科技部補助專題研究計畫成果報告
期末報告

臺灣文化中推廣節能減碳之張力-個人、學校、網路行為分析(3/3)

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執 行 單 位 ：國立政治大學教育學系

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報 告 附 件 ：出席國際會議研究心得報告及發表論文

處 理 方 式 ：
1.公開資訊：本計畫可公開查詢
2.「本研究」是否已有嚴重損及公共利益之發現：否
3.「本報告」是否建議提供政府單位施政參考：否

中 華 民 國 103 年 10 月 31 日

中 文 摘 要 ： 本研究的目的是探討永續發展整合到教學方法課程中所面臨的挑戰與解答。本研究主要採用行動研究法，探討整合永續發展於教學方法的教師經驗，輔以學生訪談和作品的質性資料。質性資料分析結果顯示整合永續發展於教學方法中的四項挑戰和解決方案：(1)課程目標：從注重永續發展的價值到學生永續力的發展；(2)課程教材：從專業導向到脈絡導向的永續發展；(3)學生專題：從評估學生產品到評估學生反思；(4)課程支持：從傳統的認知和協作支持到多樣化情感、社會和媒體的支持。本研究增進如何將永續發展（概念性知識）整合到教學方法（程序性知識）的知識，這是過去較少研究的主題。本案例研究也顯示在高等教育中，永續發展整合到不同學科的方法學課程之可能性。

中文關鍵詞： 行動研究；學科整合；永續發展；教學方法

英 文 摘 要 ： The aim of this study is to investigate the challenges and solutions from integrating sustainable development (SD) to teaching methodology (TM) courses. This study mainly uses action research approaches to investigate the instructor ‘s experiences of integrating SD to TM, supplemented with qualitative data from student interview and works. Results of qualitative data analysis demonstrate four sets of challenges and solutions in integrating SD to TM courses: (1) Course objectives: from emphasis on SD value to student sustainability; (2) Course materials: from profession- to context-based SD; (3) Student projects: from assessment on student products to student reflections; (4) Course supports: from traditional cognitive and cooperative support to diverse emotional, social and media supports. This study adds the understanding of ways to integrate SD (as conceptual knowledge) to TM (as procedural knowledge), a topic rarely researched to date. This case study demonstrates the possibility to integrate SD to diverse disciplines in higher education via methodology courses.

英文關鍵詞： Action research; discipline integration; sustainable development; teaching methodology

1. Introduction

Sustainable development (SD) is a new topic raised by the United Nation but rarely be placed into the national curriculum and in teacher-education programmes (Gottlieb, Vigoda-Gadot, Haim, & Kissinger, 2012). Education has sometimes be criticised as a transmission of cumulated traditional knowledge as presented by the national curriculum. Teachers are criticised as failing to response to evolving world changes at the community, national and global levels. Integrating SD into teaching methods (TM) courses may provide an opportunity to advance pre-service teachers higher-order ability of sustainability and of flexibility to response to the fast-changing issue, world and knowledge.

SD or sustainability as an evolving knowledge and competence-based education system may be strengthened by utilising local, traditional and indigenous knowledge (Mochizuki & Fadeeva, 2010). Action research is especially suitable for innovative teaching contents or methods by which teacher professional development can be built by quick responses to new, critical and local issues such as SD and sustainability. Several endeavours have been made to integrate sustainability to diverse disciplines such as operation management (Fredriksson & Persson, 2011), business (Marshall & Harry, 2006), design (O'Rafferty, 2014), engineering (Quist, 2006; Svanstrom, 2012; Huntzinger, 2007), science and mathematics (Hopkinson, 2010). Some education programmes focus on simultaneously integrating SD to multiple disciplines including aesthetics art history, engineering, environmental science, geography, international relationships, communication, science and teacher education (Clark & Button, 2011; Lozano-Garcia, 2009). There appears to be no study focusing on reporting TM courses aiming to integrate SD to date. The purpose of this study therefore is to use action research to elicit local wisdom from integrating SD to TM for benefiting both disciplines.

