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What influences the emergence of a new subject in schools? The case of environmental education

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New subjects are always emerging but only some gain a place in the formal school curriculum. In fact, most of the now accepted conventional school subjects have, at some stage, struggled to become established. This paper presents findings of a three-year study of teacher and school responses to the introduction of environmental education (EE) as a new subject within the Taiwan national curriculum. School leaders and teachers were interviewed the year prior to the introduction of the new curriculum and during the first two years of implementation. Findings substantiate the importance of six themes (such as examination status and a university pathway) raised in elaborations of the traditional Layton/Goodson model. However, the complex community-school relationships and the value accorded in EE to community-based and even global action, as opposed to academic outcomes, highlighted the need for curriculum policy makers to consider expanding the traditional model with another five themes and most importantly introducing three particular themes. When seeking to promote the emergence of a holistic and integrative subject such as environmental education there is a need to also consider local environment involvement, the transformative nature of EE within whole school involvement, and linkages with a national cooperation network. Without these factors it appears EE may struggle to gain a place in the curriculum.

Keywords: theme, transformative, internal evolution, subject emergence, whole school involvement, local environment involvement

Introduction

Educators who are passionate about a novel subject area (be it ‘peace studies’, ‘transition to work’, ‘civics’, and so on) often find it difficult to mount a persuasive case for its inclusion in the established curriculum. This paper documents such a case – it describes a three-year study of teacher and school responses in Taiwanese Junior High Schools to the introduction of environmental education (EE) as a new subject within the Taiwan national curriculum.

We begin, however, by first describing the current state of a major discourse of curriculum theorizing about the emergence of new subjects that originated in the United Kingdom, namely the work of David Layton in the 1970s, which was developed by Ivor Goodson in the 1980s and further elaborated by many others, mainly in Europe and the United States. This tradition of theorizing has mainly considered historically traditional subjects (biology, geography, etc.). We then examine accounts from many countries concerning the emergence of the relatively recently

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introduced subject of environmental education, and we suggest what have been the nature of, and specific themes for, the emergence of environmental education world-wide.

Next, we turn to our own research: the introduction of environmental education in Taiwan, cast against a background of wide-ranging national curriculum change. The findings from three Junior High Schools, gathered over three pivotal years of curriculum change are presented in our 'Findings and Discussion' section, where we address the two research questions which had emerged during this study. Firstly, do the models of subject emergence initiated by Layton and Goodson, and subsequently elaborated, continue to adequately describe the emergence of new subjects such as environmental education? Secondly, we ask: What are the crucial factors influencing the emergence of new subjects such as environmental education?

The Emergence of New Subjects

One of the first models of subject emergence, based around the development of science in nineteenth century English schooling, was proposed by Layton (1972). Layton's model outlines a three-stage process for the internal evolution of a new subject. In the first stage a subject gains a place in the *school timetable* with the support of enthusiastic, but usually untrained, teachers. Geography with few lessons (Goodson, 1995) and French with few hours (Radford, 1985) in their early days of being taught in British schools are examples that demonstrate this theme. After the 1997 school reform, EE also emerged in this way in Norway with the time devoted to EE ranging from 20% to 80% of the total curriculum time at different Grades (Benedict, 1999). The second stage in Layton's model is that subject specialists emerge and offer *teacher professional development*. Successful examples include elementary school science in England in the late nineteenth century (Waring, 1985), biology in England in the junior and middle school curriculum in the 1930s (Goodson, 1987), and 'new' physics in secondary schools in Canada in the 1960s (Rowell & Gaskell, 1988). Teachers of these subjects were offered evening classes, summer schools, conferences, lecture series, workshops, courses, or weekend sessions to enhance their classroom teaching. As regards EE, in-service and pre-service teacher development has been shown to be a crucial influence on EE's successful implementation in Norway (Benedict, 1999), Switzerland (Sleurs, 2008), and in other countries where there has been a whole-school focus on EE (Henderson & Tilbury, 2004). In the third stage, teachers construct a professional body that establishes the subject as a specialised one with academic repute. The establishment of a subject association is one manifestation of this stage.

Goodson (1985), who used Layton's model to examine the emergence of environmental studies within British secondary schools in the 1960s-1970s, expanded Layton's third stage. He argued that internal academic evolution involves base subject groups achieving academic recognition in their schools and then seeking a pathway towards academic university study. This notion was applicable to both geography and biology in the mid-twentieth century in that both subjects sought to gain a place in the *external examination system* and to become established as *university departments* during their emergence process.

Goodson (1985) also proposed that subject *teachers' material interests* were crucial to the emergence of environmental studies during the 60s and 70s in British schools. Subject teachers' material interests (their pay, career prospects, and resource allocation) are important because teachers would be motivated to modify their teaching to gain better status in schools.

Later, Goodson (1995) added subject characteristics and external constituency to Layton's model. The identity of a subject is related to its *subject characteristics*. In Bernstein's (1971) terms, a strongly bounded subject has a distinct subject identity due to the strong boundaries between it and other subject areas. Weakly bounded subjects have ambiguous identities and this can impede their emergence as a new subject. In the 1960s-1970s, environmental studies and

European Studies were weakly bounded, having both interdisciplinary and integrated characteristics, and both encountered difficulty in gaining status within the school curriculum in Britain (Goodson, 1995). Goodson identified the *external constituency* for a subject as including parents, employers, trade unions, universities, scholars, politicians, administrators and others in the public arena. To promote their case beyond the confines of the individual school, new subjects have to gain support from a wider external constituency. Successful examples of this include high school biology in United States (Rosenthal & Bybee, 1987), high school mathematics in United States (Stanic, 1987, 1988), and the introduction of a physics curriculum in secondary school in British Columbia (Rowell & Gaskell, 1988). Each of these subjects called on groups outside the school to gain wider recognition. To sum up, the six themes of school time-table, teacher professional development, external examinations and university departments, teacher material interests, subject characteristics and external constituency have been identified by Layton and Goodson as pivotal to subject emergence.

