

# How universities provide education relevant to interdisciplinary studies? – Environmental studies courses in research university as IR survey using education support system

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## Abstract

How universities provide interdisciplinary education for students such as environment, information, and ethics, flexibly/quickly to correspond social needs under the “globalization”? We need to grasp which graduate schools provide the courses, especially interdisciplinary studies, for universities to provide better education through educational reformations such as establishing new education program and/or collaboration between graduate schools. This request is truly a function of Institutional Researches (IRs). As a trial, we used the search function for syllabi on ELMS as an IR tool, and identified the courses relevant to environmental studies, one of the common interdisciplinary studies, provided by graduate schools in Hokkaido University, one of the 11 leading research universities in Japan. We extracted 240 courses relevant to environmental science from 3,006 courses. Although this study only demonstrated how to provide courses relevant to environmental studies in Hokkaido University, we found two way of providing the courses relevant to interdisciplinary research studies: high discipline diversity courses provided by the graduate school founded for corresponding to interdisciplinary studies and/or courses relevant to interdisciplinary studies mainly in their traditional discipline provided by the established graduate schools. This result would be applied to other interdisciplinary studies and other universities.

*Keywords:* Institutional Research (IR); educational supporting system; diversity index; syllabus; tuning

## 1 Introduction

It has been traditionally considered that the advanced expertise required by the professions are unintentionally equipped during the entire process of writing master or doctoral thesis, because

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“Graduate Schools are designed to teach and study academic theories and applications, and inquire deeply into them or cultivate knowledge and outstanding ability in depth to engage in professions which require advanced expertise, while contributing to the development of culture.” is laid down in Paragraph 1 of Article 99 of the School Education Law in Japan [1]. Knowledge belonging to traditional discipline is provided by traditional graduate schools such as the graduate schools of science, agriculture and engineering. On the other hand, universities should also provide interdisciplinary courses such as environment, information, and ethics, to flexibly/quickly follow social needs under the “globalization” [2,3]. We need to grasp which graduate schools provide the knowledge, especially interdisciplinary studies, for universities to provide better courses through educational reformations such as establishing new education program and/or collaboration between graduate schools. This request is truly a function of Institutional Researches (IRs). Students can search their syllabi of courses as their needs, registered on the educational support system on the web. It is the original purpose/usage of the educational support system. It, however, is no guarantee that the target university (or graduate school) systematically provides courses relevant to target discipline (or interdisciplinary studies). In order to discuss competencies obtained in target discipline (or interdisciplinary studies) for tuning education programs in the higher education, first of all we should identify the current status of courses in education programs provided by target graduate schools or universities relevant to target discipline (or interdisciplinary topic).

The Science Council of Japan (SCJ) proposed to address points of reference in disciplinary curriculum-design and development as a method of disciplinary quality assurance in August 2010 [4]. SCJ is making the reports of “A point of reference in curriculum - design/development for disciplinary quality assurance in university education” for each discipline, and 27 reports for each discipline are listed on the website [5]. The reports written in English was only for mechanical engineering, though all of the reports were issued in Japanese [4]. In the process of making these reports, SCJ members discussed the report contents of each field based on their expert judgement without taking a survey of courses provided by Japanese universities as current status, except the field of mechanical engineering referring Japan Accreditation Board for Engineering Education (JABEE) accreditation programs. These processes might be summarized for the established disciplines, but not for interdisciplinary studies without identifying the current status of courses in universities.

As an example of investigation how to provide interdisciplinary courses, Uchiyama (2008) suggested that graduate schools with the name including “*kankyo*”, a Japanese word of environment, provided courses in the different disciplines dependent on their historical backgrounds, by comparing three graduate schools: Graduate School of Life and Environmental Science at the University of Tsukuba, Graduate School of Human-Environment Studies at Kyushu University, and Graduate School of Environmental Science at Hokkaido University [6]. Disciplines covered by these graduate schools were categorized into five groups (Table 1), although categorizing criteria such as the correspondence of courses provided by these graduate schools to disciplines and the reason of adopting five groups were not explicitly indicated by the author. We also questioned whether other graduate schools cover the groups not covered by each graduate school (e.g., Engineering in Hokkaido University).