1.1 Challenges in integrating sustainability to existing courses

SD bears the essence of uncertainty in knowledge while TM requires students to design teaching activities. Uncertainty in knowledge invites students to develop critical thinking while designing teaching activities invites creative thinking. The integration of SD and TM may raise issues of the commonality and differences in knowledge between the two disciplines and the ways to integrate the two disciplines.

Two major challenges are identified by past instructors' experiences of integrating SD to courses in higher education. (1) Emerging knowledge of SD: Instructors lack of

clear knowledge of SD and need to link SD with their original domains of knowledge. Instructors have to pay deliberate effort to conceptualise the concepts of sustainability and SD (Marshall & Harry, 2006) and to identify the commonality between the two courses (Fredriksson & Persson, 2011). (2) Adaptive teaching: Instructors have to fit SD to student characteristics such as students from diverse cultural and economic backgrounds (Marshall & Harry, 2006).

1.2. Creative teaching designs for SD

Teacher preparation courses need to increase teacher expertise to create digital learning and teaching materials by supportive and collaborative environment (Hsu & Ching, 2013). Student-teacher sustainable ability is likely to be cultivated by the process of knowledge creation, design, and collaboration (Tsai, Chai, Wong, Hong, & Tan, 2013). SD serves as a fertile knowledge building soil for intensive use of ICT given the emerging knowledge in global warming and tensions in the implementation of energy policy (Chiu, 2013). Micro-teaching provides opportunities for reflection on teacher (technological) pedagogical content knowledge and learning content knowledge and their relationships (Chai, Koh, & Tsai, 2013).

Creation of open educational resources (OER) promise the use of the general public with little fee, time, and space limitations (Hilton III, Gaudet, Clark, Robinson, & Wiley, 2013). Teacher capacity to create OER may help increase teacher trans-literacy and reduce student inequality in education, e.g., Khan Academy, MOOCs, and the teacher education in sub Saharan Africa program (Murphy & Wolfenden, 2012).

The above review of literature suggests that there appears to be no studies to date focusing on integrating SD (as declarative knowledge) to TM (as procedural knowledge) courses. With action research supplemented by general qualitative research methodology, this study aims to answer the following research questions.

1. What are the challenges confronted in the first try to integrate SD to TM courses?
2. What are the solutions to the challenges (confronted in the first try) in the second try to integrate SD to TM courses aiming to reduce the challenges?

2. Method

The major research method was action research for the instructor's part. Action research is a qualitative methodology based on the notion that knowledge arises from human actions (Carr & Kemmis, 1986). For educational practice, action research fits educators' missions well by directly feeding previous research results to next related

educational settings and benefit educational practices (Snape & Spencer, 2003). This study also used the data of in-depth interviews, works and reflections from students to increase the trustworthiness of action research (Lincoln & Guba, 1985).

2.1 Participants

The instructor. The instructors had nine years of experiences of teaching diverse 'teaching methods (TM)' courses in the teacher training program in the university. She began to integrate SD into her TM courses three years ago because of the government's policy to increase the public awareness of SD and energy issues.

The students and teaching assistants. The research participants were students, who registered for the TM course on teaching skills for general, domain-specific and cooperative learning. The students were organised into groups by personal choice and/or random distribution after the instructor provided the advantages and disadvantages of homogenous and heterogenous grouping and class discussion. This way of grouping was likely to fulfill student needs for relatedness and competence in classroom at the same time (Hallam, Ireson, & Davies, 2004; Hofer & Busch, 2011). Teaching assistants were introduced in the last two years in order to resolve the challenges raised because of integrating SD to TM.

2.2 Data collection and measures

Instructor action research. Data related to the courses were collected. The Moodle learning management system compiled the course syllabuses, teaching materials, class forums, student responses to assessments and questionnaires. The instructors' kept field notes of reflections after teaching. Some lessons were audio and/or video recorded by PowerCam and cameras. The university academic department provided student anonymous assessments towards the courses.

Student works, reports and interviews. Students complete group projects of designing, implementing, and assessing teaching activities. Students also provided their individual learning reports (e.g., case studies, weekly journals and essays) as part of the course assignment. Two-three students from each group were interviewed by an independent interviewee (research assistant) after the first try of integrating SD to TM due to the undesirable student anonymous assessments toward the course provided by the university. The interview questions were similar to those presented in the Appendix.