A survey of the literature beyond Layton's and Goodson's model reveals a further five themes: syllabi and teaching resources, central government leadership, informal curriculum, non-formal education, and emergence process. Layton (1973) stated that textbooks or *syllabi* were crucial to the emergence of science in the late nineteenth century although he didn't mention this in his model. Cerovsky (1977) and Benedict (2000) asserted that successful EE implementation and the development of teachers' competence in EE could be accomplished by the use of *teaching resources.* In recent times there has been increased interest in effecting curriculum change by shifting the emphasis from individual or group endeavour to *central government leadership* (Paechter, 2000). An intent hidden in many means for supporting implementation of educational policies is to establish the policy on the government's term (Stevenson, 2007). Some countries have introduced mandatory curricula and attempted to change the status of school subjects by making some compulsory and others not. This can be seen in the Norwegian experience when its Ministry of Education introduced a compulsory EE topic in the primary curriculum in 1974 (Yueh, 2007). Another example is from Brazil where the Ministry of Education exerted a powerful influence and had EE implemented in 97% of the Brazilian schools by 2005 (Haddad, 2009). On the other hand, the *informal curriculum*, that is everything done outside of the timetabled periods and non-school subjects inside the school timetable, has played a role in the emergence of school subjects. This theme has been important in the case of civics and citizenship in Australia (Department of Education and the Arts, 2006) and in the case of values in Northern Ireland (Smith & Montgomery, 1997). *Non-formal education* also has a role to play. It includes things relevant to education but not taught by teachers in or out of school and has become more influential in every field of education, including EE, since the 1970s (Yueh, 2007). For example, the Carpathian Sustainable Learning Network within Environment and School Initiatives (ENSI) umbrella in Europe has been launched in 2007 as an informal learning network for EE (Sleurs, 2008).

The driving force contributing to the *emergence process* of a new subject can come from either an internal or an external powerbase. External compulsion by governmental legislation for subjects was not mentioned in the models developed by Layton (1972) or Goodson (1985). Their models focused on internal academic evolution. External compulsion has been effective for subjects such as technology education and environmental education (Yueh, 2007) suggesting that both forms of emergence need to be considered.

These eleven themes developed from the literature provided an initial framework for the analysis of themes in the emergence of EE in the three Taiwanese junior high schools in this study.

The Nature of and Specific Themes for the Emergence of Environmental Education

The case of EE is unique because it not only emerged via the internal 'academic' evolution in the school curriculum in the late 1960s, though it failed in the early 1970s in Britain, but it was also introduced into schools by external authority (central government leadership) in many countries in the 1990s (Yueh, 2007). Any discussion of the emergence of EE must first clarify what is meant by EE because its nature has evolved since the 1960s. The paradigm shift within EE is from teaching about, in and for the environment in the 1970s to being a catalyst of systemic educational change in the 1990s, and a model for the 'new learning' (educational reform movement) in the twenty-first century (Yueh, 2007). In the 1970s, Eichler (1977) described EE as problem-centred, interdisciplinary, value-oriented, community-oriented, concerned with man's survival as a species, based on student-initiated activities and involvements, and both present- and future- oriented. During the 80s, the scene did not change markedly. In the 1990s, and building on Eichler's description, Palmer (1998) argued that EE is an approach to education as a whole rather than a separate subject. He proposed that it encompasses the environment in its entirety including social, political, economic, technological, moral, aesthetic and spiritual aspects. Further, he proposed that EE should be enhanced and supported by the organization and structure of the learning situation and the institution as a whole. Based on this conception, it is clear that EE is different from most current school subjects such as language, mathematics and science that tend to be strongly-bounded with their boundaries serving to divide, rather than integrate, knowledge. This quality poses a practical challenge to the emergence of EE when there is competition with well-established school subjects.

Three particular themes discussed in the literature on successful EE implementation worldwide appear to link to the characteristics of EE. These themes are: local environment involvement, the transformative nature of EE with the need for whole school involvement, and the role of a national cooperation network. *Local environment involvement* relates to how schools and their students work with the local community and environment. The successful Environment and School Initiatives project in European countries highlights the role of the school in generating concrete knowledge about the local environment for community use, rather than the transmission of abstract knowledge dissociated from local applications and uses (Elliott, 1998). Brazilian strategy was also to promote Agenda 21 projects thr\ough interaction between the school and the community (Haddad, 2009). The *transformative nature* of EE pertains to the sense of a radical change brought about through changes in teachers' perspectives and actions within educational institutions working to deal with the problems now being faced at a global level. A whole school approach similar to that conducted by exemplary schools in New Zealand, Sweden, China, United Kingdom, Canada (Henderson & Tilbury, 2004) and integral education in Brazil (Haddad, 2009) could be seen to offer the transformative potential for EE in schools. This is because within the whole school approach all staff in a school work together to integrate EE across the school curriculum and to seek quality in the teaching-learning process through engaging in high level debates with global environmental issues. This contributes to sustain student engagement and greater appreciation of the holistic and integrated nature of EE. The implementation of EE with this approach has also been shown to impact positively on the educational climate within a school. The third theme particular to EE is that of the need for a *national cooperation network*. A national cooperation network is important because students can access it to gain essential information for any local, or national, EE study. This network can include central and local governmental agencies, research institutions, universities, educational organizations, subject associations, private sectors, commercial and industrial sectors, and other schools. Norway had provided a successful example of the value of a national cooperation

network since the 1990s (Yueh, 2007), while Austria, Switzerland, Finland (Sleurs, 2008) and Brazil (Haddad, 2009) also showed their success in EE via this theme in the late 2000s.

Taiwanese National Curriculum Change

The Taiwanese education system comprises six years for elementary school, three years for junior high school, three years for senior high school, and four years for tertiary education. Education is compulsory for nine years: elementary and junior high schooling. A call for Taiwanese educational reform emerged in the 1980s and was achieved in the 2001 curriculum reform. The new national curriculum was introduced in Grade 1 in 2001; in Grades 1, 2, 4 and 7 in 2002; in Grades 1, 2, 3, 4, 5, 7, 8 in 2003; and implemented fully (Grades 1-9) in 2004. Due to this escalation process, the 2001 reform reached the junior high level (Grades 7-9) in 2002.