Table1: Five groups of disciplines covered by three graduate schools with the name including “*Kankyo*” (Table 2 in Uchiyama, 2008)

	Science	Agriculture	Engineering	Social Science	Others
Graduate School of Environmental Science, Hokkaido University	✓	✓			✓
Graduate School of Life and Environmental Science, the University of Tsukuba	✓	✓	✓	✓	✓
Graduate School of Human-Environment Studies, Kyushu University			✓	✓	✓

The check mark (✓) shows that each graduate school covers the discipline.

There is another previous study that tried to categorize papers relevant to environment studies into traditional disciplines [7]. The authors used top ten books with the highest number of hold at university libraries in Japan from 45 books introducing environment issues or sciences listed by Nishikawa [8]. They extracted 23 common keywords least in five books from the indexes and keyword lists in ten books, and used them to extract papers from CiNii database (the largest database dealing with papers in Japanese). As a result, they obtained 2,206 papers published from 1970s to 2000s, categorized them into research areas of Grants-in-Aid for Scientific Research (as described in 2.3), and clarified the transition of environmental studies in that period. This study shows that we can categorize interdisciplinary studies such as environment into traditional disciplines.

Hokkaido University, the target university in this study, was established in 1876 as Sapporo Agriculture College, and presently has around 6,000 graduate school students in 17 graduate schools (including professional graduate schools) in 2015. The Education and Learning Management System (ELMS), an educational support system on the web, provides all syllabi in all graduate schools (except the Graduate School of Veterinary Medicine), in the academic year when students take courses [9]. Syllabus for each course has information about its title, responsible instructor, other instructors, keywords, objective, goals, schedule, contents, grading, open day of a week and periods, semesters/quarters, etc. All information of syllabi of all courses are accessible via the internet even from the outside of Hokkaido University (it is a rare case for all information to be accessible from the outside). It is one of the reasons why we chose Hokkaido University.

In this paper, as a trial, we used the search function for syllabi on ELMS as an IR tool, and identified the courses relevant to environmental studies provided by graduate schools in Hokkaido University. Through this trial, we discussed how to provide courses relevant to environmental studies, as an example of interdisciplinary studies, and pointed out the problems when we would use the search function for syllabi on the educational support system as the IR tool. In section 2, we explain the method extracting target courses from ELMS with quality control and matching between courses and academic areas. In section 3, we analyze how Hokkaido University provides courses relevant to the environmental studies by introducing the Shannon Index. In section 4, we suggested the conclusion based on our demonstration.

## 2 Method: How to Extract Target Courses from ELMS

### 2.1 Target courses relevant to environmental studies in Hokkaido University

A word of “environment” has vague and various meanings such as natural environment, indoor environment, operating system (OS) as software working on. We cannot a priori define courses relevant to environmental studies. In this study, we regard the courses having “*kankyo*” included in the course titles and/or keywords in the syllabi as “environmental studies courses”.

We found 3,006 courses of master and doctoral programs (including professional graduate schools) registered on ELMS, in the academic year 2015, and simply extracted 369 courses hit by their titles and/or keywords by a partial matching of “*kankyo*” (Fig. 1), and we found 92 courses hit by both of titles and keywords.

