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# A Study on the Mainstream of Real Estate Education with Core Term Analysis

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**Abstract:** This study was conducted to provide basic information about the curricula of real estate education with respect to globalization. The literature, such as the histories and characteristics of real estate education in the United Kingdom and the United States that have historically lead real estate education, are reviewed. We also extract the core terms used in the curricula of departments accredited by the Royal Institution of Chartered Surveyors and The Association to Advance Collegiate Schools of Business—International that are leading the globalization of education, and Meikai University, the only university with a real estate department in Japan. In extracting core terms from each country, we proceed with basic terms that constitute the subject titles, not the entire subject title itself. After extracting core terms from each country, we discuss the overall characteristics of real estate education in each country and clarify the main stream of the globalization of real estate education. In addition, by comparing core terms and calculating proximities among Japan, the United Kingdom and United States, Japan’s specificities of real estate education are identified.

**Keywords:** real estate education; mainstream; history; globalization; RICS; AACSB-International; text mining; core term; proximity

## 1. Introduction

Providing new solutions and technologies to real estate problems, real estate science has evolved to solve complex real estate problems that arise between people and real estate. Today, globalization is proceeding in all fields with remarkable advances in information and communication technology. In recent years, the globalization trend has expanded not only in the fields of finance, investment, and real estate development in the business environment area, but also in the fields of education and culture in the knowledge industry area. The Bologna Process (a set of ministerial agreements among 48 the European countries to enhance comparability in the standards and quality of higher-education qualifications. In 1999, the process begun with the Bologna declaration, which was signed by educational ministers from 29 European countries, aiming at building the The European Higher Education Area (EHEA)) and the Erasmus program (an the European union (EU) exchange student programme that has been in existence since 1987) as the representative examples in the field of higher education and globalization in the education sector, are now in progress. In order to evolve in accordance with a new era, it is more important than ever to educate real estate professionals via a well-designed curriculum that responds to the demands of a new age.

Since 2000, university-level real estate education programs have been a topic of discussion in a global context. Schulte et al. [1,2] classified the real estate education programs of 39 countries into three categories: “surveying approach” in the United Kingdom (UK), “investment and finance approach” in the United States (US), and “interdisciplinary approach” in European countries, except the UK. Yu [3] at the National University of Singapore expanded the scope of the discussions to worldwide coverage

and classified real estate educations into the UK model, the US model, and an eclectic approach which includes Asian and African countries.

Here, “interdisciplinary approach” mentioned in Schulte et al. [1,2] or “eclectic approach” mentioned in Yu [3] refers to the model of real estate education in which the UK and US education models are modified appropriately according to the educational needs of the local real estate industry.

Table 1 categorizes 28 countries which have university level real estate programs among 39 countries in Schulte et al. [1] according to the classification scheme of Yu [3]. The 28 countries were categorized according to their current education content. The eclectic model includes not only a country with a similar nature to Britain and the United States from its inception but also some countries that initially adopted the UK model but later modified it to the US model with the increasing number of professors earning degrees in the United States. Table 1 shows that most countries currently are classified as eclectic models, which means that most countries have been influenced by the real estate education of the UK and the US, which has historically led real estate education. In this regard, the UK and US still take influential positions.

Today, the globalization of real estate education is also being led by The Royal Charter of the Royal Institution of Chartered Surveyors (RICS) in the UK and The Association to Advance Collegiate Schools of Business—International (AACSB-International) in the US. In this perspective, research on real estate education should start with reviewing the historical developments and current streams of the real estate educations of the UK and US.

Due to reasons like these, the first target of this study is identifying the characteristics of real estate education in the UK and US via the review of the literature on historical developments.

The second is finding out the mainstream of real estate education in the current global era through analyzing the core terms (which is explained in Section 3.1.1) used in the current subject titles of real estate departments accredited by RICS and AACSB-International. The second target is the main target of this study. As already mentioned, RICS and AACSB-International currently take the initiative on globalization of real estate education. Shelton et al. [4] investigated what curriculum requirements constitute real estate programs, but focused only on the curricula accredited by AACSB-International. To overcome this limitation, this paper analyses the curricula accredited by RICS as well as AACSB-International for more objective analysis. This is one of the major features and contributions of this study. Last, through core term comparison and proximity analysis (which is explained in Section 3.2.1) among Japan, UK and US and, we identify Japan’s specificities of real estate education as a first trial among eclectic model countries.

Despite the fact that most countries are classified as eclectic models as shown in Table 1, the contents and characteristics of eclectic models have not been sufficiently studied. In this context, this paper attempts to find out the characteristics of Japanese real estate education as an eclectic model through comparison with the UK and US models. In other words, through the core term analysis of the subject titles of the real estate department established in the United Kingdom, the United States, and Japan, some features of real estate education in Japan are identified.