2.3 Data Analysis

Three efforts were made to establish the trustworthiness of action research (Clark, Garrett, & Leslie-Pelecky, 2010; Ivankova, Creswell, & Stick, 2006; Lincoln & Guba, 1985). (1) Fully document the original data and reflections for the instructor's part. (2) Relate theories and practices dialectically. (3) Relate the instructor's understandings to the contexts by incorporating qualitative data from students (e.g., student works, reports and interviews).

The student interviews were conducted in Chinese and fully transcribed. All of the data from both the instructor and students were analysed by the methodologies of general qualitative data analysis (Kahlke, 2014; Miles & Huberman, 1994) with the elements of phenomenography (Marton, 1981) and grounded theory (Charmaz, 2000; Corbin & Strauss, 2007; Strauss & Corbin, 1990). The data analysis followed the process of open coding, theme finding, constant comparison and theoretical saturation. The process was supported by the Atlas.ti Version 6.0.15 software (Atlas.ti GmbH, Berlin, Germany).

3. Results (tries to integrate SD to TM courses)

This section majorly focuses on the first and second tries to integrate SD to one TM course although the instructor also tried to integrate SD to other TM courses. The first reason for integrating SD to TM was that SD was a new critical issue but had not yet been included in the national curriculum. Second, SD was not learnt by the students before but was needed in Taiwan as advocated by the government. Third, the TM course generally received desirable assessments from students but faced a decreasing trend. The university independently asked students to assess each course they took with 20 items (e.g., teaching materials, teaching methods and class atmosphere) on a 5-point scale (from 5 = desirable to 1 = undesirable) at the end of the semester. The TM course generally received desirable assessment results for the first six years (average = 4.02) but in a slight decreasing trend (from 4.28 (Year 1) to 3.76 (Year)). The instructor therefore decided to introduce SD to the TM course to maximise student learning by the challenges of teaching SD as emerging conceptual knowledge with uncertainty and aiming to help pre-service teachers learn to contribute to future education practice, society and the world.

The first try to integrate SD to TM in Year 7 faces significant challenges from student responses in the classroom, journal reflections and university-led assessments towards the course. Then, the instructor invited a student from the class as a research assistant to interview 18 students (two-three students from one group) in the class. The instructor changed the course design of integrating SD to TM in Year 8 (i.e., the

second try) focusing on solutions to the challenges confronted in the first try (Year 7). Student responses in the classroom, journal reflections and university-led assessments towards the SD-TM integration course became desirable in Year 8 (the second try) and the following year (Year 9). The major challenges and solutions in the tries of integrating SD to TM occur in the aspect of course objectives, course materials, student projects and course supports, with the course objectives as the central issue.

3.1 Challenges in integrating SD to TM: Setting the course objectives from emphasis on SD value to student sustainability (higher-order abilities)

The course objectives in the first try to integrate SD to TM set the SD as value-laden conceptual or declarative knowledge that needs to be address in mitigating global warming. In other words, SD 'should' be included in the national curriculum and the pre-service teachers need to face this challenge to take action to contribute to future education and students. On the other hand, TM is skills, vehicles or procedural knowledge to deliver SD to the public and future students. The emphasis on SD values appears not to fit student goals in attending a TM course and daily agenda.

In the second try, the instructor emphasises teaching for cultivating student sustainability. In other words, integrating SD and TM as teaching for higher-order (critical, creative and interdisciplinary) thinking and sustainability.

Student projects of teaching designs show their critical thinking. Students use news and official websites as the major sources of teaching the declarative knowledge on SD. Creativity is revealed by their diverse use of different sources to create their designs with news and official websites as knowledge resources, emotional films for motivation or affect, goals or slogans for volition, and real or virtual environment for action. Emotional films (negative images) are used to increase affective concerns for reflections and to prompt action, e.g., group discussion to figure out more creative ideas. Students appear to prefer films with happy or neural atmosphere and avoid films with sad or warning atmosphere (e.g., the films regarding nuclear power). More students express 'like' for the happy films and none for the sad ones as a response to the instructor's post on Facebook for the students' reference.