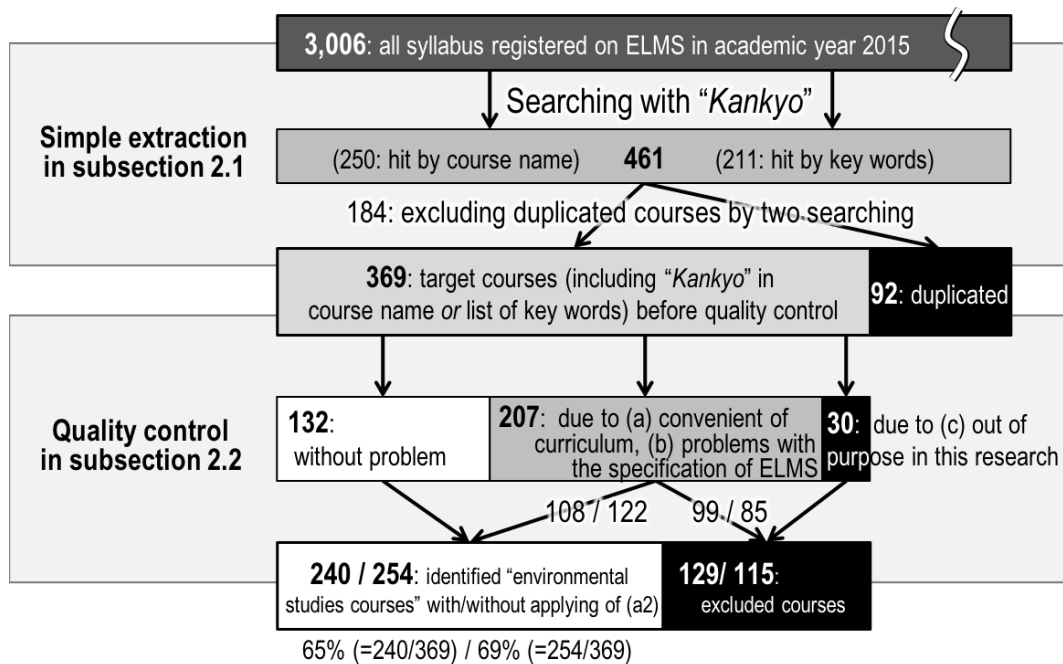


Figure 1. Process extracting 240 “environmental studies courses” from 3,006 courses registered on ELMS by two steps: (1) simple extraction in subsection 2.1 and (2) quality control in subsection 2.2. Width and gray thickness of boxes represent the number of handled courses and their percentage of “environmental studies courses” (white/black means pure “environmental studies courses”/no “environmental studies courses”). If (a2) were not applied, we identified 254 “environmental studies courses” (see detail in text).

## 2.2 Quality control such as removing duplicate courses

We had to conduct quality control due to duplicate/triplicate syllabi for one course and dublicately/triplicately named courses of an actual lecture (class) due to the inconsistency of their syllabi and their naming concept of course as follows. Hereafter we use “the same class” for the case of the same hour of the same day of a week by the same responsible instructor with the same contents even if it has a different title and/or is provided by the different graduate schools. Note that the responsible instructor should be only one person for each course.

### (a) *Convenience of curriculum (inconsistent naming convention for courses)*

(a1) We counted them as one course when the course provided by the graduate school has “the same class” of the “common graduate courses” that are originally opened as independent courses of any graduate schools, or when the course of master program in the Graduate School of Law has “the same class” of professional school program of Law. Hokkaido University offers “Common graduate courses” as an unique system among universities, which have introductory contents provided by each graduate school with secondary names for students belonging to other graduate schools. Note that none of the students can take two courses of “the same class” because the registration system prevents duplicate registration for the same open hour of the same day of the week. We regarded 18 courses as “environmental studies courses” and excluded 17 courses.

(a2) We counted courses having the same title but multiple responsible instructors with different contents as one course. These kinds of courses are mainly opened for different students belonging to each research group. These courses have sub-course title (lecture title) named by each responsible instructor who is the professor/associated professor of each research group. Students can only choose one among different contents because these are one course with the same title. Note that the total numbers of “environmental studies courses” are dependent of applying or no applying of (a2), as described later. We regarded 2 courses as “environmental studies courses” and excluded 8 courses.

(a3) We counted them as one course when the English course in a virtual education program for international students in the graduate school of engineering has “the same class” of its original course registered as a different course, while its English title (just translated from Japanese title) is usually displayed by pushing the bottoms switching language of the web system. We included 27 courses in the list of “environmental studies courses” in Japanese and excluded 27 courses in English.

(a4) We counted courses that accompanied with changing curriculum as one course, the previous course for the past entering students is overlapped onto the succeeded course with the different name for “the same class.” We excluded all 29 courses. We also excluded 5 courses not opened in the academic year 2015, as students cannot take these.