The 2001 reform emphasised three dimensions: consistency, integration and deregulation (Wu, Chen, Chen, & Lin, 2003). Consistency involved replacing the separate elementary and junior high-level committees with one curriculum development committee. The new curriculum integrated traditional school subjects (11 in elementary and 21 in junior high education) into seven major learning areas (language arts, health and physical education, social studies, arts and humanities, science and technology, mathematics, and integrative activities). The seven learning areas accounted for at least 80% of the school timetable per week or per school year. The other 20%, or less, of curricular time was allocated to the Flexible Curriculum which fits with the notion of deregulation. Deregulation, in the context of the reform, involved the central government allowing schools and teachers the freedom to make their own decisions about teaching and school development. Schools could use the Flexible Curriculum component to develop their own school-based curricula. The reformed curriculum also included six Important Issues to be taught in an infusion way (subject teachers independently teach something relevant to the Issue without cross-subject linkage in their subject teaching) within the seven learning areas. The Important Issues are information technology education, environmental education, gender education, career development education, human rights education, and home economics education. Like other Issues, EE is to be infused into all seven learning areas in the new Taiwanese national curriculum. It should be noted, however, that curriculum integration and school-based curriculum development are encouraged rather than mandated even though they are major reform features. During curriculum change, many uncertainties and problems arose and need to be understood if they are to be overcome and effective curriculum change achieved. This paper examines themes that teachers thought to influence the emergence of EE within the Taiwanese junior high school curriculum at the time when national curriculum change was introduced.

The Research Approach

Since the late 1990s, there has been a tendency to study EE via case study research. The strength of the case study method is that it allows the researcher to concentrate on a specific instance or situation and to identify the various interactive processes at work. A case study approach generates the depth and richness of information other researchers, working in a similar situations, need to inform their decision-making (Bassey, 1981). This study comprised three school case studies. Case study research generally relies on interview, observation and document analysis (Denzin & Lincoln, 1994). In this study, interview was the major method used to collect data.

The study aimed to explore teachers' views of the factors that influenced the emergence of EE in their schools. The focus was to understand the process of long-term school development as a consequence of curriculum change and so the same interview schedule was used with all the

research participants over each of the three years. Three rounds of interviews were conducted in three urban public schools (Redbrick, Parkway and Riverside) over three school years (August 2001-July 2004). The first year of data collection was before the curriculum was formally introduced at the junior high level, although it had been formally introduced at the primary level. In the second year of data collection the curriculum was mandatory for Grade 7 and in third year for Grades 7 and 8. In order to understand the whole scene when EE was introduced into schools, the interview questions covered teachers' personal views of EE, the implementation of EE in their schools, and teachers' views of the factors influencing EE emergence. The interviewees from each of the schools included three administrators (principal, instructional director, and environment officer) and at least seven teachers, one from each of the seven major learning areas. Due to the staffing changes, there were 38, 35 and 32 interviewees in the three different rounds and 46 interviewees in total. Each round of interviews was transcribed and analysed to compare similarities and differences. The analysis informed the development of the next round of interview questions. School curriculum documents were collected and examined. Because EE was to be taught in an infused way, making its incorporation somewhat spontaneous and serendipitous, it was not possible to observe and monitor any classroom teaching. The research findings were to be reported according to the themes relating to subject implementation already identified in the literature.

Redbrick, Parkway and Riverside were medium size junior high schools (student population around 1200) in a large city in Taiwan. Each school was involved in garbage classification and recycling, which are viewed as EE in Taiwan, but there were individual differences. Redbrick is a new school with a biology background principal. Parkway has owned an incinerator for more than ten years and has won many awards for energy education. Riverside ran outdoor education via its community temple and river and had published two books on temple architecture and riverbank wildlife. These aspects have the potential to enable the schools to pursue the emergence of EE within their school curriculum in response to the national curriculum change.

A limitation of the study is that its findings cannot be generalised to schools with successful implementation of EE in Taiwan. Due to cultural differences worldwide, some findings cannot be generalised to other countries, either.

Findings and Discussion

The findings related to teacher perceptions and experiences of the influences on school EE implementation and on the emergence of EE in schools are presented in this section. The section begins with an overview of the implementation of EE, set in the wider context of the curriculum implementation generally. Following this, findings which respond to each research question is addressed in turn.

An Overview of the Implementation of EE

Across the three years, all 46 interviewees said that EE was important and should be taught in schools. However, at the level of classroom teaching, they indicated that very little change had taken place, as far as EE was concerned, with the introduction of the new curriculum. The teachers said that they focused on their subject teaching and that they would teach EE only when it was relevant to their subject-matter. Their reported teaching strategies did not change dramatically with the reform, mainly comprising lecturing, lecturing via media, and lecturing coupled with whole class teacher-student discussion. Once in a while, they used team or cooperative learning. In the third round of interviews, the teachers noted that EE could enrich their school educational

goals and enhance student education overall through a focus on education for the whole person. However, they did not consider that it had the potential to increase their school's reputation in the short term. While all those interviewed said that they should not focus solely on examinable knowledge they still stressed the importance of examinations. Their comments indicated an intensive exam pressure on school staff, and provided evidence of the paradox between the ideal and reality of Taiwanese school education.

Two reform features, school-based curriculum development and curriculum integration, have the potential to be closely connected with the implementation of EE. At the school development level, only Parkway chose EE to be their school-based curriculum. They allocated one period a week to EE in 2002, the first year of the curriculum implementation. In 2003 this period was removed from the timetable. Surprisingly, Riverside did not continue previous activities associated with their local environment because the key persons driving the development of the two books and outdoor education left the school just before this study commenced in August 2001. Not much was done at Redbrick which was specifically relevant to EE before the curriculum change, except for garbage classification, recycling and teaching swimming in the community swimming pool. Neither Redbrick nor Riverside developed any school-based curricula when implementing the new curriculum because this was not mandated. As regards curriculum integration, the three schools considered that they achieved this across all seven learning areas through school festivals, sports days and topic teaching. With regard to examined learning areas, they had tried curriculum integration with social studies but not with science and technology. As to non-examined learning areas, the schools respected teachers' individual decisions to do, or not to do, curriculum integration. None of the three schools conducted curriculum integration specifically for the implementation of EE.