3.2 Challenges in SD as emerging conceptual knowledge: Reducing knowledge loading in course materials from profession- to context-based SD

The instructor includes teaching contents of SD that address the objective of SD as value-laden declarative knowledge in the first try to integrate SD to TM. The lecture topics include energy as cultural issues, global warming crisis, strategies for migrating

global warming, and energy use and SD. The lectures aim to support student teaching on the five topics of profession-based SD: ecological engineering, green building, sustainable production and consumption, human energy use, and sustainable enterprise development, respectively. The design appear to be undesirable as revealed by the suggestions provided by a student in the first try.

- My suggestion for this course this that the teacher can further think about the teaching topics. Either the teacher can make the decision or perhaps the teacher can change the topics into a broader scope allowing student to develop teaching freely. (weekly journal near the end of the term from a male student in the first try class)

In the second try, the instructor changes the teaching materials from professional-based topics to context-based ones. The lectures aim to elicit context-based SD by the topics of green curriculum designs, sustainable learning, and conception of sustainability. The five student teaching topics were also context based: sustainable lifestyle, sustainable campus development, sustainable community development, sustainable enterprise development, and sustainable development of the Earth. The teaching materials focusing on context-based SD receive student desirable or not-bad responses.

3.3 Challenges in TM as procedural knowledge to implement SD: Reducing gaps between course objectives and student assessments in student projects from assessment on student products to student reflections

The TM course traditionally in the first six years focuses on project-based learning, in which students work in groups to design and implement teaching activities followed by students assessing their own and the other groups' teaching activities. In the first try to integrate SD to TM, the assessment also focuses on student products although students have additional products to complete: editing and broadcasting their videos of teaching activities after design and implementation. The top-down assessment on student products appears to raise more stress than before as four products need to be produced when SD is integrated to TM for contribution to future education due to the lack of SD in the national curriculum.

The major group works are that each group design and implement teaching activities in class based on the topics they choose from the five assigned topics. Each group video-records their teaching activities, edited their videos, and shared the edited videos in class. After the sharing, the groups are encouraged to share their videos onto

the YouTube. The students kept weekly journals on what they learn from this course.

In the second try, students are guided by four sets of questions for their weekly journals and especially asked to answer each of the questions that aim to elicit their higher-order critical, creative and interdisciplinary thinking regarding their teaching materials and methods in the mid-term and end-of-term essays (Appendix). The new measure (guided reflections) appears to give students a concrete rationales for integrating SD to TM as a vehicle to achieve course objectives. In other words, the consistency between course objectives and assessments increase the whole systematic thinking in the SD-TM integration course.

3.4 Challenges in triple challenging tasks: Increasing course supports from traditional cognitive and cooperative supports to diverse emotional, social and media supports

The TM-only course includes one learning task (i.e., TM) but the SD-TM integration course in fact include three tasks: SD as conceptual knowledge, TM as procedural knowledge and the SD-TM integration as double initiative actions. The instructor focuses on teaching the procedural knowledge of TM. The conceptual knowledge of SD and technological knowledge of digital content use and creation from web 2.0 media, e.g., YouTube, largely rely on student ability and collaboration. SD as emerging conceptual knowledge with uncertainty and TM as new procedural knowledge beyond student past learning experiences focusing on individual and competitive learning in the Taiwan context inevitably create triple burdens for the students participating in the SD-TM integration course.

The Moodle learning management system is long used to deliver teaching materials since the start of the TM course and the instructor works not only a lecturer but also a collaborative partner. The Moodle and instructor appear to be insufficient to support student projects to complete the three challenging tasks in the SD-TM integration course; that it, the student groups design, implement, and video-edit and share teaching activities in class and most teaching-activity videos are shared onto the YouTube. The complex of teaching designs can be found in one 35-minute teaching activity designed by a group.

