental issues can be solved through more efficient use of resources.

Attitudes to ESD

A significant majority of teachers describe ESD as having a central role in current Japanese educational policy (figure 7) and yet, at the same time, the overwhelming majority of respondents find it a very difficult concept to understand (figure 8). Further, there is considerable confusion regarding the difference between Environmental Education and Education for Sustainable Development (figure 9)

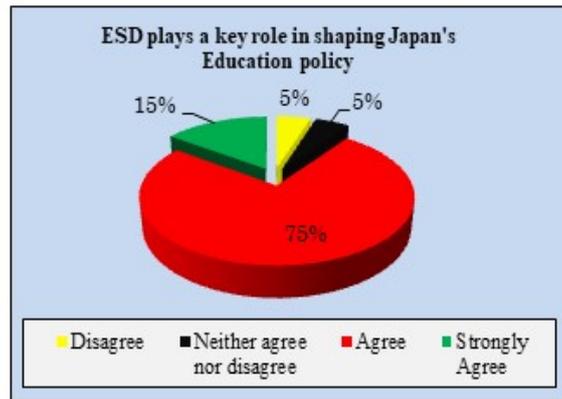


Figure 7: ESD plays a key role in shaping Japan's Education policy
 ($n = 20$, $Std. = .649$ $\mu = 4.00$)

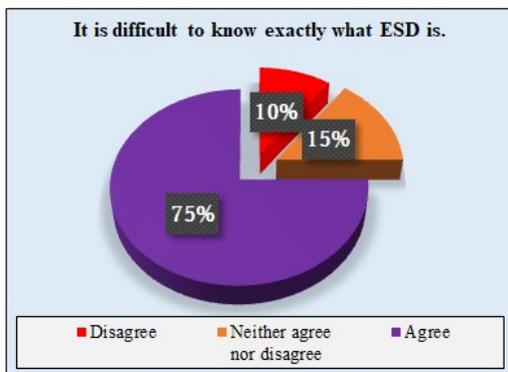


Figure 8: Is difficult to know exactly what ESD is
 ($n = 20$, $Std. = .671$ $\mu = 3.65$)

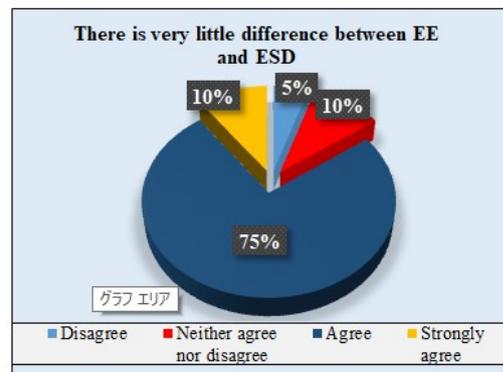


Figure 9: There is very little difference between EE and ESD
 ($n = 20$, $Std. = .641$ $\mu = 3.9$)

The implementation of ESD in the classroom

To assess the degree to which ESD has been implemented in classes, two factors were analyzed. First, consideration was given to the content of lessons and the extent to which themes associated with ESD have been incorporated. Second, whether the pedagogies respondents use support the development of sustainability competencies.

The Incorporation of ESD-related Content

A significant majority of respondents, who voiced a definite opinion, agreed that the three pillars of SD – economy, society and environment – should be addressed equally in ESD (figure 10) Crosstabs analyses (figures 11 and 12) indicate that ESD's core themes are included in lessons to some extent, with some variation depending on the teacher's department. However, in terms of including content on poverty reduction – Goal 1 of Agenda 2030 – only 15% of respondents could agree with the statement that students will learn about how poverty can be reduced (figure13)

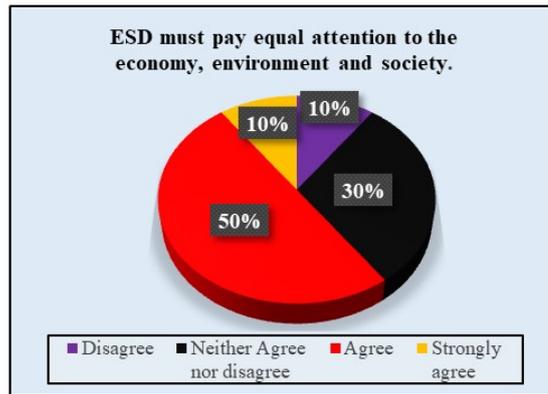


Figure 10: ESD must pay equal attention to the economy, environment and society ($n = 20$, $Std. = .820$, $\mu = 3.60$)