In addition to the above two reform features, Redbrick registered with Taiwan's Green School Partnership Network Project (TGSPNP), which is a national EE project established by the Ministry of Education in February 2000. With help from an enthusiastic practicing teacher, Redbrick gained recognition from TGSPNP and therefore was chosen by the City Educational Bureau to undertake an EE action research project in 2004. After the curriculum reform, they did not do anything specifically for EE because there was no EE budget and they lacked human resources. Neither Parkway nor Riverside had built any relationship with TGSPNP. Overall therefore, it can be seen that EE gained entry but failed to sustain itself in the emergence process in the three schools, especially Parkway and Redbrick.

Themes Relevant to the Emergence of Any New Subject

In this section we address our first research question, namely: Do the models of subject emergence initiated by Layton and Goodson, and subsequently elaborated, continue to adequately describe the emergence of new subjects such as environmental education? To test this question, we examine the adequacy of presenting data organised according to the eleven themes of the Layton/Goodson derived model. The order of the themes presented here is based on the extent of their perceived influence on subject emergence in the three schools that were the focus of this study.

External examinations and university departments

Exam demands were perceived as a constraint on changes such as the introduction of EE, as can be seen from the following statement from the Redbrick environment officer in 2002. This comment is representative of the view expressed by all those interviewed:

> "The new curriculum tries to let children learn happily, but the problem is that the external examination still leads the instruction in schools … The curriculum must be similar to that of past times if students just want to get good marks in examinations."

This teacher went on to state that any subject not examined in the external examinations is unlikely to receive attention from either teachers or students. Being non-examined therefore became a factor that contributed to EE not becoming established in the curriculum. Further, the general view was that external examination via paper-pencil could not evaluate the essence of EE. For instance, nearly all of those interviewed (29/32) in 2003/04 stressed that the learning outcomes of EE should be behavioural change rather than knowledge gain. This could be seen to exacerbate the challenge of EE meeting the demand of being examined, and examinable. The Riverside principal summed up this challenge when she noted, in 2004, that testing EE via external examination would only lead to teachers and students emphasising knowledge over action:

> "Of course it will be valued more if the Basic Competence Test examined the content of environmental education. However, it will probably be valued by studying more about the knowledge part. As to whether students would do it or not, it is not known for sure yet."

Added to this, there are no departments of EE in universities in Taiwan even though some universities have graduate programmes or courses in EE. This means there is no obvious pathway from secondary/junior high school to university so that its uptake and continued place in the school curriculum would have to rely mostly on school staff enthusiasm and commitment. The disadvantages of this can be seen in the discontinuation of outdoor education for the community river at Riverside after key people left the school.

School timetabling and programming

In the schools in this study most of the time in Flexible Curriculum was allocated to supplementary learning for the examined subjects (English, Chinese, mathematics and social studies). Only Parkway designated a period for EE but this was only in the first year. Redbrick and Riverside designated several topics rather than developing a school-based curriculum and they did not allocate regular, or even weekly, periods for these topics.

As to the implementation of the six Important Issues, in 2002 the Ministry of Education required junior high schools to teach information technology education (ITE), but not the other Issues, for 40 hours per school year at Grade 7. Subsequently, ITE has emerged as an independent school subject even though, like EE, it is just an Important Issue within the new Taiwanese national curriculum. In this study ITE, and not EE, was accorded the highest priority in all three schools. ITE was said to produce immediate learning outcomes and therefore the schools preferred to spend time on it. In contrast, the learning outcomes of EE were said to be difficult to achieve and demonstrate within a short timeframe, which was said to be a consideration for schools. The Riverside English teacher articulated this view in 2003:

> "The first priority implementing the six Important Issues in my school will be 'information technology education' because it can have an immediate impact … You can observe its learning outcomes from the school Website…The content and form of the Web pages certainly could show students' computer literacy … As to environmental education, it's hard to see its immediate learning outcomes … We

> must find something with fast endings if we want to show credit in a brief time. Information technology education can do this."

One year later, this teacher said that EE would be the lowest priority for an allocation of time in Riverside because it was more a style of living or way of thinking than a school subject. Although all 46 school staff (from the three rounds of interviews) expressed at least once, and up to three times, that EE was important and should be taught in schools, apparently it was still not their first priority when considering time allocation in their school timetables. This is exactly what Young (1971) points out: school subjects vary in status in the eyes of teachers, students and the outside world. The Riverside instructional director asserted that the survival of EE depended on whether government policy mandated that it be included in the school timetable.

Syllabi and teaching resources

The lack of a syllabus was construed as an impediment to the introduction of EE. Parkway gave this as the reason it could not continue to run its weekly period of EE. During the second round of interviews, it was suggested that adding a unit of EE to the textbook for each of the seven learning areas would increase the teaching of EE in schools. One year later, more than one fifth (22%; 7/32) of the interviewees ranked this suggestion as a first priority for the support they needed. In the third round of interviews, when asked what teachers needed in order to teach EE, nearly three quarters of the interviewees (73%; 22/30) said teaching media and materials such as videos, VCD, DVD, statistical diagrams and tables of environmental problems, lesson plans, a syllabus and exemplar case studies were needed to the implementation of EE. Among the Important Issues only ITE has its own textbook for Taiwanese junior high schools. The Redbrick chemistry/physics teacher said it had made a difference to its subject status: ITE was valued highly. The Riverside history teacher in 2003 commented that the government should nominate a task team to develop teaching materials rather than expect teachers to do this themselves:

> "The government should nominate an environmental education task team to develop teaching materials for school-teacher reference and conduct workshops on environmental education to give teachers professional development**.** The government should not just let schools do it by themselves as school-teachers are all overloaded."