**Table 1.** Real estate education programs in 28 countries classified by the scheme of Yu (2001).

<b>Eclectic Model</b>			Canada 1958 Nigeria1957 Kenya 1956	Singapore 1968 S. Africa1969 Malaysia1967 Sweden1965	Austria1989 Korea1970 Greece 1980E Australia198E N.Z1980s	Japan1992 Bulgaria1992 Lithuania1991 Finland1990 Spain1990 France1990mid Germany1990 Netherland1990	Denmark2000 Russia2000 Belgium1997 Estonia1996 Latvia1995 Belarus1995
<b>US Model</b>	<b>Wiscosin univ 1892</b>	<b>#AACSB</b> (The Association to Advance Collegiate Schools of Business) <b>1916</b> <b>Wharton school 1905</b>		<b>#AREUEA</b> (The American Real Estate and Urban Economics Association) <b>1964</b>	<b>#ARES</b> (The (American Real Estate Society) <b>1985</b>	<b>#IRES</b> (The International Real Estate Society) <b>1992</b>	
<b>UK Model</b>	<b>#IS</b> (Institution of Surveyors) <b>1868</b>	<b>Cambridge1919</b> <b>The College of Estate Management</b> <b>(CEM)1918</b>			<b>#RICS (Royal Institution of Chartered Surveyors)1970</b>	<b>Note: # indicates associations.</b>	
<b>t = years</b>	<b>1800S</b>	<b>1900S</b>	<b>1950S</b>	<b>1960S</b>	<b>1980S</b>	<b>1990S~2000S</b>	

## 2. History and Characteristics of Real Estate Education in the UK, the US and Japan

In this section, we review the literatures on the historical developments of the real estate education for identifying the characteristics of the UK and the US model.

### 2.1. History and Characteristics of Real Estate Education in the UK

The education of professional surveyors began in the middle ages in the UK, as the purpose of succeeding to family work and training apprentices in the guild organization [5] through the systematic training of apprentices. The acceleration of urbanization by the 1st and 2nd Enclosure in the 16th century and the Industrial Revolution in the 18th century demanded that the roles and skills of surveyors become more specialized and diversified; this created an opportunity for business (The businesses related to professional surveyor work are categorized by RICS into 17 professional groups, as follows: Art and Antiques; Commercial Property; Dispute Resolution; Facilities Management; Machinery and Business Assets; Management Consultancy Professional Group; Residential Property; Valuation; Environment; Geomatics; Minerals and Waste; Planning and Development; Rural Building Control; Building Surveying; Project Management; Quantity Surveying; and Construction.) [6] and education programs in universities to expand. In 1868, William Sturge established the “Institution of Surveyors”, which eventually became the “Royal Institution of Chartered Surveyors” [7] in 1947; this organization maintained standards of membership and guaranteed that licensed surveyors would have outstanding qualifications and skills [5]. The group established a compulsory professional qualifying examination for its Professional Associates and Fellows; the first examinations were held in 1881 [5]. Together, the group’s establishment and qualifying examination brought systematic management and improved quality to the profession, something that would be continued in the future through courses in higher education.

The 19th century was a turning point for modern education in general, and real estate in particular, shifting the focus from rural land surveys to an area of increasing demand, urban architecture. By the middle of the 19th century, the need for universal education was widely recognized; with the enactment of the Education Law in 1870 and amendments to that law in 1902 and 1918, the modern education system in the UK was established. At this time, the Estate Management degree, a precursor of the current real estate field, was established in certain universities. A Bachelor of Science (BSc) in Estate Management was first offered at the University of London and University of Cambridge in 1918 and 1919, respectively [5]. Additionally, although it was not formally offered at a university, the College of Estate Management [8] was founded by the Chartered Auctioneers’ and Estate Agents’ Institute in 1919. This college was formed to serve the property-related Estate Management and Construction industry sectors by providing evening courses and a post-based distance learning class [9]. In 1938, then to that point independent CEM was absorbed by the University of London, which then began offering a BSc in Estate Management.

In the 1960s, new departments derived from the Department of Estate Management began to emerge. In 1962, the University of Cambridge established a BSc in Land Economy with William Dampier, who had already created a BSc in Estate Management at the same university. The origins of Land Economy studies at the University of Cambridge date back to Estate Management classes taught in the School of Agriculture. In 1968, the University of Reading established a BSc in Real Estate and Planning, and in 1970, three institutions—RICS, the College of Estate Management, and the Chartered Auctioneers and Estate Agents Institute—all merged. From this integration, the current RICS was established. However, in response to a decline in the number of applicants (A nearly 50% decline in the number of student surveyors in the UK occurred between 1994 and 2001 [10]) and the progress of university autonomy, RICS had at this time almost entirely abandoned its role in examinations; full time (or the equivalent) courses that covered a full range of surveying disciplines were being offered at UK universities [11]. Thus, RICS shifted into a new role overseas; after 1999, RICS transformed itself into a global organization that facilitates quality control of Chartered Surveyors outside the UK

through systems such as their accredited courses and partnerships with universities, along with the Bologna Process, a program promoting globalization in higher education in the EU [6].

Across these series of historical developments, real estate departments in the UK based themselves on the Department of Estate Management and have been strongly affected by the traditional survey approach led by RICS. The mainstream of real estate education in the UK can be said to be the built environment within the framework of surveying approach. In recent years, however, a strong shift toward the business school context of the US approach has been seen in The UK [12].

## 2.2. History and Characteristics of Real Estate Education in US

Since the early days of the US, there had been a market environment in which the transfer of land is free. The British settlers who immigrated to the US pursued the freeholds in the New England region [13]. This was based on a custom established in the New England region dating to before independence in 1776, which provided for a freehold of land by a certificate of registration of the transfer of the land rights [14]. This market environment became an issue of study for Henry George in 1879, because of a social problem called the Land Question that occurred at the end of the 1870s [15,16]. Many scholars and practitioners addressing this problem focused on the need for specialized knowledge and education to solve the negative repercussions resulting from the Land Question. In 1886, a course called Land Tenure was opened at the University of Kansas by James H. Canfield as means of investigating the Land Question; in 1892, Fred M. Taylor opened a lecture entitled the History and Theory of Land Tenure and the Agrarian Movement at the University of Michigan. However, these courses were abolished after two years [17]. Thus, in some universities, courses related to Land Economics were opened; however, university officials saw to it that such courses were short lived because of the lack of university stakeholders' understanding. But, a course called "Property and Rent of Land" that began as a seminar in 1892, taught by R. T. Ely at the University of Wisconsin, had been carried on and became a regular university course titled "Land Economics" in 1915 [17].