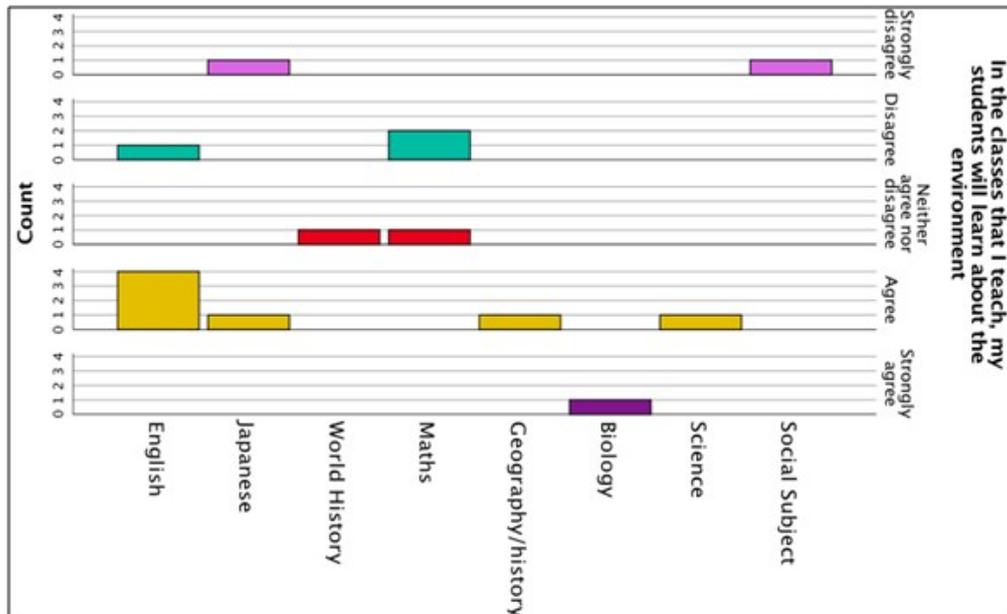


Figure 11: In the classes that I teach, my students will learn about the environment ($n = 20$, $Std. = 1.16$, $\mu = 3.25$)

