การมีส่วนร่วมของนักศึกษาในการสร้างนิสัยการปฏิบัติอย่างยั่งยืน: กรณีศึกษาวิวัฒนาการถังขยะที่วิทยาลัยนานาชาติ มหาวิทยาลัยมหิดล

Student Involvement in Developing Sustainable Practices: A Case Study of Waste Receptacle Evolution at Mahidol University International College

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บทคัดย่อ

การจัดการขยะเป็นขั้นตอนสำคัญเพื่อการอยู่อย่างยั่งยืน การใช้แนวคิดแบบรวมองค์ประกอบมหาวิทาลัย (whole-of-university approach) สามารถช่วยสร้างความยั่งยืนในมหาวิทยาลัยโดยการบูรณาการความรู้จากฝ่ายการศึกษางานวิจัยและงานปฏิบัติการ แต่กรอบความคิดนี้ไม่ได้คำนึงถึงการมีส่วนร่วมของนักศึกษา การศึกษานี้ได้สำรวจบทบาทของนักศึกษาในการปรับการออกแบบถังขยะที่วิทยาลัยนานาชาติ มหาวิทยาลัยมหิดล โดยใช้กรณีศึกษาจากงานกลุ่มในวิชา ICNS257 Environmental Issues (เทอม 3/2558-2559) นักศึกษาได้ใช้ผลการศึกษาและผลการวิเคราะห์จากงานกลุ่มเพื่อพัฒนาคำแนะนำเกี่ยวกับการปรับปรุงระบบจัดการขยะที่วิทยาลัยนานาชาติ และได้นำเสนอผลงานให้กับเจ้าหน้าที่และอาจารย์ จากการศึกษานี้พบว่า การมีส่วนร่วมของนักศึกษามีบทบาทสำคัญในการพัฒนาระบบการแยกขยะและการสร้างพฤติกรรมที่ยั่งยืนในอนาคต ดังนั้นจึงเสนอให้ดัดแปลงแนวคิดแบบ whole-of-university approach เพื่อรวมนักศึกษาเป็นองค์ประกอบสำคัญไม่ใช่เป็นเพียงผลผลิตของความยั่งยืนในมหาวิทยาลัย

คำสำคัญ: ความยั่งยืน/ ขยะ/ นักศึกษา/ การมีส่วนร่วม

Abstract

Proper waste management is a key step to sustainability. A whole-of-university approach can be used to bring together curricula, research and campus operations to develop sustainable practices. However, this approach does not consider the possible contribution from students. This study examines the role of student involvement in the evolution of waste receptacles at Mahidol University International College using the case of a student project conducted in the ICNS257 Environmental Issues class, T.3/2015-2016. Results and analyses from the project were used to develop recommendations for improving the waste management system at the College which the students then presented to staff and faculty. The study concludes that student involvement plays an important role in contributing to the development of effective waste separation and sustainable practices in the future. Thus, a modified whole-of-university approach should be adopted that includes students as a main component, and not just a product, of institutional sustainability.

Keywords: Sustainability/ Waste/ Student/ Involvement

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1. Introduction

Mahidol University International College (MUIC) recognizes the role of proper waste management in developing sustainable practices. Waste is a major environmental issue and many studies have been done focusing on the negative environmental effects of waste, effective waste reduction, and proper waste management strategy [1]. Since 2012, MUIC has focused on improving its waste management. The first step of waste management is proper waste separation. Waste can be separated into several categories including plastic, paper, metal, hazardous waste, and electronics, and proper waste separation is vital to developing sustainability in many ways. Recyclable products can be recycled and reused, reducing the need for extraction of new raw materials from the earth. Additionally, less waste will go to the landfills, a major source of environmental problems. Finally, waste separation may draw more attention to the types of waste being produced so that the appropriate steps can be taken to reduce that waste.