By 1905, real estate education at institutions of higher education took the form of evening courses at the Wharton School of Finance and Commerce in Philadelphia and the School of Commerce of New York University, as well as the School of Economics at the University of Pittsburgh, which opened courses in 1908 [18]. The general purpose and ideals put forth in these classes are illustrated in the following: "Thus, collegiate courses in real estate were designed to improve the productivity and ethical standards of real estate dealers, to improve dealers' understanding of their economics and social function, and to provide an education about real estate customs, economics and valuation for consumer and business property owners and renters" [18].

In 1916, The Association of Collegiate Schools of Business (ACSB) was established; this organization later evolved into The Association to Advance Collegiate Schools of Business (AACSB) in 1919. In 1923, the Joint Commission (Participation in AACSB, Land Institution, and NAREB to discuss real estate education [18]) was created under the auspices of NAREB which was established by the US government in 1908 for the "expansion of existing knowledge through education and research" with the aim of leading brokers [18]; the first three curricula for standard real estate education were developed in 1924 (Fisher Real Estate Practice (Principles of Real Estate Practice, 1924) on real estate practice, Ely and Morehouse (Elements of Land Economics, 1924) on Land Economics, and Babcocks (Appraisal of Real Estate, 1924) on appraisal [18]). These efforts contributed greatly to the development of academic education for real estate dealers and other practitioners. In 1931, a standardized real estate curriculum began to be taught at MBA (Master of Business Administration)-level business schools [18]. Real estate education from the early 1920s to the mid-1950s was a quantitative system focused on the acquisition of real estate qualifications; it was based on land economics and practical training [19]. One area of remarkable growth in terms of the number of real estate programs in the 1950s was MBA programs. The number of MBA programs began to multiply at this time, and many included a course or two in real estate. Some even offered real estate as an area of concentration [20].

However, this growth was considered an unfortunate transition in the Gordon-Howwell (Ford) and Pierson (Carnegie) report [21]; the authors expressed a negative opinion of the content and quality of real estate education at this time, stating that it focused on the acquisition of real estate certification. Suggestions were offered for improvement. The Gordon-Howwell (Ford) and Pierson (Carnegie) report said that undergraduate programs were insufficiently analytical, too institutional, and vocationally-oriented. They recommended that business schools offer only a course or two in the core fields of marketing, finance, and management. They also suggested that the number of courses in “inner” fields such as real estate and insurance be reduced, the remaining courses be made much more analytical, and real estate not be a part of the “core curriculum”. They argued that academic real estate education at the university level should separate education from any certification exam [20]. This led to an overall shrinkage in the spread of real estate education, and many real estate programs and courses moved to their universities’ finance departments [20]. This is the historical background of many real estate programs now in finance departments in the US.

The early 1960s postwar economic expansion and return to peaceful life meant an increase in demand for real estate qualifications, and university real estate departments began to recover [19,20]. During this period, real estate education turned to a problem-solving approach (This is also called analysis for decision-making or real estate administration); at the same time, investment analysis began to be recognized as an important topic of study, providing an integration framework for other courses and an analytical basis for real estate decision-making [19]. At the end of 1964, The American Real Estate and Urban Economics Association (AREUEA) was established, and as a result research in real estate science became more analytical and academic [20]. In the 1970s and 1980s, the problem-solving approach developed two branches: multidisciplinary and financial management. With the proliferation of MBA programs in the 1980s, investment and finance became the most popular topic of focus, a trend that has continued to this day [20].

In the 1990s, with the expansion of globalization, The American Real Estate Society (ARES; founded in 1985) became a catalyst for the formation of The International Real Estate Society (IRES; formed in 1992) and other real estate societies around the world [20]. IRES contribute to the support and development of international real estate education by holding a conference every year.

As a result of the globalization trend, AACSB decided to accredit its first school outside of North America (ESSEC) in 1997 and changed the organization’s name to the AACSB International Association for Management Education. In 2001 it renamed itself again, changing to the AACSB International Association to Advance Collegiate Schools of Business; the goal was to globalize and expand its certification program internationally [22].

Across this series of historical developments, real estate education in the US evolved in the business environment based on the free transfer of land ownership dating to before independence. The mainstream of real estate education in the US can be said to be the finance and investment within the framework of business approach.

### *2.3. History and Characteristics of Real Estate Education in JAPAN*

In pre-modern Japan, individuals had sustaintially the right to use land, but since monarch had ideological ownership of the land, individual land ownership was not recognized. The Meiji Restoration in 1868 led to modern reforms in all areas, and modernization of the land system was achieved as part of the state tax reform. On 5 February 1872, the government issued the first muniments to recognize the ownership of land in Tokyo’s urban areas, which can be regarded as the beginning of a modern land ownership system. Although there have been developments in the land system and real estate industry during the war period from the Sino-Japanese War (1894–1895) to World War II (1939–1945), the real development of the real estate industry from a modern point of view began in 1945 after the end of World War II.