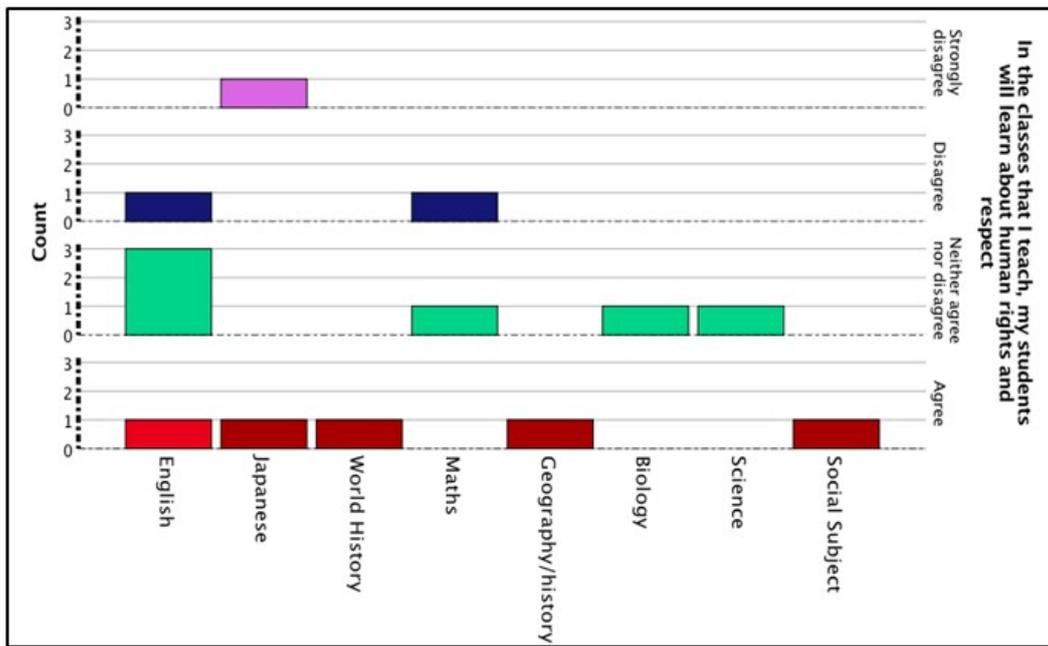


Figure 12: In the classes that I teach, my students will learn about human rights and respect
 ($n = 20$, $Std. = 1.08$, $\mu = 3.00$)

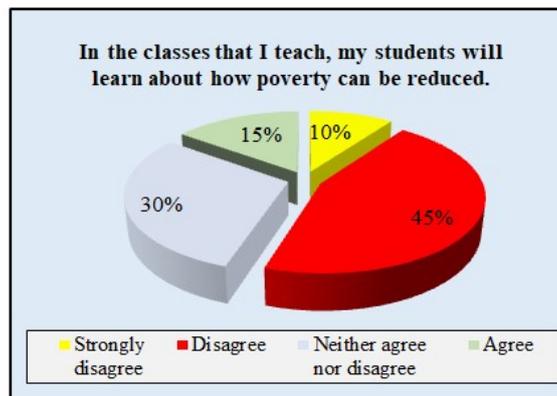


Figure 13: In the classes that I teach, my students will learn about how poverty can be reduced
 ($n = 20$, $Std. = .889$, $\mu = 2.5$)

Changing Pedagogies

A significant majority of teachers agreed that how students learn is more important than what they learn (figure 14). The following figures (figures 15, 16 and 17) reveal, however, that, in general more traditional pedagogies are favoured rather than those that have been identified as being most likely to develop sustainability competences.

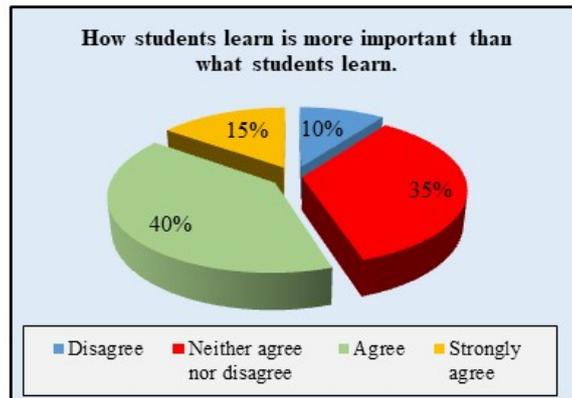


Figure 14: How students learn is more Important than what students learn
 ($n = 20$, $Std. = 820$, $\mu = 3.68$)

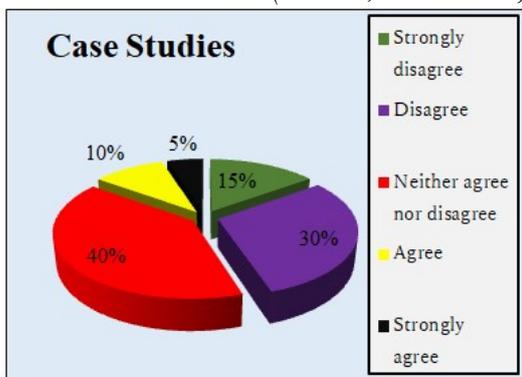


Figure 15: Case Studies
 ($n = 20$, $Std. = 1.04$, $\mu = 2.68$)