With over 3,500 people at the MUIC, sustainability is a joint effort. Thus, a whole-of-university approach may be adopted (Figure 1) [2]. This approach links the main components within the community together in order to encourage greater knowledge sharing among the normally isolated groups. The aim is to develop a greater understanding of how each group's functions influences students and how integrating such functions can lead to stronger institutional sustainability [2]. Such an approach has been adopted at several academic institutions. Koester et. al. [3] described the success the university has had in various areas including policy adoption, interdisciplinary curricula changes, and community involvement which were attributed to the "bridging of the academic content, administrative policies, and facilities management arenas". Rather than focusing only on teaching students about sustainability in subject-specific classes, universities may find it more beneficial to expose students to concepts of sustainability from other sources as well. As McMillin and Dyball [2] point out, "students were more likely to report exposure to the concepts of sustainability from the media and the university's corporate environmental manage ment division", despite the fact that the division has almost no direct contact with students. This shows that students are influenced by more than just the curriculum being taught.

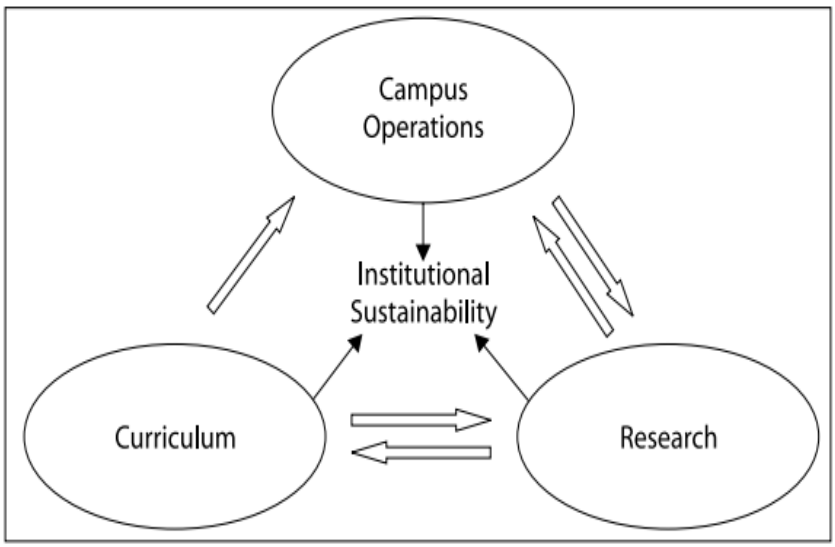

Figure 1 A whole-of-university approach [2]

Researchers have also recognized that students learn from the physical space outside the classroom as well as from the curriculum [4]. As such, sustainability should be taught as a tangible concept that relates to students' everyday lives so they develop the understanding that their actions affect the environment. Many studies have pointed out that the university campus is itself a community that reflects the larger "real-world" society, what Stewart terms "living laboratories" [5]. Projects that study the university's activities serve as a tool to demonstrate the concepts of sustainability to students. Thus, by engaging students in in-class projects based on real-world problems, the students' learning experience can be enhanced and vital skills such as teamwork, problem solving, and leadership can be developed [6]. Furthermore, such project-based learning not only develop valuable skills for the student but also provides beneficial contribution for the institution. Shriberg and Harris [7] discussed how student involvement in green projects at the University of Michigan resulted in several projects advancing throughout the term. This can be explained in part by the added "free labor" provided by the extra hours of work students can contribute to a project. More importantly, however, students can provide a unique perspective and creative ideas that may lead to actions or solutions not previously considered by decision-makers [7]. This idea is echoed by Karol [8], where their study concluded that student involvement in sustainability projects contributed to "enhanced quality, scope and likely implementation of the project" [8].

Considering these findings, the present study examined the role of student involvement in the development of different waste receptacles at Mahidol University International College through a case study of a sustainability-related project completed in an Environmental Issues class. The design of MUIC waste receptacles has changed many times over the past several years (Figure 2). Decisions are generally made by the Operation and Environment Section (OES) based on their own knowledge and research, but in recent years, the OES has started receiving input from students. This paper discussed the changes made to waste receptacles as well as highlight student contributions to past (and future) changes.