With the rapid industrial development of Japan since the 1950s, during the industry boom period of the early 1960s, the boom of Remodeling the Japanese Archipelago in the early 1970s, and the

bubble economy period in the late 1980s, real estate prices in Japan have risen sharply. Due to the rapid rise in real estate prices, public concern with the real estate industry has increased and a need for systematic real estate education has begun to be demanded. In response to these social demands, the Japan Institution of Real Estate Transaction Agents, Japan's first real estate education institution, was established in 1959. Until the 1970s, real estate education consisted mainly of On-the-Job-Training (OJT) for job improvement in the industrial field and training for job training.

In the early 1980s, the necessity of higher education and research institutes for real estate was discussed at conferences consisting of experts from industry, government, and academia. At these meetings, there was an agreement to establish real estate institutes and introduce real estate education in universities [23]. Since then, in November 1984, the Japan Real Estate Society was established by the cooperation of industry, government, and academia. Many experts in various fields such as law, economics and engineering, which are closely related to the real estate industry, participated in the Japan Real Estate Society. Such an industry, government and academy cooperation system and a comprehensive research platform composed of experts in various fields can be considered a strength of Japanese real estate science and has contributed greatly to the realization of real estate policy and development of real estate administration [24]. On the other hand, the department of architecture at Nihon University established a planning and management course in 1982, which can be regarded as the beginning of education related to real estate in the university. However, the purpose of this program was to educate architecture engineers who are not experts in real estate, but who understand laws and economics, have a sense of the market, and are well versed in social systems [23]. In addition to the Nihon university, a planning and management course at the department of architecture at Toyo University and a real estate law courses at Asahi University were offered. In addition, 14 universities in Japan have opened real estate-related lectures [25].

1992 was a year of great progress in real estate education in Japan. In April 1992, the Meikai University opened the department of real estate by benchmarking curricula of real estate departments in leading countries such as the UK, US and some Asian countries. The school of Real Estate at Meikai University is the first one specializing in real estate and is aimed at meeting the social needs of specialists to solve problems such as environmental problems, resource problems, urban social problems, and national welfare problems [26]. The School of Real Estate in Meikai University consists of the Department of Real Estate only, but conducts a wide interdisciplinary education in law, economics/business administration and engineering related to real estate, in order to cultivate competent persons with diverse and broad ability related to real estate, with a scientific approach [27]. In order to achieve this objective, the faculty consists of four major fields of law, economics and business administration, engineering, and real estate, and various courses has provided. The current courses include the finance course, the business course, and the design course.

In 1992, the Department of Real Estate Science was established at the graduate school of Nihon University. Unlike the planning and management course in undergraduate school described above, it was established with the aim of comprehensive real estate education [24], but the Real Estate Science major was abolished in April 2018. As of 2018, seven universities offer real estate-related education in their graduate courses. In 1998, a master's degree program was opened at Meikai University, and a doctoral course was opened in 2000. Currently, Meikai University is the only higher education institute for real estate in Japan and emphasizes English education to nurture human resources capable of coping with ongoing globalization.

In summary, the department of real estate of Meikai University is the only higher education institution and the representative of real estate education in Japan. As discussed, real estate education in Japan can be classified as an eclectic model in that it has benchmarked real estate education curricula in the UK, US and Asian advanced countries in real estate education.

### 3. Core Term and Proximity Analysis

In this section, core terms are extracted from the subject titles by text mining. The current status of real estate education in Japan is also examined via a proximity analysis.

#### 3.1. Analysis of Core Terms

##### 3.1.1. Extraction Core Terms of Text Mining

In this study, 14 real estate departments (1. Real Estate (Birmingham City University), 2. Real Estate Surveying (Edinburgh Napier University), 3. Real Estate Management (Kingston University), 4. Real Estate Management and Business (Liverpool John Moores University), 5. Real Estate (Northumbria University), 6. Real Estate (Nottingham Trent University), 7. Real Estate Management (Oxford Brookes University), 8. Real Estate (Royal Agricultural University), 9. Real Estate (Sheffield Hallam University), 10. Real Estate (Ulster University), 11. Planning and Real Estate (University College London), 12. Real Estate (University of Reading), 13. Real Estate (University of the West of England), 14. Real Estate (University of Westminster)) in the UK and 22 real estate departments (1. Real Estate (Baylor University), 2. Real Estate and Urban Land Economics (California State University, Fresno), 3. Real Estate (California State, Los Angeles), 4. Real Estate (California State, Northridge), 5. Real Estate (Clarion University of Pennsylvania), 6. Real Estate and Urban Economics (University of Connecticut), 7. Real Estate and Built Environment (University of Denver), 8. Real Estate (Florida International University), 9. Risk Management/Insurance Real Estate and Regal Studies (Florida State University), 10. Real Estate (University of Georgia), 11. Real Estate (Georgia State University), 12. Real Estate (University of Mississippi), 13. Real Estate (University of Nevada, Las Vegas), 14. Real Estate (University of North Texas), 15. Real Estate (University of Northern Iowa), 16. Real Estate (Ohio State University), 17. Real Estate (University of Saint Thomas), 18. Real Estate (San Diego State University), 19. Real Estate, Risk Management, and Business Law (Southern Methodist University), 20. Real Estate (Temple University), 21. Real Estate (University of Texas, Arlington), 22. Real Estate, University of Wisconsin-Madison)) in the US accredited by RICS and AACSB-International are respectively selected for analysis; the list of “Mandatory Subjects for graduation” (MS) is excerpted from the 2016 version of the websites of the real estate departments. The reason for adopting only Mandatory Subjects in this study is that there are a wide variety of curriculum choices and options at each university, as well as many differences in the operating systems that make systematically analyses difficult.

