A Comprehensive Survey of IS Undergraduate Degree Courses in the UK

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Abstract
There is little conclusive evidence about the state of the IS curriculum in the UK. This paper presents the results of a detailed survey about the provision of Information Systems (IS) undergraduate degree courses in the UK using the newly developed IS 2010 curriculum guidelines as its basis. IS 2010 identifies three main categories of knowledge that underpin the essence of IS as an academic subject: IS Specific Knowledge and Skills, Domain Fundamentals and Foundational Knowledge and Skills. Our desire to offer a holistic and conclusive representation of the curriculum is supported by the development of an IS curriculum survey framework that caters for the mapping of every subject that populates the IS curricula of undergraduate degrees in the UK, including subjects that are generic or are derived from other hierarchical disciplines.

Keywords: IS curriculum, IS education, IS2010.

TOPIC

IS Learning and Teaching
Instructional Design for IS
A Comprehensive Survey of IS Undergraduate Degree Courses in the UK

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1.0 Introduction

Information Systems (IS) is a relatively young, fast-changing discipline with no precise definition (Kennan et al., 2008). Its evolution is often driven by the dynamic forces that permeate the world of business and IT. While the IS research community has been undergoing a period of existentialism, debating the multidisciplinary nature of IS and its questionable theoretical underpinnings (Benbasat and Zmud, 2003; Hirschheim and Klein, 2003; Neufeld et al., 2007), industry has been calling for more relevant curricula and training that meet its needs (Kyootai and Mirchandani, 2010; Prabhakar et al., 2005; Zwieg et al., 2006). At the same time, universities have gone through a period of noticeable under-recruitment of new IS students (Choudhury et al., 2010; Walstrom et al., 2008), although, recent signs show a reversal of fortunes. Simultaneously to all these developments, the IS community, its professional, and accreditation bodies responsible for curriculum development have been seeking to devise curricula that are both relevant to the needs of industry (Atchison and Gonsalvez, 2001; Ryker et al., 2008), and the expectations of the new breed of IS undergraduate students that is technologically ‘savvy’ (Martz and Cata, 2008; Scott et al., 2009).
The issue of IS curriculum relevance and pace of IS curriculum evolution can be traced back to the early 1970s when the first attempts to develop IS curriculum recommendations were made (Davis et al., 1996). A number of revisions since then have led to the latest set of recommendations, known as the IS 2010: Curriculum Guidelines for Undergraduate Degree Programs in Information Systems (Topi et al., 2010). The authors of IS 2010 argue that the accelerating perpetual advancements in the fields of IT and business necessitate frequent reviews of IS curricula to ensure that they remain relevant to the needs of industry (Topi et al., 2010). Their argument, however, is not new. (Lee et al., 1995) argued the case for better alignment between industry and academia through curriculum relevance. More recently, (Granger et al., 2007) reiterated the importance of re-evaluating IS curricula to attract more students to the discipline, while (Bullen et al., 2007; Zwieg et al., 2006) noted the importance of re-thinking curriculum and training development efforts.

Research in the area of IS student enrolments echoed the earlier expressed need for updating IS curricula (Foster, 2005; Hirschheim, 2007; Panko, 2008). At the same time, the body of work promoting the importance of possessing the right skills to succeed in a changing IS job market, continued to grow (Prabhakar et al., 2005; Tuson, 2008). In a recent article (Benamati et al., 2010) carried out a survey to measure the level of IS curricula alignment with industry needs, and examined the amount of change in the curriculum over a period of three years by reviewing a sample of IS courses in US universities. The authors concluded that while progress was being made, more work to address the problems of low student recruitment and insufficient graduate skills was necessary. The work by (Benamati et al., 2010) reaffirms the usefulness of IS course surveys through content analysis, but measuring curriculum alignment with industry needs is a complex issue and requires a comprehensive understanding of issues such as career tracks and industry requirements.

Curriculum surveys in the past have tended to focus on mainly core subjects of IS (Kung et al., 2006; Lifer et al., 2009; Pierson et al., 2008; Williams and Pomykalski, 2006). We offer a more detailed picture by measuring the impact of core and option IS subjects, including those borrowed from the domains of business and computing. The motivation for this paper arises from our belief that the IS academic community
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in the UK and elsewhere would benefit from the opportunity of examining the broad IS curriculum offered by UK Higher Education Institutions (HEIs). At the heart of the work presented lies a comprehensive survey of undergraduate IS courses in the UK. Modules are catalogued according to their content, analysed by year of study, credit size, core or option mode, and contribution to either the core knowledge of IS or knowledge that is part of other hierarchical domains. Rankings are produced to capture the frequency of each subject. To contextualise the analysis of modules, entry-level qualifications are considered. The core set of findings of our study relates to new and comprehensive rankings for all IS and non-IS modules that make up the IS curriculum in the UK, denoting the popularity of individual subjects which, by implication, signifies the emphasis curriculum developers place on them and the skills they promote. These findings are complemented by similarly organised findings about admissions criteria.