2. Materials and methods

Study group

Personnel from the MUIC Operation and Environment Section have started working with members of the Rak Kaew (environmental care) Club, and have attended final presentations in environment-related classes in order to obtain direct feedback and explore new ideas and suggestions from students. The students involved were those enrolled in the ICNS257 Environmental Issues class, trimester 3, 2015-2016. The students conducted a term project that examined waste disposal patterns in MUIC waste receptacles with the objective of providing more targeted inputs regarding waste receptacle design and use to the MUIC OES personnel. The class consisted of a total of 37 students. They ranged from first to final year students from various divisions including business administration (majors include international business management, marketing, finance, information systems and business economics), science (majors include computer science, biomedical science, environmental science and food science), fine and applied arts (majors including film production and animation production), and art (majors including social science and intercultural studies). As a part of project-based learning, students were randomly divided into seven groups composed of 5-6 students per group resulting in a mixture of younger and older students from different majors.

Process

Each group was given the task of observing the waste disposal habits by the community members in a particular section of the College during trimester 3 (Apr.-Jul. 2016). In the middle of the trimester, MUIC OES changed the types of waste receptacles as part of an effort to improve waste separation practices. Waste disposal

habits were determined by observing the overall amount of waste (total number of individual pieces of waste in various receptacles) as well as the type of waste (categorized as paper, plastic, glass, food, metal, hazardous, or other). The amount and type of waste being disposed of both before and after the waste receptacles were changed was recorded numerically and visually (students took pictures of the contents of various waste receptacles). The incidences of correct and incorrect waste separation were determined. Based on their data, students drew conclusions regarding the effectiveness of the new waste receptacles and reported their findings in a final presentation and final report at the end of the term.

Student involvement

Students presented their key findings and recommendations to staff and faculties of MUIC. Attendees included faculty members from the Science division, representatives from the MUIC Operation and Environment Section, and representatives from the MUIC Environment Committee. Audience members were able to ask questions and discuss ideas with the presenters.

3. Results and Discussion

Older waste receptacle designs

Originally, MUIC provided only one type of waste receptacle designed to take all types of waste (Figure 2d). With the introduction of environmental policies at MUIC in 2012, MUIC adopted a separated bin system (Figure 2e) with receptacles for paper, plastic, and glass. In 2013, new sustainability indicators set by the MUIC Energy Saving and Environmental Committee saw the College adding more recycling bins in key areas with receptacles for excess water/ice, recyclable materials (bottles), recyclable materials (cans, cartons), and non-recyclable waste (Figure 2a). Subsequent modification in bins took place in 2015, where the categories were changed to general waste, beverage cartons, plastic bottles, and cans, which suited the current usage more (Figure 2b). However, general feedback regarding the waste receptacles was that they were ineffective in encouraging proper waste separation for several reasons. Results from the Environmental Issues class project showed that for most waste receptacles, approximately one-third of the waste had been placed in the wrong bin. Some bins, especially the bins for glass, had 100% incorrect waste type as glass is rarely used at the College. In addition, paper waste was also found in the plastic bin and vice versa. This showed that the waste receptacle categories were not appropriate for the type of waste being generated at the College and the differences between the bin categories were not clear enough. Furthermore, the small receptacle size meant bins were often full so waste was disposed of in the nearest bin which was usually a different category, leading to higher rates of incorrect waste separation.

Design changes after student engagement

The findings of the Environmental Issues class students reflected previous student feedback stating that the waste receptacles at MUIC were confusing to use and inconveniently located. Consequently, working with the Rak Kaew (environmental care) Club, the Operations and Environment Section introduced a new waste receptacle system in May 2016 (Figure 2c, 2f). The small bins for paper, plastic, and glass were replaced with two large bins – recyclable waste and general waste. The categories of the waste separation bins in key areas were changed to non-recyclable waste, beverage cartons, recyclable waste, and organic waste.