### (b) *Problems with the specification of ELMS*

(b1) We counted them as courses when the course has the same title and contents by the same responsible instructor, but multiple syllabi with different open hours or days of the week, and semesters. We included 16 courses in the list of “environmental studies courses” and excluded 16 courses.

(b2) We counted courses of “the same class” with the same course title but multiple syllabi of the different education programs (syllabi registered on EMLS should be registered for each education program) as one course. We regarded 6 courses as “environmental studies courses” and excluded 7 courses.

(c) *The selection based on the purpose of this research*

(c1) We excluded courses relevant to research work for thesis, such as “Research in Environmental Science Development for Master’s Thesis” in Division of Science Development, Graduate School of Environmental Science, in order to focus course work that many students will take lectures, *etc.* We excluded 26 courses.

(c2) We also excluded the courses in which student will obtain the credits through learning English writing and joining an annual academic meeting of no specific academic society, and so on. We excluded 4 courses.

We excluded total 92 courses including some courses hit multiple items in (a1)-(c2). Finally, we obtained 240 “environmental studies courses” after the quality controls above. A number of 240 corresponds 65% of 369 courses before the quality controls above. As a case for not applying to (a2), we counted 254 “environmental studies courses” when we discussed the classification of “environmental studies courses” into academic area, because some courses with the same title have the multiple responsible instructors who are in the different academic fields for each other.

### **2.3 Matching between courses and academic areas using “List of Categories” of Grants-in-Aid for Scientific Research**

Education in graduate schools tightly connects with research activities, and professors are specialists in their academic areas (Articles 3 and 9 in University Establishment Standards) [10]. Based on this connection, we try to match each course to the academic area that is the responsible instructor’s academic area. Using the fact that most of the professors obtain research funds of Grants-in-Aid for Scientific Research “KAKENHI” supported by Japan Society for the Promotion of Science (JSPS), we regarded the research areas of their latest research projects supported by Grants-in-Aid for Scientific Research as their research areas, referring the previous study [7] that decomposes environmental studies into traditional disciplines. We basically use “List of Categories, Areas, Disciplines, and Research Fields” in 2016 [11] to categorize their latest research projects into 14 research areas: (1) Informatics, (2) Environmental science, (3) Complex systems, (4) Humanities/Social science, (5) Humanities, (6) Social sciences, (7) Interdisciplinary science and engineering, (8) Mathematical and physical sciences, (9) Chemistry, (10) Engineering, (11) Biological sciences, (12) Biology, (13) Agricultural sciences, and (14) Medicine, dentistry and pharmacy. Some of the responsible instructors could not be matched because they are not researchers but administrators of governments and so forth.

Roughly speaking, we confirmed that the contents for each course match studies in the research area determined by responsible instructor’s academic areas above, as the level we cannot clearly deny this matching, except multi-disciplinary contents in the form of omnibus lectures such as an introductory course in which many professors teach their academic studies.

### 3 “Environmental studies courses” provided by Hokkaido University

#### 3.1 Graduate schools providing “environmental studies courses” with their research area

We categorized 254 “environmental studies courses”, which were not applied to (a2), into 14 research areas of Grants-in-Aid for Scientific Research (Table 2). We found that “environmental studies courses” provided by all graduate schools in Hokkaido University cover 13 research areas, in spite of large different numbers. Top three areas are Engineering (56 courses), Agricultural Sciences (50 courses), Environmental Science (35 courses), which occupy 56% of the total number of “environmental studies courses”. Top three graduate schools providing “environmental studies courses” are the Graduate Schools of Environmental Science (84 courses), Engineering (61 courses), and Agriculture (34 courses), which correspond to 70% of the total number. Among these graduate schools, the Graduate School of Environmental Science provides various courses in many academic areas, while the other two graduate schools mainly provided their academic areas as a traditional discipline.