Teacher commentary indicates the importance of teaching resources to facilitate the emergence of EE in schools in Taiwan.

Central government leadership

Participants in the study identified central government leadership as contributing to the non-emergence of EE. In the last round of interviews in 2003/04 many of the teachers indicated that they believed the Ministry of Education had the ultimate influence over the introduction of EE in Taiwanese junior high schools. The Redbrick chemistry/physics teacher described the scope of this influence as encompassing the provision of resources and formalizing timetable requirements along with the provision of teacher development. In 2003 he said:

> "It depends on the attitude of the Ministry of Education … Whether the Ministry wants to keep environmental education as a school subject, or not. During the period of curriculum development the Ministry of Education could look for experts to edit textbooks, require teaching hours in the school timetable, and ask professional

> teachers to teach it. This has happened for information technology education already."

In 2003/04, half of the interviewees (15/30) in the three schools assumed that the Taiwanese government did not much value EE. The Ministry had not funded EE and had not taken a leading role when implementing EE in the new curriculum. This view was clearly expressed by the Riverside lead administrators at each phase of the research. For example, in 2003 the instructional director commented that the educational budget was only distributed to the Issues for which the Ministry functioned as the leading governmental office. EE did not fall within this category.

> "Ministry of Education is not the leading governmental office to expand environmental education but it is the leading office to do career development education. Therefore lots of money from the Ministry was distributed to schools on the implementation of career development education rather than environmental education."

One year later, the Riverside principal expressed the opinion that one reason for the small budget allocated to EE by the Ministry was because it was not the major governmental office in charge of EE in Taiwan. Combined these comments suggest that whether or not the Ministry plays the major leading role definitely influences the emergence of EE in Taiwanese junior high schools.

Teacher professional development

The findings of the study highlight the impact of professional development, or more specifically in this case, a lack of professional development. All of the 46 interviewees in each of the three rounds of interviews commented that, with the exception of one citywide workshop, there had been no specific professional development for EE. The Redbrick art teacher even said there had been very little introduction specifically aimed towards EE in workshops on the new curriculum in 2001 (the year prior to the curriculum change):

> "Before implementing the new curriculum, there was no workshop specifically for environmental education ... The workshops mainly introduced the new curriculum in general such as curriculum integration, core rationale, curriculum goals, core competences, and competence indicators … There was very little introduction of the six Important Issues. They were mentioned only by name without detailed introduction."

As to school-based workshops, the last round of interviews indicated that no EE internal school workshops had been conducted over the three years studied. It is no wonder some of the interviewees said they did not fully understand EE and so could not teach it properly. Their comments suggested there is no doubt as to the importance of teacher professional development, as a means of developing teacher confidence and expertise, to support the emergence of EE in Taiwanese schooling.

The informal curriculum

In 2003/04, 84% of the interviewees (27/32) believed that EE existed more in the informal curriculum than in the formal curriculum in their schools. This can clearly be seen in the daily

garbage classification and recycling done at lunchtimes, cleaning times, nap times, homeroom teacher time, the intervals between periods and sometimes after school. Most of the staff interviewed viewed these activities as mainly and particularly for EE. They referred to them as school activities for EE. Further, it is weekly meeting rather than other timetabled periods that students were told specifically about EE. During this period, all the students from one grade level or the whole school would be assembled to listen speeches given by guest speakers on a variety of topics.

In the third round of interviews, a third of the school staff (34%; 11/32) believed that EE should be taught more via the informal curriculum because there was no time available in the formal curriculum. They believed that learning by doing (garbage classification and recycling) would better achieve the goal of cultivating positive environmental behaviour. The Parkway health teacher commented on this point in 2004:

> "It's enough to teach environmental education during the informal curriculum. No time is left for doing it in our subject teaching. Doing is better and we need to let students practise seriously about garbage classification and recycling."

Given the constraints on the school timetable and the nature of EE itself, it is perhaps hardly surprising to find that EE was taught and practised so much via the informal curriculum in the three Taiwanese junior high schools. Thus, this study confirms the importance of the informal curriculum when discussing subject emergence in schools, especially for EE.

Non-formal education

More than a quarter (28%; 9/32) of the interviewees in 2003/04 believed that non-formal education services, especially those within society at large, should take more responsibility for teaching EE. In 2004, the Redbrick principal asserted that social education, that is education gained from out-of-school activities that are not provided by school teachers, is better job than school-based education because of its greater flexibility:

> "Let social education do it. It will be better because schooling is constrained within the crowded curriculum … Students can join out-of-school activities, read the newspaper and magazines, and watch TV programmes. It will be better if students can develop their attitude and/or behaviour by themselves via these influences rather than being guided rigidly from school teaching."

Family education was a focus when Taiwanese school staff, both teachers and administrators, mentioned non-formal education. The Riverside instructional director, in a pre-reform interview, spoke of the potential of the transition from family educational influences to school education in cultivating students' valuing of the environment. He said in 2001:

> "Valuing the environment should be initiated from family education to cultivate in children good sanitary habits and then gradually add in environmental education during kindergarten and primary education. If family education could be achieved well and then extended to school education it should lead to every citizen valuing the environment."

Taiwanese school teachers normally teach abstract concepts, including definitions and explanations of phenomena, that students rarely have the opportunity to explore through first-

hand experience. Non-formal educational organizations have the opportunity to reverse this learning process and motivate students to change their attitudes and maybe take action as well because they have the potential to provide effective learning of EE.

Subject characteristics

Interestingly, those interviewed preferred not to use the term 'environmental education' when teaching topics relevant to the environment. In the last round of interviews, the interviewees indicated they had never used the term in class during the three years of the study. This was because they considered EE was involved in students' daily activities. In 2004, the Parkway instructional director said using this term would led to EE becoming a slogan in education:

> "Why should we use the term 'environmental education' when doing anything relevant to it? It then would become rigid and a slogan education. Most of the time when we use a slogan this means that it is done the most poorly. Environmental education is involved in our daily life. There is no need to name it to become a slogan."