- (1) an ‘emotional’ film for motivating students and rising affective concerns, (2) the definition on the knowledge of the SD topic by lecture, (3) types and/or examples by lecture, some together with films from news and official websites, (4) an ‘emotional’ film for raising affective concerns, (5) group activities

including discussion and assessment via games and sharing, and (6) summary by lecture and/or feedback according to assessment results.

The second try of SD-TM integration includes additional course supports: Examples to edit videos, teaching assistants, class Facebook group for emerging and additional knowledge resources, and team Facebook groups for informal team members supports and knowledge sharing. The challenges of integrating SD to TM increase students need of private and multi-facet supports. Higher-order tasks such as creation and design especially need informal, occasional and emotional support from teachers, group members and other sources in addition to cognitive and collaborative support from the teachers.

The social media also keep records of vivid pictures of the different creative processes between the stages of teaching design, implementation, film making, and broadcasting in different groups. Creation and broadcasting of digital contents rely on specific able group members. Better products are expected via collaboration.

4. Discussion

4.1 Curriculum tends to be a low-pace design with values

Global warming has made SD or sustainability an important issue as advocated by some global organisations such as UNESCO (Mochizuki & Fadeeva, 2010). People, however, have their own value hierarchy. Not all people value SD or the environment especially when the concept of SD is new to students and has not yet been included in the national curriculum as revealed by the students in this study.

4.2. Redefine sustainability for the context

SD or Education for SD (ESD) are broadly defined by UNESCO (Mochizuki & Fadeeva, 2010). The definitions of SD or ESD at their present status are still in an young stage and rely on multiple cases created in the context. The students' teaching activities massively use films of SD cases to convey knowledge and to orient students toward action taken for SD (Chai et al., 2013).

4.3. Harmony in SD-TM integration replies on inviting student higher-order thinking and reflections

Can disciplinary boundaries be crossed and integrated? The commonality between

two disciplines may be a choice (Fredriksson & Persson, 2011). Another choice may be to integrate by student higher-order thinking and reflections as this study reveals.

4.4. Collaborative learning with multiple supports increases the opportunity to generate high-quality products and learn for knowledge and action

Collaborative learning increases the opportunity to share products to open access media, e.g., YouTube. Different groups use different avenues to create teaching designs and digital videos via diverse collaborative learning patterns. Students have differential ability and preference in collaboration, SD and technology. Social network analysis may be used to further identify critical factors for improving SD-TM integration courses (Lewis, Kaufman, Gonzalez, Wimmer, & Christakis, 2008).

Use and creation of open educational resources (OER) are driven by intrinsic motivation, knowledge/skills, and supportive/collaborative environment/resources. Influencing factors in use and creation of OER tend to be similar (both with above 60% agreement) and include reducing student costs, environmental concerns, academic quality, ICT knowledge and skills, time, administration and team supports (McKerlich, Ives, & McGreal, 2013). A revision to Tasi et al.'s (2013) and Chai et al.'s (2013) models of knowledge and collaboration in teacher professional development may add additional affective and detailed social variables.

5. Conclusion

This paper reports the experiences obtained from integrating SD to TM courses via action research supplemented by general qualitative methodology. The major challenges and solutions via the action of integrating SD to TM occur in the aspect of course objectives, course materials, student projects and course supports. This study by action research and qualitative methodology generates four strings of knowledge. (1) Curriculum tends to be a low-pace design in response to diverse values. (2) Redefine sustainability for the context. (3) Harmony in SD-TM integration replies on inviting student higher-order thinking and reflections. (4) Collaborative learning with multiple supports increases the opportunity to generate high-quality products and to learn for knowledge and action. This study strengthens the knowledge of how SD as conceptual knowledge can be integrated to the teaching of procedural knowledge of TM or methodologies in other disciplines.

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Appendix. Student mid-term and final reflections on teaching materials on SD and teaching methodology (TM) for sustainable critical and creative thinking

I. Before teaching: regarding the entire process of designing this educational exercise

1. What thoughts did you have? What were you most concerned about?
2. Teaching materials (on SD): Regarding selection of teaching materials, what were your considerations? How did you find relevant information (For example: from other teachers, family and friends, the Internet, etc.)? How did you make sure the information was accurate? (e.g., what standards were used to evaluate the accuracy

of the teaching materials?) Please provide a concrete example (such as from a portion of the process that left the deepest impression on you).
3. Teaching methods: How did you carry out the educational activity design process? (For example: How could you make the implementation process better? How did you divide the work? Was there anything that happened during the process that left a deep impression on you?)
4. Do you have any other thoughts, suggestions, expectations, etc.?