As a distinctive point of this study for finding the specificities of real estate education of each country, we proceed with basic terms that constitute the subject titles, not the entire subject title itself. This is different from other studies. For one of the examples, Shelton [4] used the subject title itself for analysis. In general, the basic terms constituting the subject titles, not including articles and conjunctions, can be said to represent the core contents of the subject since they are chosen to express the contents of the subject. Even if the subject title is parsed in basic terms, the meanings of basic terms do not fade out.

We also think that the analysis based on subject title itself has some barriers. For example, subject titles can offer an infinite number of combinations and some titles are unreasonably made because of the needs of the university such as lesson unit restrictions and the requests of lecturers, and so on.

In addition, if the subject title itself is used to classify the characteristic of the subject for explaining the overall curriculum characteristics of each country, then there are the possibilities of free hands such as researcher’s subjective judgments. This method has a limitation that different results can be obtained depending on the researcher’s subjective judgments with the same data.

From this point of view, this study decomposes each subject title into basic terms, which are the basic components, and extracts core terms. According to the types and frequencies of core terms, we identify and explain the overall characteristics of real estate education in the UK, US, and Japan. The analysis based on basic terms is very useful for eliminating any chance of discretions.

In extracting core terms that are high frequency terms among basic terms, the text mining method is used in this study. The text mining method is efficient method for extracting information from unstructured textual electronic documents [28].

In this paper, we use R3.3.2 software for text mining and the detailed mining process is as follows.

**Step 1. Disassembling** the titles of mandatory subjects into basic terms

Ex)

- Business of the Built Environment →“Business”, “of”, “the”, “Built”, “Environment”
- Law and Economics for the Built Environment →“Law”, “and”, “Economics”, “for”, “the”, “Built”, “Environment”
- Business and Economics for Surveyors →“Business”, “and”, “Economics”, “for”, “Surveyors”

**Step 2. Filtering and Removing** of the terms that have no relation to subject characteristics, such as article, preposition and conjunction.

In the above example, Filtering and Removing “and”, “of”, “the”, and “for”

**Step 3. Extracting** the terms representing the core contents of the subject.

“Business”, “Business”, “Built”, “Built”, “Environment”, “Environment”, “Law”, “Economics”, “Economics”, “Surveyors”.

**Step 4. Grouping** of the same terms, Counting and, Arranging by frequency order.

In the above example, “Business” (2), “Built” (2), “Environment” (2), “Law” (1), “Economics” (2), “Surveyors” (1).

After arranging by the Term Frequency (TF), the Term Proportion (TP) of each is calculated and used as a criterion for selecting core terms in this study.

$$TP \text{ (Term Proportion)} = \frac{TF_i}{\sum TF_i}, \text{ } TF_i \text{ Refers to the } i^{\text{th}} \text{ Term in total numbers.}$$

The selected core terms based on TF and TP are illustrated in Table 2.

In the UK, core terms are selected by the ranking of TF from total 739 terms extracted from 250 MS listed on the webpages of 14 real estate departments accredited by RICS. In the US, core terms are selected from total 585 terms extracted from 189 MS listed on the webpages of 22 real estate departments accredited by AACSB-International. In Japan, because there is only one real estate department in Meikai University, mandatory subjects of Meikai University are used as the data of Japanese real estate departments and core terms (these were obtained from the Meikai University Affairs Officer) are selected from a total 57 terms extracted from 13 MS. The results are as follows.

**Table 2.** Core terms based on Term Frequency (TF), the Term Proportion (TP) in Mandatory Subjects (MS) of UK, US, and Japan.

UK	TF	TP	US	TF	TP	Japan	TF	TP
Property	44	0.060	Real	110	0.188	Real	8	0.140
Management	36	0.049	Estate	109	0.186	Estate	7	0.123
Valuation	36	0.049	Finance	42	0.072	Science	4	0.070
Estate	34	0.046	Management	32	0.055	Seminar	4	0.070
Real	34	0.046	Law	21	0.036	Introduction	3	0.053
Practice	30	0.041	Investment	18	0.031	Law	3	0.053
Law	28	0.038	Analysis	14	0.024	Practice	3	0.053
Planning	27	0.037	Principles	14	0.024	Transaction	3	0.053
Project	27	0.037	Business	12	0.021	Workshop	3	0.053
Development	24	0.032	Marketing	11	0.019	Building	2	0.035
Economics	21	0.028	Appraisal	10	0.017	City	2	0.035
Professional	20	0.027	Property	9	0.015	Graduation	2	0.035
Introduction	19	0.026	Development	8	0.014	Property	2	0.035

Table 2. Cont.

UK	TF	TP	US	TF	TP	Japan	TF	TP
Building	16	0.022	Banking	7	0.012	Basic	1	0.018
Appraisal	15	0.020	Valuation	7	0.012	Business	1	0.018
Finance	14	0.019	Environment	6	0.010	Career	1	0.018
Investment	14	0.019	Economics	5	0.009	Designing	1	0.018
Commercial	13	0.018	Insurance	5	0.009	Fundamental	1	0.018
Construction	13	0.018	Legal	5	0.009	Game	1	0.018
Business	10	0.014	Planning	5	0.009	Mathematics	1	0.018
Environment	10	0.014	Risk	5	0.009	Microeconomics	1	0.018
Surveying	10	0.014	Research	4	0.007	Planning	1	0.018
Principles	9	0.012	Advanced	3	0.005	Statistics	1	0.018
Urban	9	0.012	Brokerage	3	0.005	Technology	1	0.018

Note: Term Frequency (TF) and Term Proportion (TP) are rounded to four decimal places in the Table 2. Extracted terms are reconstructed in the Table 2 and the terms ranked lower than 24th are omitted in the Table 2. The term “financial” is integrated into “finance” and the term “designing” is integrated into “design”.