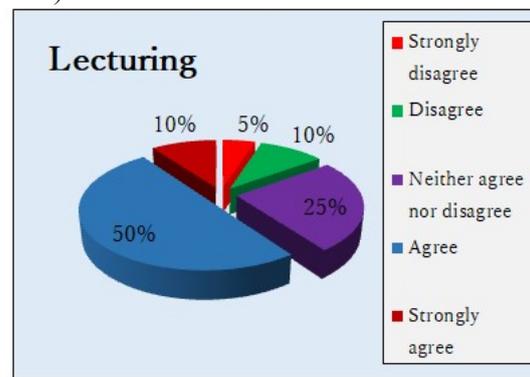


Figure 16: Lecturing
 ($n = 20$, $Std. = 1.02$, $\mu = 3.52$)

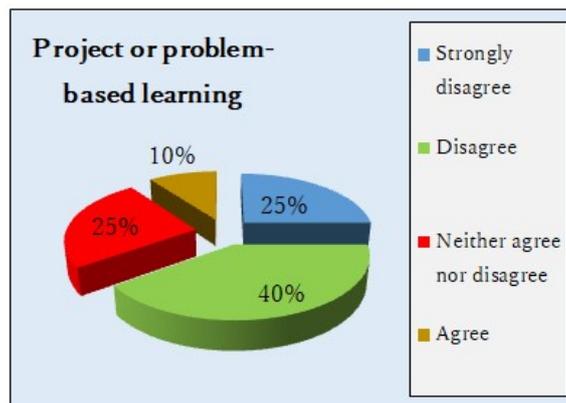


Figure 17: Project or problem-based learning
 ($n = 20$, $Std. = .951$, $\mu = 2.26$)

Conclusions & Recommendations

In this section, the three research questions are addressed. Next, recommendations will be made on how ESD can be better implemented at the school and for future research in the field.

R.Q.1: How do teachers conceptualize SD?

A significant majority of respondents see SD as being essential for the future of the planet. In order to transition to a more sustainable form of development, in which the environment is better protected, most respondents accepted that people's consumption habits would have to change. All of the respondents placed a strong emphasis on preserving natural habitats. On the other hand, most respondents did not believe that people's priorities and perspectives had to change to achieve SD. Further a slight majority of respondents agreed with the statement that environmental problems can be solved through a more efficient use of resources

These responses can be interpreted through the lens of Hopwood, Mellor and O'Brien's (2005) mapping technology (Appendix 2). Using this approach, it is possible to assert that teachers follow a techno centered reform approach, where often profound changes in policy and lifestyle are needed but these can be achieved incrementally and within existing social and economic systems.

R.Q.2: What is teachers' understanding of Education for Sustainable Development?

A striking feature of the data is that although ESD was described by the vast majority of respondents (75%) as playing 'a key role in shaping Japan's education policy', at the same time, 75% of respondents described ESD as being a difficult concept to define. Moreover, many of the respondents to the questionnaire were uncertain as to whether there was any difference between EE and ESD. The view was also expressed in the instrument's open-ended questions that teachers were, in general, insufficiently informed of the subject or even that they had no knowledge of it, in spite of the fact that MEXT has produced so much literature on the subject and the Japanese government played a lead role in launching DESD and GAP.

R.Q.3: To what extent does teachers' classroom practice support the stated goals of ESD?

To answer this question, two points shall be considered. First, to what extent have ESD-related themes been integrated into lessons and second, how far do teaching practices support the development of the core competences described in the literature on ESD and zest for life?

ESD-related themes are included to some extent. A significant majority of teachers stated that students will learn about both the environment and international understanding in their lessons, and a slight majority said that students will learn about biodiversity. However, key themes related to Sustainable Development are still insufficiently addressed, as can be seen with the very low percentage of teachers who include content on poverty reduction in their lessons (SDG 1) and the slight majority of respondents who do not include content on gender discrimination (SDG 5).

Further, it can be surmised that ESD-related themes are not addressed in a holistic way, in spite of this being described as a key feature of ESD by both MEXT and UNESCO. To give an example, in Social Subjects, content on the environment is not included, which suggests that the connections between the environment, society and the economy, which is a key part of ESD, are not being made.

Finally, that ESD content is not taught across the different subject areas is also indicative of the school not having developed an inter-disciplinary approach, although its importance was set out by UNESCO. As an example, while gender discrimination is addressed in World History, it is not addressed in either biology or science.