If we tried to change finer resolutions, we can use its sub- and sub-sub-categories, Disciplines and Research Fields, of Grants-in-Aid for Scientific Research. For example, 56 courses of Engineering in Table 2 are categorized into 7 sub-categorized disciplines under the research area of engineering; 15 courses in civil engineering, 13 courses of architecture and building engineering, 9 courses of integrated engineering, 6 courses of material engineering, 6 courses of process/chemical engineering, 4 courses of mechanical engineering of Electrical and electronic engineering, 3 courses of integrated engineering. 50 courses of Agricultural Sciences in Table 2 are also categorized into 11 courses of agricultural chemistry, 8 courses of agro-engineering, 7 courses of applied aquatic science, 6 courses of boundary agriculture, 5 courses of forest and forest products science, 5 courses of agricultural science in society and economy, 5 courses of animal life science, 5 miscellaneous courses .

To make sure, we introduced the Shannon Index ( $H'$ ) as a typical index measuring the level of biodiversity used in ecosystem, and derived the equivalent number of areas ( $N$ ) [12]. We define:

$$H' = - \sum_{n=1}^{14} p_i \log_2 p_i, \quad N = 2^{H'} \quad (1)$$

where  $p_i$  is a ratio of number of courses in  $i$ -th research area to the total number of courses provided by each graduate school. Maximum number of Shannon Index is 3.81(= $\log_2 14$ ), when assumed to the same number ( $p_i = 1/14$ ) for all academic areas of 1/14 of the total number, with  $N=14$ . All graduate schools in Hokkaido University provide “environmental studies courses” of 13 academic areas with  $N=8.3$ . Shannon Indexes of “environmental studies courses” provided by Graduate Schools of Engineering and Agriculture are less than one, which means the concentration of less than two areas. That is, two graduate schools provide “environmental studies courses” within their traditional discipline, engineering and agriculture.

On the other hand, Graduate School of Environmental Science provides various courses in many different research areas, in which the Shannon Index (2.56) is almost equivalent to Shannon

Index (2.76) of “environmental studies courses” provided by the other 13 graduate schools. That indicates high diversity of “environmental studies courses” provided by the Graduate School of Environmental Science has a unique characteristic as the graduate school dealing with interdisciplinary studies. It, however, does not provide courses relevant to humanities and social sciences. It also is interesting that each graduate school has one-to-one correspondence to the research area.

Table 2. Total 254 courses relevant to environmental studies provided by 16 graduate schools in Hokkaido University, categorized by 14 research areas of Grants-in-aid for Scientific Research.

	* Integrated categories	Research Area of Grants-in-aid for Scientific Research													Miscellaneous	Total	Shannon Index( $H'$ )	Equivalent number of areas ( $N$ )	
		Informatics*	Environmental science*	Complex systems*	Humanities/ Social sciences	Humanities	Social sciences	Interdisciplinary science & engineer.	Math. & physical sciences	Chemistry	Engineering	Biological sciences	Biology	Agricultural sciences					Medicine, dentistry & pharmacy
Graduate Schools	Environmental Science		25	5					4	15	3	1	13	15		3	84	2.56	5.9
	Engineering		7	2							47			1		4	61	0.87	1.8
	Agriculture		1											33			34	0.19	1.1
	Health Sciences												2		11		13	0.62	1.5
	Public Policy						4			4				1		4	13	1.39	2.6
	Letters		1		1	5	3									1	11	1.69	3.2
	Science			1					6				1			1	9	1.06	2.1
	Fisheries Sciences															6	6	0.00	1.0
	Information Sci. & Technology		1		1											3	5	1.00	2.0
	Chemical Sci. & Engineering			1						1	2						4	1.50	2.8
	Medicine														4		4	0.00	1.0
	Law						2									1	3	0.00	1.0
	Education				2		1										3	0.92	1.9
	Economics						2										2	0.00	1.0
	Life Science												1				1	0.00	1.0
	Int'national Media & Tourism studies					1											1	0.00	1.0
<b>Total</b>		1	35	11	2	5	12		10	16	56	1	17	50	15	23	254	3.06	8.3

>25%, >10% of total courses and >1 provided by each graduate school are shaded with dark, moderate, and light green colors. Shannon Index ( $H'$ ) and equivalent number of areas ( $2^{H'}$ ) are described in text. >1/2, >1/3 and >1/4 of equivalent number of areas to that of all graduate schools (8.3) are shaded with dark, moderate, and light blue colors. Maximum of Shannon Index is 3.81 ( $=\log_2 14$ ) with the same numbers of courses in 14 research areas.