### 3.1.2. Analysis of Core Terms in the UK

In Table 2, the core terms frequently used in the titles of MS in UK are listed. The term “Property” (0.060) has the highest TF value in the UK. Shulte [29] explained that the “physical construction and management of buildings is property”. In this respect, the term “Property” (0.060) is closely connected with the built environment. Terms such as “Valuation” (0.049), “Management” (0.049), “Practice” (0.041), “Planning” (0.037) and “Project” (0.037) are ranked higher. As these terms are closely related to the work of construction, they can be said to be also closely connected with the built environment. Thus, built environment can be seen to be the central concept of real estate education in the UK. This explanation is the same context as Roy T. Black’s argument [30] that “built environment” is the main focus of real estate education in the UK and reflects a technical need for university courses emphasizing the construction and management of buildings.

In Table 2, the terms of only the UK include practice-related terms (e.g., “Practice” (0.041), “Project” (0.037) and “Professional” (0.027)), construction-related terms (“Building” (0.022), “Construction” (0.018) and “Built” (0.011)) and introductory-related terms (“Introduction” (0.026), and “Principle” (0.012)). From the fact that these terms are also closely related to practice and construction, it can be interpreted that the real estate education in the UK is a built environment-oriented education focusing on practical work which is in line with traditional surveying approach.

The appearance of terms listed in high rank also supports the proposition that “the mainstream of the UK can be said to be the built environment within the framework of surveying approach” referred to in Section 2.1.

### 3.1.3. Analysis of Core Terms in the US

In Table 2, the core terms frequently used in the titles of MS in US are listed. The term “Real” (0.188) and “Estate” (0.186) have the highest TP value, which can be attributed to the widespread use of the phrase once real estate departments began to be established in business schools in 1905.

Terms such as “Finance” (0.072), “Management” (0.055), “Law” (0.036), “Investment” (0.031) and “Marketing” (0.019) rank higher. From the fact that these terms are closely related to the works for profit-maximizing that is the be-all and end-all of business, they can be said to be closely connected with business. Thus, finance and investment in a business environment can be seen to be the central concept of real estate education in the US. This is the same context as Black’s argument [30] that “finance and investment” is the main focus of real estate education in the US. This is distinguished from the UK, which focuses on the built environment.

In Table 2, the terms of only the US include finance and investment-related terms (e.g., “Banking” (0.012), “Legal” (0.009), “Risk” (0.009) and “Insurance” (0.009)), institution-related terms (e.g., “Institution” (0.005), and “Fundamentals” (0.005)) and brokerage-related terms (“Brokerage” (0.005))

and “Ethical” (0.001)). From these terms are also closely related to profit, it can be interpreted that the real estate education in the US is a business-oriented education focusing on finance and investment. The appearance of the terms listed in high rank also supports the proposition that “the mainstream in the US can be said to be the finance and investment within the framework of business approach” referred to in Section 2.2.

In addition, there are terms to pay special attention to. They are the term “History” (0.001) in the UK and the term “Ethical” (0.001) in the US. Although TPs’ Numerical values of the two terms are very low, they are important terms that reflect the differences of educational background and the business environment in curricula.

### 3.1.4. Finding the Mainstream of Current Real Estate Education with Respect to Globalization

As explained in the introduction, the UK and US have historically led real estate education and the current globalization of real estate education is also intuitively being led by RICS in the UK and AACSB-International in the US. Based on this status, this study tried to find the mainstream of current real estate education with respect to globalization with the common core terms of mandatory subject titles of the real estate departments accredited by RICS in the UK and AACSB-International in the US.

Table 3 shows core terms in only the UK, only the US and common core terms between the UK and US. Table 3 also includes terms not listed in Table 2 (because their TF rankings were lower than 24th). Different from Table 2, Table 3 shows TF only in parentheses in order to improve its readability. These terms are very important from the viewpoint of showing the education characteristics of each country.

**Table 3.** Summary of the UK and US core terms.

[Only the UK Core Terms]	[The UK and US Common Core Terms]	[Only the US Core Terms]
Practice (30)		
Project (27)	Real (34, 110)	Banking (7)
Professional (20)	Estate (34, 109)	Legal (5)
Introduction (19)	Property (44, 9)	Risk (5)
Building (16)	Finance (14, 42)	Insurance (5)
Construction (13)	Management (36, 32)	Fundamentals (3)
Principles (9)	Valuation (36, 7)	Institutions (3)
Urban (9)	Law (28, 21)	Brokerage (3)
Built (8)	Investment (14, 18)	Ethical (1)
Surveying (10)	Appraisal (15, 10)	note: (TF of US)
History (1)	note: (TF of UK, TF of US)	
note: (TF of UK)		

The common core terms between the UK and US, as listed in Table 3, include the following: “Real”, “Estate”, “Property”, “Finance”, “Valuation”, “Management”, “Law”, “Investment” and “Appraisal”. These terms are commonly high important terms in the departments accredited by RICS in the UK and AACSB-International in the US. They give us important insights in search of the mainstream of real estate education in the current global era.