In terms of pedagogies, it will be remembered that the adoption of active learning methods has been described as essential to develop core competences within ESD (MEXT, 2016 and UNESCO, 2006). The data obtained suggests that increasing use is being made of AL. According to the curriculum coordinator, the school is committed to transitioning away from more traditional pedagogies.

However, the extent of the progress made towards AL should not be overstated. The data points to the continued use that teachers are making of lecturing, with very few of the respondents indicating that they used any of the AL pedagogies that were included in the questionnaire. In terms of competence development, referring back to Lozano et al's (2017: 10) study, it will be remembered that lecturing, at best, 'may address' some of the competences identified as important within the framework of ESD.

Further, the value of knowledge transmission with regards to content on the environment – defined within ESD as an instrumental approach (Balls, 2016) – has been questioned by Boeve-de Pauw (2015). Citing studies by Krnel and Naglic, and Hallfredsdottir, the author posited that having knowledge of environmental problems will not automatically lead to more positive attitudes to the environment.

Recommendations

In this section, recommendations are made for the better implementation of ESD at the school and for areas of further research.

Implementing ESD

First, the school needs to introduce an ESD calendar. According to MEXT (2016: 17), this will enable lessons to be designed around key concepts identified within ESD. In a case study conducted by MEXT (2016), it was found that having an ESD calendar ensured that teaching activities could be continued even when a teacher left or was moved to a new grade.

Second, the school needs to continue transitioning away from traditional pedagogies, specifically lecturing, to the pedagogies associated with the development of ESD core competences. There needs to be a more varied approach in the use of pedagogies and this should also have a positive impact on the level of student involvement.

Finally, following the literature on ESD, the three pillars of SD need to be addressed in a more balanced manner. By omitting the social and economic dimensions of SD, it will be extremely difficult for students to develop the systems thinking that will enable them to conceive of solutions to the problems that the world faces and this, after all, is the essence of ESD.

Areas for further research

First, the nature of teaching on ESD related themes should be scrutinized to see what issues are being addressed. Where content on poverty reduction is being taught, for example, is this done purely in reference to other countries or are local issues also addressed?

Second, in order to assess the impact that ESD is having, it would be useful to conduct a longitudinal study among students, in ESD oriented schools, in order to establish the degree to which ESD shapes their values and behaviours. Such a study would need to be conducted in a number of sites so that comparisons could be drawn on the efficacy of different approaches and in this way best practice could be established.

Limitations

Following Verschuren (2003), as a case study, this work can be said to have limited external validity because only one research unit was included. According to Yin, however, the goal of case study research is to, 'expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization) (Denscombe, 2014: 61). Further, according to Simons (2012), validity is grounded in, 'professional agreement as to the usefulness of particular insights, and in the trust and confidence that may be placed in colleagues offering them' (2012: 6).

The quality of the findings can also be questioned on the basis of bias or the subjectivity of the researcher (Cohen, Manion and Morrison, 2015). In defense of this study, Simons (2012) writes that rather than trying to eliminate subjectivity, a more fruitful approach is to acknowledge the subjectivity of the account and to detail the steps which have been taken to identify and correct the bias.

The subjectivity of the researcher involves a focus on the environmental dimension of SD. Further, because of the author's teaching experience in Japan, he is skeptical regarding the extent to which ESD has been or will be incorporated into teaching and learning.

How the study was implemented will also have had an impact on the findings. Of concern is the non-response bias of 80%. This contrasts poorly with Fincham's (2008) assertion that researchers should strive to attain a response rate of 60% for questionnaires. Following Tourangeau and Plewes (2013), the low response rate in this study 'creates the potential for bias in estimates, in turn affecting survey design, data collection, estimation, and analysis' (2013: 40). The authors note, however, that a high non-response rate does not necessarily equate to a high level of bias.

Applying these considerations to the current study, it was the intention of the author to gather data that would reflect the attitudes of the generality of teachers at the site. Breaking down the respondents, it is evident that the English department was over-represented ($n = 5$), while teachers in the science departments were considerably under-represented. Female respondents are slightly over-represented. In terms of the ages of respondents, there was little difference between respondents and the average for the teacher population. Finally, the number of full-time teachers was slightly over-represented ($n = 12$).