This position suggests that EE has not been identified and labelled as a distinct subject by those interviewed in the three schools involved in the study, even though all those interviewed considered that they had incorporated it into their teaching. When asked about the possibility of teaching EE as a stand-alone topic, the teachers were concerned about who would do the teaching. In 2004, the Riverside health education teacher asked:

> "Who is going to teach it? Which learning area should environmental education belong to? Everyone is overloaded … it is hard to get someone interested in designing a topic teaching unit for it."

More than this, the broad and holistic nature of EE was identified as a constraint to its implementation. During the first round of the interviews, more than one third of the interviewees (35%; 13/38) expressed concern about the breadth of EE. In pre-reform the Riverside ex-principal expressed concern that the curriculum would not be good if divided into a number of specific areas such as EE and leisure education, particularly when a subject like EE was connected to many other areas. He said in 2001:

> "Environmental education is too broad and connected with many things … Education is hard to be divided into one and another as they are closely connected. If you divide education into leisure education, environmental education and so on, it would become rigid."

Due to its broad content, everything and anything taught in Taiwanese junior high schools could be seen as potentially relevant to EE. This view could be seen to underpin the lack of urgency to develop EE as a specific subject.

Teachers' material interests

Data from the current study indicates that school staff have a preference for projects and research linked with their accessing grants for their schools. That is they are motivated by material interests but at a school-based level rather than an individual subject teacher level. The notion of *school-based material interests* is not however often mentioned in the literature. It seems that

Taiwanese junior high schools prefer to apply for projects or Seed School grants for ITE because funding comes hand in hand with these projects. This was the reason that both Redbrick, in 2002, and Riverside, in 2003, applied for Seed School status for ITE. Redbrick applied for funding from the Taiwan Sustainable Campus Programme in 2004. This funding provided the opportunity to buy school facilities relevant to EE. Thus, it can be seen clearly in this study that Taiwanese junior high schools prefer to apply for funding for material items such as computers, facilities and equipment, new buildings, e- and multimedia classrooms and other resource-based projects such as the greenification and beautification of the school grounds.

School-based material interests can also be seen to influence the implementation priorities for the six Important Issues because some Issues, but not EE, are allocated funding. In 2003 the Riverside instructional director pointed out that career development education, gender education and ITE were the budget-based Issues:

> "The government will ask for accountability and evaluate those Important Issues that are allocated money … Schools will work more on those Issues … the new upcoming Important Issue is career development education … Gender education is a yearly project and regular funds have been available both before and after the new national curriculum … information technology education has been funded well in the past but the funding is less now."

This theme is found in the literature of successful EE worldwide. Benedict (2000) stated that adequate financial resource to plan and implement the instruction of EE is necessary in schools. Further, the review of Whole-school Approaches to Sustainability for EE development highlights the role of significant and continuous financial support to assist whole-school programme strategic planning and to focus on improving schools for more effective outcomes (Henderson & Tilbury, 2004).

An external constituency: Taiwanese parents

In this study some interviewees, for instance the Parkway principal in 2004, recommended that environmental pressure groups especially educators strongly advocate EE to the Taiwanese central government and request the government to examine EE. These groups and individuals are the external constituency for the development of EE as a new subject as outlined in the literature. However, this study found that parents are the most direct external constituency for Taiwanese junior high schools, linked with the wider societal focus on the need for examination preparation. Awareness of parental pressure was evident in comments from both teachers and administrators in each of the three schools. For example, in 2004 the Parkway home economics teacher said it was normal in Taiwanese junior high schools to vigorously pursue exam preparation in response to parental requests. In the same year, the Parkway principal said school instruction was guided by society, especially parents. He said school staff had to emphasise exam-driven instruction for this reason. As a principal he considered he was evaluated by the community on the basis of how many of his students gained entry to high status senior high education:

> "The government values something while the whole of society and parents do not value it. Schools are usually guided by the view of society … we all know education should not be guided by the examination but what can we do if not follow the examination? … The reality in society is that it is difficult for schools to get the situation changed … Society evaluates a principal by the number of students attending star senior high schools."

Evidence of the power of parental pressure came from the phenomenon of 'streaming' in the three schools. This is a product of parental pressure because streaming is illegal in the Taiwanese education system. Parents with academically high performing children always request that schools stream students because they believe this will enhance their children's examination marks. If this does not happen, they transfer their children to schools with a streaming system. Parents consider there is a link between the star senior high schools and state universities, which constitutes a pathway leading to high status professional occupations for their children in the future. Parents place high value on whether or not the school will help their children gain high marks and school staff realise the ultimate means of raising a school's reputation is student performance in external examinations. In order to retain students, schools often manipulate the school timetable to increase the time for examined subject teaching. Even schools that had successfully implemented new initiatives could face pressure to meet these societal expectations. For example, the Riverside environment officer's previous school had successfully piloted the government's 1998-2000 Trial School Scheme for the new curriculum. It continued these excellent trials till the 2001 school year but nevertheless they did not gain more students when the new curriculum was implemented in the 2002 school year at junior high level. The Riverside environment officer said parents in her previous school community continued to send their children to study in a nearby school with a 'streaming' system.

All the 32 interviewees in the third round of interviews said that parents in their schools valued most the number of their graduate students attending star senior high schools. Therefore, school administrators and teachers had to give up, due to parental pressure, their ideal educational philosophies in order for their schools to survive and prosper in the competitive exam-driven society in Taiwan. In short, the power of the entangled relationship between external examination and the external constituency, especially parents, is clearly illustrated in this study. This entangled relationship impeded a shift to include EE as a priority in school development.