“Real Estate” and “Property” are used almost interchangeably [29]; however, “Property” is dominant in the UK and “Real Estate” is dominant in the US. Except “Real Estate” and “Property”, terms such as “Finance”, “Valuation”, “Management”, “Law”, “Investment” and “Appraisal” are most common core terms. These terms are intimately related to the overall real estate business. It implies that real estate education focusing on business is popularly taught in both countries. This is because the business school context in the US is accepted by many real estate departments in the UK, as mentioned by D’Arcy and Taltavull [8]. In this sense, it can be said that the current mainstream of real estate education is the business approach that has its roots in the US.

### 3.2. The Specificities of Real Estate Education in Japan

As mentioned in the Introduction section, despite many countries being classified as eclectic models, not many studies have been conducted on the contents and characteristics. In this context,

this paper firstly conducted an international comparative survey on the characteristics of real estate education in Japan. Specifically, we clarified Japan's specificities of real estate education through the proximity analysis between the core terms of current courses opened by the department of real estate in Japan and the core terms of courses offered in the UK and the US.

### 3.2.1. Analysis of Core Terms in Japan

In Table 4, the core terms proportion used in the titles of MS in Japan are listed. The terms are extracted from mandatory subjects provided by Meikai University. Although in 2016 there are seven universities that provide real estate related programs in the graduate course, only Meikai Univ. operates a full time bachelor program of real estate. This is why only Meikai University is considered in this study.

**Table 4.** Summary of Japan core terms.

<b>[Core terms based on TF of MS in Japan]</b>
Real (0.140), Estate (0.123), Science (0.070), Seminar (0.070), Introduction (0.053), Law (0.053), Practice (0.053), Transaction (0.053), Workshop (0.053), Building (0.035), City (0.035), Graduation (0.035), Property (0.035), Basic (0.018), Business (0.018), Career (0.018), Designing (0.018), Fundamental (0.018), Game (0.018), Mathematics (0.018), Microeconomics (0.018), Planning (0.018), Statistics (0.018), Technology (0.018)
<b>[Only Japan Core Terms] (Not appear in the UK and US)</b>
Science (0.070), Workshop (0.053), Graduation (0.035), Basic (0.018), Game (0.018), Statistics (0.018), Microeconomics (0.018)
<b>[Japan Core Terms] (appear in the UK or US)</b>
Real (0.041), Estate (0.123), Seminar (0.070), Introduction (0.053), Law (0.053), Practice (0.035), Property (0.035), Business (0.018), Career (0.018), Designing (0.018), Planning (0.018)

As shown in Table 4, the terms "Real" (0.140) and "Estate" (0.123) had the highest term frequency value, which is attributed to the widespread use of the phrase once the name of real estate departments.

In addition, the high proportion of terms such as "Science" (0.070) implies that science is highly emphasized on real estate education in Japan. This can be regarded as one of the major features of real estate education in Japan. The next highest proportion terms are "Seminar" (0.070), "Introduction" (0.053), "Law" (0.053), "Practice" (0.053), "Workshop" (0.053). These results show that the curriculum emphasizes active learning rather than passive theoretical education and that it is also strengthening the education of basic principles. Also, the fact that "Law" (0.053) is ranked at the top can be interpreted as one of the important educational goals to acquire real estate related qualifications. Next, the words "Building" (0.035), "City" (0.035), and "Property" (0.035) appear in the next highest order. It can be seen that there is also a considerable amount of education on physical things that constitute real estate.

The core term that does not appear in the UK and US, but only in Japan is summarized in Table 4 as "Only Japan Core Terms", which includes "Science" (0.070), "Workshop" (0.053), "Graduation" (0.035), "Basic" (0.018), "Game" (0.018), "Statistics" (0.018), and "Microeconomics" (0.018). From the term with two or more proportions in Only Japan Core Terms, the following characteristics of real estate education in Japan can be identified. As mentioned above, "Science" (0.070) has the highest proportion among the Only Japan Core Terms, which shows that the scientific approach is important in Japanese real estate science. Next, "Workshop" (0.053) is considered to be a feature of the Japanese real estate education system which emphasizes the field experience by emphasizing the participation of the students in the related conference. The fact that "Graduation" (0.035) is included in the mandatory subjects indicates that a social advancement program is provided for graduates.

Although "Real" (0.140) and "Estate" (0.123) have the highest Term Proportion value, these two words are not likely to explain the features of Japanese real estate education because they are included in the name of the department itself. Therefore, "Science" (0.070) has the greatest explanatory power to characterize Japanese real estate education. In addition, "Science" is one of the greatest features of

Japanese real estate education in that it is a word that does not appear in the mandatory courses in the UK and US. Accordingly, as described in Section 2.3, Japanese real estate education can be said to be a wide interdisciplinary education focusing on Science.

### 3.2.2. Proximity Analysis among the UK, the US and Japan

In this section, a proximity analysis through comparing the terms among the UK, the US and Japan perform as an effort to identify the current specificities of real estate education in Japan.

#### (1) Proximity analysis method

In this study, as a concrete method for proximity analysis between the sets of terms extracted from the subject titles in the UK, US, and Japan, the cosine measure is used [31]. This Proximity measure is designed to have a value between 0 (zero) and 1 (one) and high along with highness in similarity between the two countries. The Term Frequency (TF) and Term Proportion (TP) both can be utilized to calculate the proximity of the curricula. In fact, because the number of subjects considered differs from country to country, the TP representing the ratio of each term to the total number of words is more logical for calculating the Proximity. Due to reasons like this, we use TP for calculating the Proximity.