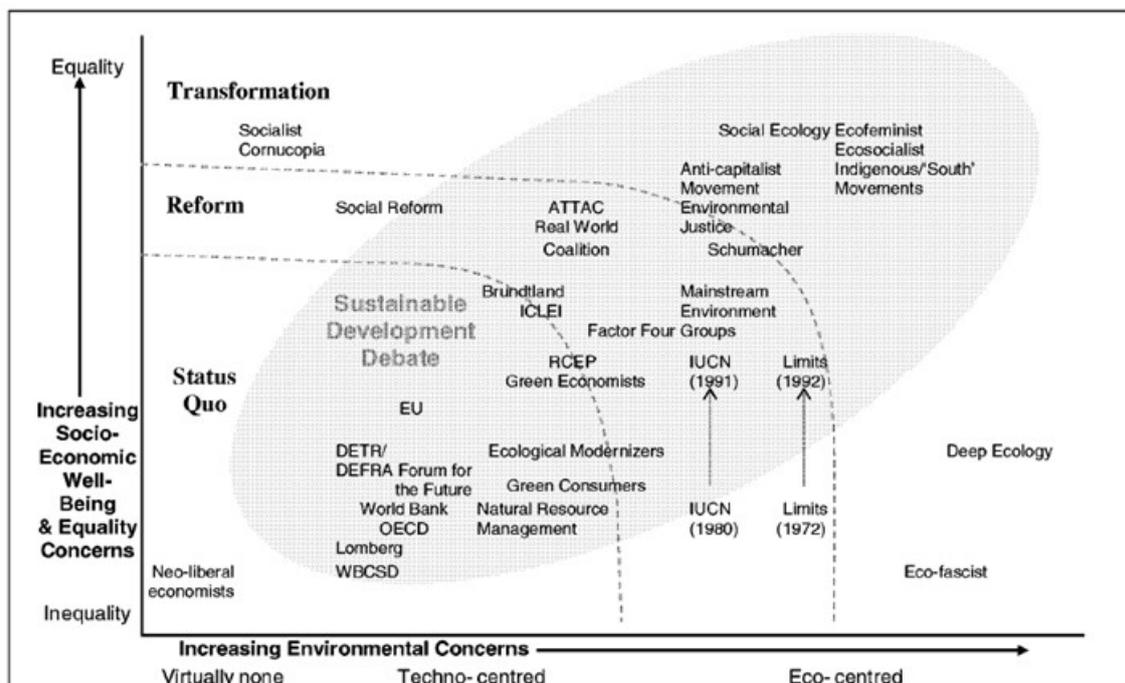
Appendices

Appendix 1: A meta-analysis of pedagogies to support ESD competences

Competence	Pedagogy												
	Universal					Community and social justice				Environmental Education			
	Case studies	Interdisciplinary team teaching	Lecturing	Mind and concept maps	Project and/or Problem-based learning	Community Service Learning	Jigsaw / Interlinked Teams	Participatory Action Research	Eco-justice and community	Place-Based Environmental Education	Supply chain/ Life Cycle Analysis	Traditional ecological knowledge	
Systems thinking	Green	Yellow	Yellow	Green	Green				Green	Green	Green	Yellow	
Interdisciplinary work	Green	Green											
Anticipatory thinking	Yellow		Yellow		Yellow				Green	Green	Yellow		
Justice, responsibility, and ethics									Green	Green	Yellow		
Critical thinking and analysis	Green								Green				
Interpersonal relations and collaboration						Green	Green						
Empathy and change of perspective							Green		Green				
Communication and use of media							Green						
Strategic action			Yellow		Green			Green					
Personal involvement					Green	Green	Green						
Assessment and evaluation	Yellow				Yellow						Green		
Tolerance for ambiguity and uncertainty	Yellow				Yellow								

Source: Lozano, Sammalisto, Ceulemans, and Lozano (2017: 10)

Appendix 2: Hopwood, Mellor and O'Brien's SD mapping technology



Source: Hopwood, Mellor and O'Brien (2005: 41)

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