As for a number of responsible instructors, top three are Engineering (42 courses), Agricultural Sciences (28 courses), Environmental Science (16 courses), which occupy 53% of the total number of “environmental studies courses”, which is similar percentages of the number of courses as described above (Table 3). A number of course per instructor in Environmental



Science, 2.2 (= 35 courses /16 instructors), is higher than that in Engineering, 1.3 (= 56 courses /42 instructors).

Table 3: Number of responsible instructors in 14 research areas of Grants-in-Aid for Scientific Research

Research Areas of Grants-in-aid for Scientific Research	Number of responsible instructor
Engineering	42
Agricultural Sciences	28
Environmental Science	16
Biology	11
Chemistry	11
Social sciences	10
Medicine, dentistry & pharmacy	8
Mathematics & physical sciences	8
Complex systems	7
Humanities	4
Humanities/Social sciences	2
Informatics	1
Biological sciences	1
Interdisciplinary science & engineer	0
Miscellaneous	13
Total	162

### 3.2 Courses around “environmental studies courses”

We regarded courses explicitly including “*Kankyō*” in the course titles and/or keywords as “environmental studies courses.” Moreover, we can potentially regard courses dealing with environmental issues such as climate change and biodiversity as courses relevant to environmental studies. As an assessment, we obtained top 10 keywords from many keywords that 240 “environmental studies courses” have: (1) climate change, (2) ecosystem, (3) resources, (4), foods, (5) hydrologic cycle, (6) biodiversity, (7) sustainability, (8) global warming, (9) material cycles, (10) conservation/preservation, except environment, earth environment, problem, and water (“environment” was already extracted as “environmental studies courses” and others are general words).

We obtained 85 courses having 10 keywords through the same processes of obtaining 240 “environmental studies courses” (Table 4). Unfortunately, we cannot regard some of 85 courses as courses relevant to environmental studies, *i.e.*, hardly judge whether those are “environmental

studies courses” or not. The specific example is that a key word of “*hozen*” (a Japanese word of conservation or preservation) can be used for the meaning of property preservation of company bankrupt in the course of business administration studies. It was difficult to clarify the courses around “environmental studies courses” by a simple procedure.

Table 4: 85 courses not having “*Kankyo*” but having top 10 keywords selected from 240 “environmental studies courses.”

Top 10 keyword	courses having each keyword
resources	45
ecosystem	17
conservation/preservation	7
biodiversity	7
climate change	5
food	4
material cycles	4
global warming	3
hydrologic cycle/water cycles	2
sustainability	2
Total*	96

\*: some of 85 courses have multiple keywords of 10 keyword

### 3.3 Comparison of our results with previous studies

We re-summed courses categorized into 14 research areas of Grants-in-Aid for Scientific Research to five groups used in Uchiyama (2008) as follows: (1) Science: Mathematics & physical sciences, Chemistry, Biological sciences, and Biology; (2) Agriculture: Agricultural sciences; (3) Engineering: Informatics, Engineering, and Interdisciplinary science & engineering; (4) Social Science: Humanities/Social sciences, Humanities, and Social sciences; (5) Others: Environmental science, Complex systems, Medicine, dentistry & pharmacy, and miscellaneous. Note this recategorizing is not strict because some research areas such as Chemistry or Biology are belonging to Science and Engineering (or Agriculture). Graduate School of Environmental Science offers various courses in Science, Agriculture, and others (including Environmental Science) compared to graduate schools of Engineering and Social Science (Table 5), which is consistent with the Uchiyama (2008)’s. The other graduate schools except Graduate School of Public Policy are corresponding to traditional disciplines for each. In our study, our results do not only confirm the coarse images along traditional disciplines, but also categorize more detailed disciplines from 14 categories to sub- or sub-sub categories (321 Research Field) [11].