Analysis of the new waste receptacles showed that in every location, waste was being separated more correctly. This was attributed to the fact that the reduction from three to two categories made it easier for people to decide where to dispose of their waste (Figure 2f). Furthermore, the addition of the organic waste bin was a better reflection of the type of waste being generated. Another important factor was the relocation of bins to better reflect traffic patterns within the building.

However, results also showed that after the design and location change, there was still a lot of waste being disposed of in the wrong bins. Certain bins had not been changed, such as the hazardous waste bins, which were located in heavily trafficked areas, leading to a large amount of general waste being disposed of in those bins. Furthermore, results did not indicate a reduction in the total amount of waste being generated. Results showed that the majority of the waste being generated at MUIC is from plastic bottles, plastic cups and plastic bags (Figure 3).

Figure 2 (a) Key area bins 2013, (b) key area bins 2015, (c) key area bins 2016, (d) general area bins before 2012, (e) general area bins 2012, (f) general area bins 2016

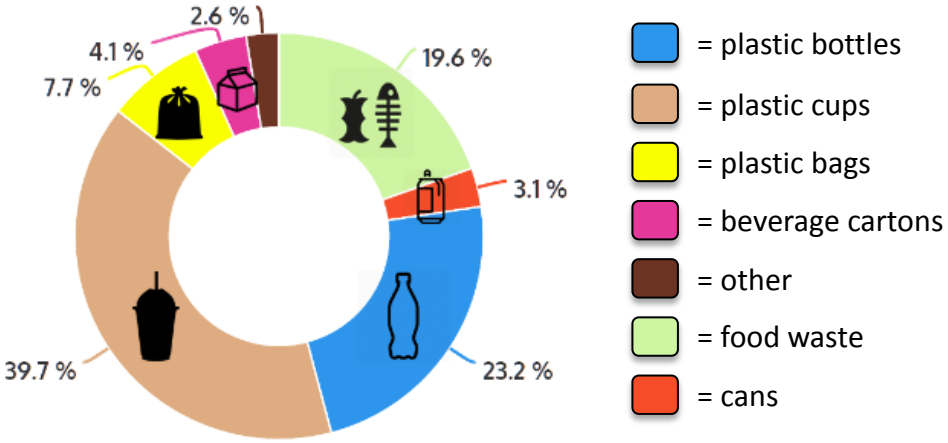

Figure 3 A sample of proportion of types of waste generated at MUIC

Based on the data gathered during the project, students made recommendations on how the waste receptacles could be improved. Recommendations were also made on how to reduce waste generation overall. Table 1 summarizes the major recommendations. From the recommendations, a few major issues were identified by the students. Firstly, the bin design could be improved through better signage and lid shape corresponding with the type of waste to be disposed of. Secondly, bin types should match the locations in which they were placed, especially in heavily trafficked areas. Thirdly, more focus needs to be placed on raising awareness and reducing overall waste generation.

Table 1 Students' recommendations for waste management improvement

Issue	Recommendations
Bin design	● Clarify category names and make clearer labels with easy-to-understand pictures ● Use a color-coding system that reflects the type of waste that should be disposed of in that bin ● Label bins in English so international faculty and students can understand and separate waste correctly ● Use lids with holes shaped like the waste they are designed to take (e.g. small round hole for plastic bottles; long, thin hole for paper) ● Standardize the categorization and labeling in all locations
Bin location	● Replace hazardous waste bins by food stall with general waste, organic waste and recycle bins ● Replace metal and hazardous waste bins in outdoor areas with general waste and recycle bins ● Reduce the number of waste receptacles in outdoor seating areas ● Provide more separated bins in heavily trafficked areas
Awareness and waste reduction	● Replace plastic packaging, containers and bags at MUIC shops and cafes with biodegradable or recyclable alternatives ● Organize "MUIC Green Week" activities ● Adopt a "Green Mascot" and produce informative videos to educate students, staff and faculty about sustainable practices ● Reduce printing paper quota ● Introduce promotional campaigns to support sustainability (e.g. 5 baht discount at shops for every 5 plastic bottles recycled; 10% discount for bringing your own cup; 1 free drink for every 10 times you bring your own cup) ● Make environmental classes or clubs compulsory for all students ● Sell sustainable products in MUIC shops (e.g. refillable bottles; cloth bags)