The process of Proximity calculation is as follows. First, we assign the sets of TPs of UK, US and Japan the letters "A", "B", and "C", respectively, and assumed the union of the three sets to be T (=A ∪ B ∪ C). If the number of elements in the set T is *m*, then the terms of each country are listed in the same order as below for the Proximity analysis. This is defined as a vector  $\vec{u}_i$  in *m* dimensional product space for each country (Equation (1)). Because *m* is the number of elements in the union of the three sets, the number of terms in each country is smaller than or equal to *m*. If *i* country has no *j* term in their list,  $TP_{ij}$  becomes 0 (zero).

$$\vec{u}_i = (TP_{i1}, TP_{i2}, \dots, TP_{im}), i = \text{UK, US, JP} \tag{1}$$

Proximity ( $\vec{u}_i, \vec{u}_j$ ) is calculated by Equation (2) [31], using the cosine of the two target countries ( $\vec{u}_i, \vec{u}_j$ ).

$$\text{proximity}(\vec{u}_i, \vec{u}_j) = \text{Cos}(\vec{u}_i, \vec{u}_j) = \frac{\vec{u}_i \cdot \vec{u}_j}{\|\vec{u}_i\| \|\vec{u}_j\|} \tag{2}$$

where  $\vec{u}_i \cdot \vec{u}_j = \sum_{k=1}^m (TP_{ik} \times TP_{jk})$ ,  $\|\vec{u}_i\| = \sqrt{\sum_{k=1}^m (TP_{ik})^2}$ ,  $\|\vec{u}_j\| = \sqrt{\sum_{k=1}^m (TP_{jk})^2}$

Here is an example to help readers understand. In the UK, the frequencies of the terms "Real", "Finance", "Practice", "Banking" are 34, 14, 30, 0, then the number of the total frequency becomes 78. Similarly, in the case of the US, the frequencies of the terms and the total frequency become 110, 42, 0, 7, and 159. Based on these figures, TPs and characteristic vectors for the UK and US,  $\vec{u}_{uk}, \vec{u}_{us}$  can be determined as follows.

$$\vec{u}_{uk} = (0.436, 0.179, 0.385, 0), \vec{u}_{us} = (0.692, 0.264, 0, 0.044)$$

Finally, the Proximity between the two countries is calculated as follows.

$$\begin{aligned} \text{proximity}(\vec{u}_{UK}, \vec{u}_{US}) &= \frac{\vec{u}_{UK} \cdot \vec{u}_{US}}{\|\vec{u}_{UK}\| \|\vec{u}_{US}\|} \\ &= \frac{0.436 \times 0.692 + 0.179 \times 0.264 + 0.385 \times 0 + 0 \times 0.044}{\sqrt{0.436^2 + 0.179^2 + 0.385^2 + 0^2} \times \sqrt{0.692^2 + 0.264^2 + 0^2 + 0.044^2}} = 0.773 \end{aligned}$$

By analyzing all the words in each country with the method described above, the Proximity between the countries can be determined.

## (2) Results of the proximity analysis

The Proximity analysis results for all sets of the UK, US and Japan are shown in Table 5. The Proximity of Japan to the US is highest among three results. The Proximity of Japan to the UK is lower than that of the UK to the US.

**Table 5.** Proximity analysis results among UK, US and JP.

UK-US	UK-JP	US-JP
0.592437129	0.526440083	0.706271411

In general, the Japanese model is an eclectic model, but it seems that the business model is more oriented to the business model of the US model. This can be interpreted as a result of the globalization that the United States is leading, and the business school context of the US approach is deeply affecting the Japanese real estate education curriculum. This result may be not a phenomenon confined to Japan, and it seems that the effects of the business school context of US approach are similar in the European, Asian and African countries, which are generally regarded as eclectic models.

## 4. Summary

The purpose of this paper is to identify the characteristics of real estate education in the UK and US and provide basic information about the curriculum for real estate education in the era of globalization. The results of this paper can be summarized as follows:

- (1) It is generally argued (Yu [3], Shulte et al. [1,2], and Black [30], etc.) that the built environment within the framework of surveying approach is the main stream in the UK, while the finance and investment within the framework of a business approach is the main stream in the US. This paper confirmed the argument by a literature review on the series of historical developments of the real estate education in the UK and US.
- (2) These characteristics described in [1] were reconfirmed by the core terms extracted from the curricula accredited by RICS and AACSB-International.
- (3) The main stream of real estate education in the current global era was made clear by the common core terms extracted from the curricula accredited by RICS and AACSB-International. The present main stream of real estate education is the business approach that has its roots in the US.
- (4) The specificities of real estate education in Japan were identified as first making a trial among eclectic model countries through core term comparison and Proximity analysis of real estate education. Proximity analysis shows that real estate education in Japan is more oriented toward the business context of the US model.

Finally, although there was no quantitative analysis in this research, the subjects related to the terms of “History” and “Ethical” should be considered more important, especially considering the current era of global financial crises, complex financial services derived from real estate. In addition, subjects focusing on entrepreneurship and negotiation, as well as operational abilities for use in construction projects, should be emphasized in the future.

However, this study has limitations. In order to clarify the mainstream of real estate education, this study considered only core terms as analysis objects. However, future work should include less frequent terms as analysis objects in order to more accurately identify the characteristics of real estate education in each country.

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