Emergence process: internal value evolution and external compulsion

There are many examples of schools implementing EE in a 'grass roots' way from countries such as Australia, New Zealand, Sweden, China, United Kingdom, Canada, Europe, Africa, and South America (Henderson & Tilbury, 2004). It is suggested in the national guidelines that schools can develop EE programmes through a process of school-based curriculum development, but this is not mandated. It could be said that the emergence of EE in these countries follows a process of internal evolution. However, it is internal 'value' evolution rather than the internal 'academic' evolution as described for biology and geography in Goodson's model. School staff in these countries voluntarily develop EE programmes because they see its value. They have not worked to include EE into high stakes examinations. Teacher commentary in this study suggested a contrary view. In the third round of interviews, school staff indicated they would definitely teach EE if the Ministry of Education mandated it. At different times, two Parkway instructional directors mentioned the Ministry's influence. The former director said in the first year of curriculum implementation most schools would not allocate time to the teaching of EE without a government directive. One year later, the new director said that teachers would definitely cooperate with the government mandates to teach EE, if they were posted, even though they were reluctant to do so. However, some staff doubted the effectiveness of governmental compulsion given the crowded curriculum. Thus, the social value of the opportunity to attend star senior high schools was again the crucial reason why Taiwanese junior high school staff were not keen to implement authentic EE, even under pressure from the Ministry. It would take too much time. In 2003, the Parkway former instructional director predictably, and sharply, said that schools would

only produce documents without genuine implementation if the problem of academic competition was not solved:

> "The real problem is the pressure to attend senior high education. Everything will be tricky and even fake if this problem is not solved … Everyone will just follow to do governmental requirement and produce documents but not really do it. Or they may say something but act differently."

Again, this indicates that the examination, rather than governmental requirement, is the most influential theme in the implementation and emergence of EE in Taiwan.

In conclusion, and in response to the first research question, employing the eleven-theme framework elaborated from the literature generated in the Layton/Goodson tradition, has enabled us to provide a satisfying, if incomplete, account of many of the themes that were evident in the emergence of EE in the Taiwanese context.

Themes Important to Current School Subjects but Particularly Pertinent to the Emergence of the New Subject of EE

We now turn to the second research question, namely: What are the crucial factors influencing the emergence of new subjects such as environmental education? Our findings suggest that, in addition to the above, there are three further themes which would seem to be indispensable to evolution of EE. They are mentioned in the literature on successful EE implementation worldwide and their importance is confirmed in this study.

Local environment involvement

In 2003/04, all 32 interviewees said there needed to be a sound and mutually interactive relationship between their school and its local community. In each case, the schools had regular meetings with their parent boards, community members attended school activities and used the school grounds to run educational/recreational programmes, community mothers helped with road duty and library management, and sometimes schools used community facilities for instruction and had friendly relationships with community/city organizations. In addition, Riverside held regular outdoor education (social studies visits) to its community temple. This programme ran both before and after the curriculum change. However, biology outdoor education at Riverside ceased the year prior to the curriculum change because the biology teacher left for another school. In the last round of interviews, although nearly four fifths of the interviewees (78%; 25/32) identified with the potential of EE to advance the interactive relationship between their school and its community, their views of its effectiveness varied. A quarter (25%; 8/32) of the teachers were of the pessimistic opinion that it had little or no effect because the exam-driven society in Taiwan did not encourage school involvement in the local environment as a part of school development. Some staff even complained about the opening of school grounds to the public because this added an extra cleaning job for their students. In 2004, the new Parkway instructional director said she felt it was a burden having close relationship with the school community:

> "Our school grounds are opened to the public to play tennis and other sports after school hours. The problem is that community people do not keep the sports field and toilets clean. Our students have to do a big clean-up every morning. We are becoming furious and considering shutting our school grounds … we feel it is too

> much of a burden having a close relationship with our community except for in certain activities."

A key element in this theme is collaboration. It is this which distinguishes 'local environment involvement' from 'external constituency', which involves only community support and approval, or mere acquiescence. It is clear that for these three schools, genuine school-community collaboration in the identification, analysis and amelioration of environmental issues was not a vigorous, expansive determinant as far as EE's profile in the schools' curricula was concerned.

Transformative nature with whole school involvement

The transformative nature of EE relates to its potential to bring a radical change in both thinking and action within educational institutions when educators deal with environmental problems that are being faced at either a local, or global, level. Without using this terminology, all 32 teachers in 2003/04 indicated they were aware, at least to some extent, of the transformative nature of EE. They commented that EE could enhance their school's educational goals and enrich student general education as a process of education for the whole-person. For example, in 2004 the Parkway Chinese teacher said EE could fulfill students' affection development, especially value, leading to a whole person education. She said:

> "The river within a school community must be very clean if environmental education is done successfully in the school. Everyone would care a lot and be a volunteer to value their local environment … Students would adore the environment and then protect, treasure and beautify it. This is how a whole person education required."

This study confirms therefore that teachers appreciated the potential of EE to supplement school educational goals and promote wider educational goals even though these have not yet been achieved, at least in these schools.

Although there is no evidence from this study to support a whole school approach, the Riverside environment officer's previous school had implemented EE successfully via this strategy. In 2004, she said all the staff in her previous school worked together preparing materials for the new curriculum, including EE. Her colleagues strongly relied on their local environment to develop teaching materials for EE and the school, though small, gained a reputation by following the essence of the new curriculum. Many people visited the school to study the achievements. She considered that a whole school focus had been important in teachers learning about the new curriculum, including EE:

> "Whether or not teachers have pressure to learn new stuff is relevant to its whole school atmosphere … All of the school staff in my ex-school worked together executing the Trial Scheme and prepared everything for the new curriculum including environmental education … My ex-school then gained reputation after doing the Trial Scheme … Many visitors came to learn from us."

The Riverside environment officer stressed the influential role of leadership by the school principal in the successful EE implementation in her previous school. In 2004, she said whether or not a school conducted out-of-school visits very much depended on the principal's support:

> "I think the reason why my ex-school could make the topic teaching of environmental education and especially out-of-school visiting a focus relied on the principal … whether the principal wants to take responsibility and do it or not."