II. While teaching

1. What thoughts did you have? What were you most concerned about?
2. Teaching materials (on SD): How do you feel about the materials you used? For example, where they appropriate for your students? How accurate do you feel the materials were? How did you make sure the educational content was accurately conveyed? Please provide a concrete example (such as from a portion of the process that left the deepest impression on you).
3. Teaching methods: How do you feel about how the whole educational process was put into effect? (e.g., how could you make the implementation process better? How did you divide the work? Was there anything that happened during the process that left a deep impression on you?)
4. Do you have any other thoughts, suggestions, expectations etc.?

III. Producing the educational activity design video

1. What thoughts did you have? What were you most concerned about?
2. Teaching materials (on SD): What kind of information did you want to communicate to the your audience? How did you make sure information you are communicating was accurate? Please provide a concrete example (such as from a portion of the process that left the deepest impression on you).
3. Teaching methods: How did you carry out the work for the “educational activity design video production”? (e.g., how could you make the implementation process better? How did you divide the work? Was there anything that happened during the process that left a deep impression on you?)
4. Do you have any other thoughts, suggestions, expectations, future plans, etc.?

IV. Uploading your educational activity video to YouTube

1. What thoughts did you have? What were you most concerned about?
2. Teaching materials (on SD): How do you feel about the video you made?
3. How do you think your audience will feel about it? How do you think they will use the information you have shared? What will they think about the accuracy and

usefulness of the information conveyed in the video? Please provide a concrete example (such as from a portion of the process that left the deepest impression on you).

4. Teaching methods: How did you put the video on YouTube? (e.g., how could you make the implementation process better? How did you divide the work? Was there anything that happened during the process that left a deep impression on you?)
5. Do you have any other thoughts, suggestions, expectations, future plans, etc.?

科技部補助專題研究計畫出席國際學術會議心得報告

日期： 102 年 7 月 15 日

計畫編號	NSC102-3113-S-004-001		
計畫名稱	臺灣文化中推廣節能減碳之張力-個人、學校、網路行為分析(3/3)		
出國人員 姓名	邱美秀	服務機構 及職稱	國立政治大學教育學系 教授
會議時間	2013 年 7 月 11-14 日	會議地點	Brighton, UK (英國)
會議名稱	(中文) 歐洲教育學術研討會 (英文) European Conference on Education 2013		
發表論文 題目	(中文)臺灣學校實施能源教育之張力 (英文) Tensions in the implementation of energy education in Taiwanese schools		

一、參加會議經過

7 月 11-14 日：註冊、參加會議安排的學術活動、發表論文。

二、與會心得

1、此會議由 International Academic Forum (iafor)主辦，此組織的重點是 international、intercultural 和 interdisciplinary，目前的主席是 Professor Stuart DB Picken (chairman, Japan Society of Scotland)。iafor 已辦過一些各領域的學術會議(例如：sustainability, energy and the environment; cultural studies; psychology and the behavioral sciences; business and laws; language learning; arts and humanities; politics, economics, and law; film and documentary; media and mass communication; society, education, and technology; ethics, religion, and philosophy; literature and librarianship; Asian studies; social sciences)，會議地點主要在日本，少部分在英國。此組織除了辦 conferences，也出版 open access journals，目標是不論是作者與讀者均不用花費在出版期刊論文上。

2、此次會議包括 2 個主題：education 和 technology in the classroom. 如此組織所言的，這個會議與與會者，包括來自各領域、各文化和各國的學者。各領域包括：語言、數學、建築、教育、心理、科學...等，大致看來，「教育」相關領域的學者，為數較多，這應該是與這次會議的主題有關。有來自各文化、各洲 (亞洲、歐洲、美洲、非洲、澳洲)的學者，也有來自台灣的學者參與。