Changes since student presentations

Since trimester 3 2015-2016, a number of actions have been taken based on suggestions from the students in the ICNS257 Environmental Issues class. For example, organic waste bins (for biodegradable waste including paper) have been

placed next to water coolers for disposal of paper cups. Some shops have stopped providing plastic bags. "Trash Hero" waste management awareness events were held in the subsequent term. Most recently, the MUIC Environmental Committee and OES personnel have worked to produce an informative video to raise awareness about sustainability issues (to be debuted in Trimester 3 2016-2017).

The OES continues to work closely with the Environmental Issues class every term. As sustainability is a top priority for MUIC, more people from different branches of the College have begun to take an interest in the issue. This is reflected by the fact that attendance of Environmental Issue student presentations in the subsequent term increased significantly, expanding to include not only Science faculty and Environment personnel, but also representatives from the administrative team, Student Affairs, and the Salaya Pavilion Training Hotel (including instructors for the Tourism and Hospitality Management Division). This study has shown that increased student involvement is essential for the success of sustainable practices. The findings are also in line with previous studies that showed students as a valuable resource for constructive feedback and innovative ideas [7, 8]. Thus, the researchers would suggest a modification to the whole-of-university approach to include students as a major component and not just a product of the university (Figure 4).

Conclusion

The continuing evolution of the waste receptacles at MUIC is a good example of how getting students involved in environmental issues through projects not only adds another source of data for the College but also raises awareness amongst the students themselves. This can bring about improvements that match the needs of the university population and help establish sustainable practices. Furthermore, when students see that their ideas are being considered, they may feel more committed to the sustainable practices being promoted as they are able to see that the lessons they learned in class have real-world implications. Allowing students to contribute to the decision-making process illustrates that their work is translatable and can improve the community. Thus, by increasing student involvement, the university can ensure greater success at attaining institutional sustainability and producing graduates who will be environmentally aware decision-makers in the future.

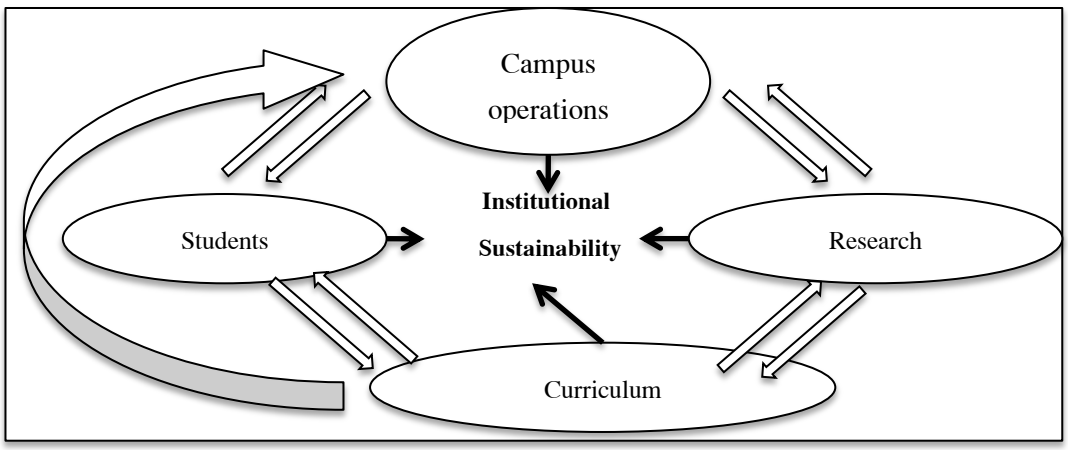

Figure 4 A modified whole-of-university approach including students as a major component

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