The need for a whole school focus was the reason why the Redbrick principal and instructional director pessimistically expressed that EE could not be one of their school characteristics after the curriculum change. Only if the whole school staff worked together, could EE be successfully introduced. In 2004, the Redbrick principal said too few teachers in her school were working together on their 'Green School' project, which was part of the TGSPNP:

> "It's too early to say that 'Green School' will become one of our school characteristics. I can't see its possibility yet. Only two teachers have joined the 'Green School' project. One of them is a practicing teacher and will leave our school in the next school year … We even don't know whether we can continue it in the future or not."

In the case of the three schools in the present study, neither the profile of EE, nor the understanding of its nature, were sufficiently well developed to allow it to adopt an appropriately central role in the lives of the schools. In the summary of findings of the international review of whole-school sustainability programmes, Henderson and Tilbury (2004) identified 'school leadership' as one of the key features characterizing the vision of a sustainable school. Once school leaders could think and work in a transformative way so as to encourage all the teachers in their schools to cooperatively operate their EE programmes, the future-orientated education and/or environmental education could possibly be achieved.

National cooperation network

Although no interviewee in this study directly suggested the idea of a national cooperation network, many teachers emphasised the need to have support beyond their schools, especially from the government, when implementing EE.

Henderson and Tilbury (2004) highlighted the importance of partnerships and school networks leading to critical success in global whole school initiatives. Norway is an exemplary country for successful EE implementation via the theme of a national cooperation network. In the early 1990s, Norway built an innovative system of inter-sectorial cooperation 'country contact groups' and fostered discussion about the local environment and schools by key players from both governmental agencies and non-governmental organizations. Further, they established an EE network as a forum for the exchange of environmental information between schools and local and regional management in different sectors, and with research institutions. Therefore, Norwegian students were soon involved in a national programme which could be mapping biological diversity, investigating lake or stream or coast, studying energy, or measuring solar radiation via the network developed by the government (Benedict, 2000; Benedict & Sandas, 2007). The results of presentation and communication will be on the Internet to enhance students' further learning. The Norwegian Ministry of Education invited several other ministries, banks, universities and non-governmental organizations to cooperate in the network (Benedict & Sandas, 2007). Brazil accomplished their success by the conjunction with agencies from government, public, educational institutions, communication media, companies and society (Haddad, 2009). Obviously, no contemporary school subjects needed such a huge supporting network during their emergence in schools.

Actually, extensive cooperative networks do exist across Taiwan i.e. Taiwan Green School Partnership Network Project and Taiwan Sustainable Campus Project but none of these three

schools appeared to access them to any great extent. The kind of cumulative synergy that could result was therefore never exploited and the in-school profiles of EE remained underdeveloped and isolated.

Conclusions

In summary, this paper has described a situation where EE has had little success in inculcating itself into the lives of three junior high schools. The reasons why EE was largely rejected become clear when teachers' views are analysed in terms of the accepted leverage points pertaining to the introduction of new school subjects.

Introducing a new subject into schools involves changes and adjustments for teachers and schools. Goodson outlined a model of internal 'academic' evolution for subject emergence for exam-oriented subjects in the 1980s. By examining the case of environmental education in 2000s, this Taiwan-based study not only substantiated the themes raised by Layton (1972) and Goodson (1985) in the British context but expanded the list to eleven themes that would seem to be crucial to the emergence of any new subject in schools. These themes are the possibility of gaining external examination credit and entry to a university department; the prioritising of the subject in school timetabling and programming; the development of a systematic syllabus; the presence of proactive support from central government leadership; the provision of teacher professional development; the inclusion in the informal as well as the formal curriculum in a school; the inclusion in non-formal education in society; the presence of clear subject characteristics; the presence of substantial school-based material interests; the gaining of support from an external constituency, especially parents; and the presence of an emergence process that couples internal value evolution with external compulsion.

However, for holistic and integrative subjects such as environmental education, this study raised three additional themes as pertinent for the emergence of a school subject. They are the need to set up long-term partnerships with local groups that have an interest in or responsibility for the local environment (e.g. societies, agencies and non-governmental organisations) to achieve local environment involvement; the need for a whole school approach through curriculum integration to achieve the transformative nature of environmental education; and the need to build up a sound cooperative network that includes people at all levels of the education system and society to achieve a national cooperation network. When these three particular themes are not taken into account, as happened in the three Taiwanese junior high schools discussed in this paper, the effective emergence of environmental education in contemporary schooling will be difficult to achieve in mainstream education.

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Okullarda yeni bir konunun ortaya çıkışını ne etkilemektedir? Çevre eğitimi

Yeni konular her zaman ortaya çıkmaktadir fakat okul müfredatinda az bir yer almaktadır. Gerçekte, güncel olarak kabul edilen geleneksel okul konularının çoğu bazı seviyede kurulmak için caba göstermektedirler. Bu makale Tayvan ulusal müfredatındaki cevre eğitiminin tanıtılmasına yönelik öğretmen ve okul cevaplarının üç yıllık bir çalışmasına ait bulguları sunmaktadır. Okul yöneticileri ve öğretmenlerle yeni müfredat tanıtılmadan önce ve uygulamanın ilk iki yılı esnasında mülakatlar sürdürülmüştür. Bulgular 6 konunun önemini kanıtlamaktadır. Bununla birlikte, kompleks toplum-okul ilişkileri ve değerler diğer beş konu ile birlikte geleneksel modeli genişletmeyi ve çok önemli olarak özel üç konuyu tanıtmak amacıyla müfredat yapıcılar için vurgulamaktadır. Çevre eğitimi gibi holistik ve integratif bir konunun ortaya çıkışını arttırmaya bakıldığı zaman, yerel çevre, çevre eğitiminin transformatif doğası ve ulusal bağlantılar ile ilgili bağlantıları düşünmek için bir ihtiyaç bulunmaktadır. Bu faktörler olmaksızın, çevre eğitimi müfredatta bir yer almak için çabalayacaktır.

Anahtar kelimeler: konu, transformative, içsel evrim, konu ortaya çıkışı, okul dahil olması, yerel cevre dahil olması