3、參加了 keynote speeches，這次的主題是 transformation，各學者以各角度來定義與詮釋 learning or education as a way of transformation。也參加了多場的論文發表，論文水準不錯，包括不少新興的議題，例如 google drive、facebook、simulation…等。報告的學者們，很樂意分享其教學經驗，並提供相關資料，供與會學者參考學習，覺得收穫良多。

4、報告投稿的論文，參與此場次的各學者，提出很不錯的思考點，我也回應，彼此互動，覺得有所收穫。

5、中間的休息時間，也和與會的學者互動，有一位學者更主動給予正式出版的著作。

三、發表論文摘要

The aim of this study is to investigate primary and secondary school teachers' perceptions of tensions in implementing energy education. School teachers are assumed the responsibility to implement energy education by energy policies and regulations in Taiwan. The research participants were 51 school teachers (28 females) selected by balancing school locations, teaching subjects, administration positions, and school stages. They were interviewed individually based on semi-structured interview questions. The interview questions were constructed to elicit their perceptions, concerns, and tension based on their school jobs in relation to energy education within and outside school. The results of qualitative data analysis showed that tensions tended to occur between one weak positive status and one strong confusing (partly negative and partly positive), based on the overall tension between risk and positivity in laws, models, and time. The four sub-tensions occurred in competing policies between values and practices, in ideological democracies between children and adults, in emerging curriculum between issues and resources, and in fearing management between saving and benefit. The findings suggest four likely solutions to the tensions: (1) Unify competing policies to coherent policies by a clear vision with a value hierarchy. (2) Elaborate ideological democracy to a rational democracy by communication. (3) Construct the emerging curriculum to a developed curriculum by innovations. (4) Transform fearing management to confident management by humanistic entrepreneurship.

四、建議

1、是否臺灣能發展一組織，更為主動且有計畫的主導國際的學術活動？跟 iafor 的主席 Professor Stuart DB Picken 與 reception 時聊到：此組織的總部在日本，他本人一年有多次到日本，與日本有不錯的關聯，也對日本有一些了解。由 iafor 所發的議程中對 iafor 的簡介，發現此組織目前的主要 leaders 有 5 人，均非日本人。The international advisory board 有來自各國的學者(包括台灣)。國科會科教處目前已主編一本很好的國際期刊，在「組織」的層次是否想再精進，以便能更有系統的影響國際學術的運作？值得考慮。

2、 建立更好的「跨領域」研究平台？由 iafor 對「跨領域」的定義型態與致力於彌補此 gap 的努力，再看到此次會議與會學者在「跨領域」研究上的「創意」，也許，台灣學術界對「跨領域」的定義，可以再更為寬廣；對「跨領域」研究的平台建立與鼓勵措施，可再更為加強。

五、攜回資料名稱及內容

會議手冊，含議程、keynote speakers 的簡介與演說主要內容、所有與會者的名單、論文名稱，此 iafor 組織的簡介。

六、其他

論文被接受發表之大會證明文件

ece2013
The Inaugural European Conference on Education
www.ece.iafor.org

ectc2013
The Inaugural European Conference on Technology in the Classroom
www.ectc.iafor.org

July 11-14 2013, Brighton Thistle, Brighton, UK

Dr Joseph Haldane, B.A. Hons., Ph.D. (London), F.R.A.S.

Executive Director, IAFOR Japan

Mei-Shiu Chiu

National Chengchi University, Taiwan

March 6, 2013 Contact Email: chium@nccu.edu.tw

Submission Reference Number: 0153 Presentation Type: Oral Presentation

Submission Title: *Tensions in the implementation of energy education in Taiwanese schools*

Authors: Mei-Shiu Chiu

Dear Prof. Chiu,

On behalf of the IAFOR local organizing committee and the ECE 2013 conference co-chairs, Professor Stuart D. B. Picken and Professor Sue Jackson, I am pleased to write that your proposal "Tensions in the implementation of energy education in Taiwanese schools", having met the accepted international academic standards of blind peer review, has been accepted for Oral Presentation at ECE 2013.