Table 5: recategorized 254 “environmental studies courses” into five groups in Uchiyama (2008) from 14 research area in Table 2 for each graduate school

	Science	Agriculture	Engineering	Social Science	Others	Total
Environmental Science	33	15	3		33	84
Engineering		1	47		13	61
Agriculture		33			1	34
Health Sciences	2				11	13
Public Policy		1	4	4	4	13
Letters				9	2	11
Science	7				2	9
Fisheries Sciences					6	6
Information Science & Technology			1		4	5
Chemical Science & Engineering	1		2		1	4
Medicine					4	4
Law				2	1	3
Education				1	2	3
Economics				2		2
Life Science	1					1
International Media & Tourism studies				1		1
total	44	50	57	19	84	254

Recently, based on the 22 specific fields above, Murakami *et al.* (2017) clarified that the original roles of sub-organizations such as graduate schools and faculties are not always matched to the disciplines of top 10% paper published by researchers belonging to them [13], which is corresponded to the courses categorized into 14 research areas in this study, though courses as education and papers as research are completely different aspect. Graduate School of Environmental Science locates around the center in the mapping of sub-organizations in Hokkaido University on page 125 of their report [13], which is consistent with our findings of Shannon index. However, the main message in their figures is the total number of output such as size of the circles. Shannon Index would offer a viewpoint of research and/or education diversities as a quantitative measure.

## 4 Conclusion and remarks

As an institutional Research (IR) survey, we tried to clarify how a university provides courses (lectures) of the target studies. As a demonstration, we extracted 240 courses relevant to environmental studies, one of the common interdisciplinary studies, from 3,006 courses provided by 16 graduate schools, Hokkaido University. We also categorized these courses into 14 research areas of Grants-in-Aid for Scientific research supported by Japan Society for the Promotion of Science, and introduced the Shannon Index (a diversity index) to quantize the level of discipline-diversity of courses provided by graduate schools. The results show that, among top three graduate schools providing courses relevant to environmental studies, Shannon Index of Graduate School of Environmental Science (GSES) is the largest (2.56) almost equivalent to those of total courses provided by the other graduate schools (2.76), while those of Graduate Schools of Engineering and, Agriculture are less than one. Although this study only demonstrated how to provide courses relevant to environmental studies in Hokkaido University, we found two way of providing the courses relevant to interdisciplinary studies: high discipline diversity courses provided by the graduate school founded for corresponding to interdisciplinary research and/or courses relevant to interdisciplinary studies mainly in their traditional discipline provided by the established graduate schools.

As a quantitative measure, Shannon Index suggested in this paper would offer a viewpoint of research and/or education diversities that are essential for research innovation and/or liberal arts, which is completely different from other key performance indexes (KPIs). The method developed in this study would apply to other interdisciplinary studies such as information and ethics. The method demonstrated in this study would apply to other universities for inter-comparison among universities as the first step of tuning process. If we compare courses among international universities, we would use another list of research areas such as the 22 specific fields of research provided by Thomson Reuters, instead of the 14 academic areas of Grants-in-Aid for Scientific research. As more general procedure, we will analyze description of course contents in syllabi with text mining methods, in order to obtain clustered courses relevant to interdisciplinary studies. Nozawa et al. (2005) tried to analyze syllabi data using the document clustering technique [14].

Another point demonstrated in this study is there are several issues when we use an educational support system as an Institutional Research (IR) tool. If we would use the search function for syllabi on the educational support system as an IR tool, it is required to keep syllabi of courses in the past academic years. This requirement would be also expected by the following reasons. At present, as requests by graduates, universities issue the certificate listing the courses completed by the graduates. We easily guess the specific contents of courses without their syllabi if they have classical titles of traditional discipline. Recently, in the case of the course serving contents to follow social needs, we cannot guess contents by their titles without their syllabi. If some students study in multi-year and/or inter-universities such as recurrent education and/or education program of dual and joint degrees, it would be more required to provide syllabi in the past years on the web, as supporting graduates in the graduate schools.

## Acknowledgement

This paper is based on SM's master thesis, and YY with MS discussed IR survey using his results. A part of this study was supported by Coca-Cola Foundation. English proofreading conducted by Ms. Eriko Ishida and Mr. Yong Seuk Park.

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