The Conference will be held in Brighton, England, at the Brighton Thistle Hotel, from the evening of Thursday, July 11 through Sunday, July 14 2013. The keynote speaker and plenary session will be on Friday morning and parallel panel sessions begin Friday afternoon and run for the duration of the conference. Most panels run for 90 minutes, with generally three presenters per panel, so each presenter has 30 minutes total for presentation and Q&A. For more detailed information about the conference, and accommodation, please visit the conference website.

If you cannot attend for any reason, please notify the conference administration team at ece@iafor.org, remembering to quote your submission reference number. Also, if you observe special religious holidays during the conference, please let us know on which day(s) you must not present. Not everyone can be accommodated with preferential dates and time, so presenters should limit any request of this nature to unavoidable situations.

A PDF of the full Conference Programme will be placed on the ECE 2013 website by June 20, 2013. Your name and paper title will be listed in the Programme upon payment of your registration fees. Please check the Programme at that time to make sure all information pertaining to you is included and correct.

Thank you for participating in the Inaugural European Conference on Education 2013. All of us affiliated with the organization aim to make this conference a success.

Yours Sincerely,

Joseph Haldane

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iafor japan, Sakae 1-16-26 - 201, Naka Ward, Nagoya, Aichi, Japan 460-0008
www.iafor.org

科技部補助計畫衍生研發成果推廣資料表

日期:2014/10/31

科技部補助計畫	計畫名稱: 臺灣文化中推廣節能減碳之張力-個人、學校、網路行為分析(3/3)
	計畫主持人: 邱美秀
	計畫編號: 102-3113-S-004-001- 學門領域: 能源國家型科技人才培育計畫

無研發成果推廣資料

102 年度專題研究計畫研究成果彙整表

計畫主持人：邱美秀	計畫編號：102-3113-S-004-001-
計畫名稱：臺灣文化中推廣節能減碳之張力-個人、學校、網路行為分析(3/3)	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	2	2	100%		邱美秀 (2013)。Creation of digital contents for sustainable development via collaborative learning。論文發表於台灣心理學會第 52 屆年會，政治大學，台北市，2013 年 10 月 19-20 日。 邱美秀 (2013)。Roles of science literacy and environmental knowledge acquisition in environmental attitude。論文發表於台灣心理學會第 52 屆年會，政治大學，台北市，2013 年 10 月 19-20 日。
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	1	1	100%	篇	Chiu, M.-S., Yeh, H.-M., & Spangler, J. (2014 in press). Public constructs of energy values and behaviors in implementing Taiwan's 'energy-conservation/carbon-reduction' declarations. International Journal of Science Education. http://dx.doi.org/10.1080/21548455.2014.969357 (SSCI)
		研究報告/技術報告	0	0	100%		
		研討會論文	1	1	100%		Chiu, M.-S. (2013). Tensions in the implementation of energy education in

							Taiwanese schools. Paper presented at the European Conference on Education 2013, Brighton, UK, 11-14 July.
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
其他成果(無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)		大學生以合作學習教學法進行「能源」、「永續發展」之教學，共設計教案，並且有教學影片發表於 YouTube 上，供大眾參考。					

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	1	整合永續發展於教學方法課程
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

科技部補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

□實驗失敗

□因故實驗中斷

□其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文：■已發表 □未發表之文稿 □撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：(以 100 字為限)

研究成果包括已發表 SSCI 科教期刊論文 1 篇，國際學術研討會論文 1 篇，國內學術研討會論文 2 篇，由參與研討會所得之與會學者建議，將持續修改與加強論文內容，投稿至學術期刊。另有多篇 working papers 撰寫中。

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）(以 500 字為限）

一、此多年計畫探討節能減碳與文化的議題，是學術界較少探索的主題，故受國際期刊重視，目前已有數篇論文發表在國際重要期刊，也代表國際人士對此議題的重視。

二、在實務上，期望一系列的研究，能發現臺灣在此議題上的優勢文化力量，也能增進政府、民眾對此議題的重視，並能指引出可行的方向與具體作法，而能不僅由科技，也能由文化、人心的層面，真實的解決臺灣的能源問題。