2.0 Research into Curriculum Surveys

2.1 Model Curricula
The first curriculum model to receive noticeable attention by the IS community was IS ’97 (Davis et al., 1996). IS ’97 and its subsequent edition, IS 2002, were the result of collaborative efforts between the Association for Computing Machinery (ACM), Association for Information Systems (AIS), and the Data Processing Management Association (DPMA) or Association for Information Technology Professionals (AITP) as it was subsequently renamed. IS ’97 was developed more than twenty years after the original efforts to develop IS curricula recommendations begun. The publication of IS 2002 (Gorgone et al., 2002) was the culmination of efforts to revise IS ’97 by incorporating the changes in the field of IS during the previous five years, namely the advent of the Internet and the increasing amount of student IT literacy. IS 2002 put forward curriculum recommendations mainly for the benefit of US and Canadian universities. It aimed to offer a fairly flexible structure that academics could adopt to fit to their local settings, while ensuring sufficient subject diversity to enable IS graduates to gain the relevant professional skills (Gorgone et al., 2002). Even though IS 2002 came about as the result of small changes to IS ’97, it soon attracted significant attention by academia in North America.
2.2 IS 2010

IS 2010 introduced both structural changes - in the form of variable level of subject coverage to IS 2002 and a philosophical shift in the curriculum recommendation development process in the form of career tracks, while maintaining the essential guiding principles that influenced the design of previous editions. Featuring a more flexible structure, the new model separated core and option subjects for the first time, thus making a clear distinction between what constitutes core IS knowledge and a number of specialisations that can exist alongside it (Topi, 2010).

![Figure 1. Structure of the IS 2010 Model Curriculum (Topi et al. 2010)](image)

The structure of IS 2010 (Figure 1) is essentially made up of three key components with varying significance: the ‘Core IS Courses’ (or core subjects as we will refer to them in this paper to reduce ambiguity among similar terms) that define the IS discipline, ‘Elective Courses’ (or option subjects) which offer specialisations within the discipline, and ‘Career Tracks’ that act as focal points in terms of exit qualifications. Core subjects define the IS Specific Knowledge and Skills (ISSKS) (Figure 2) by capturing the IS knowledge that defines the discipline. By suggesting ‘significant’ or ‘some’ coverage (Figure 1, Key) for each of the core subjects, the
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model highlights the emphasis each topic could receive in relation to the overall aims and objectives of the course. Option subjects introduce a new, previously absent dimension to the model. They offer an inherent course design flexibility which supports course developers in their attempts to design distinct IS course with localised ‘flavours’.

Career tracks is a new feature of IS 2010 that reflects the increasing importance of the relationship between student employability and university education. As a notion, the use of career tracks to develop and update IS curricula is not new. (Hwang and Soe, 2010) examined over one hundred IS courses in the US and identified numerous career tracks sometimes marred in ambiguity because of ill-thought naming conventions. They noted that courses with clearly defined career tracks tend to be updated frequently by keeping abreast of technological advancements in IT. More generally, the relationship between IS curriculum and careers continues to receive much attention (Benamati et al., 2010; Fang et al., 2005; Martz and Cata, 2008).

![Figure 2. ISSKS Translating into Core IS 2010 Subjects (Topi et al. 2010)](image)

The new IS 2010 guidelines are driven by the constantly evolving high-level capabilities that employers require from the IS workforce (Figure 2). These capabilities are expressed as three distinct areas of knowledge: ISSKS, Domain Fundamentals (DF), and Foundational Knowledge and Skills (FKS) (Topi et al., 2010). In line with previous editions, the aim of IS 2010 is to facilitate curriculum development through the contextualisation of IS topics, and not to prescribe how to design courses. The foundation of the research presented in this paper is the notion of
using the overall structure of the basic concepts of IS 2010 as the basis for surveying IS curricula across UK universities, thus extending its primary purpose. ISSKS represents the core knowledge that makes up the IS discipline.

2.3 Research Method

Several studies in the past relied on the recently superseded IS 2002 curriculum recommendations (Gorgone et al., 2002) to examine the level of alignment of IS courses to the model, producing findings that measured the popularity of subjects available to undergraduate students (Dwyer and Knapp, 2004; Lifer et al., 2009; Williams and Pomykalski, 2006). Similar empirical research methods are often used to conduct IS curriculum surveys which examine the correlation between graduate level skills and the skills expectations by industry (Litecky et al., 2004; Nelson et al., 2007; Prabhakar et al., 2005). For the majority of these studies, as is the case with (Apigian and Gambill, 2010; Pierson et al., 2008), data is collected from relevant websites to ensure the most up-to-date information is used. (Gallivan et al., 2004) argue for the existence of four main complimentary research methods often employed to identify trends in the IT/IS job market, but also in IS curriculum developments, which examine pattern changes over time: traditional surveys, interviews including focus groups, Delphi studies, and content analysis.

Traditional surveys examine the views of respondents by eliciting answers to carefully crafted questions. (Bullen et al., 2007) notes an example of a two-stage survey, traditional and web-based, used as part of a project examining current and future IT workforce trends. As part of a similar but smaller scale project, (Janicki et al., 2004) carried out an employer survey to review job skills and the implications that industry expectations have on the IS curriculum. (Zhang, 2007) demonstrated the use of surveys by analysing student data in an effort to understand their intentions to follow IS degree courses. Further examples of employer and student surveys are present in (Akbulut and Looney, 2007; Cappel, 2001) respectively. (Zwieg et al., 2006) interviewed senior IT executives to identify skill requirements and changes in the workforce trends, while (Scott et al., 2009) conducted a series of focus groups with students to understand their motivation to study IS. Similarly, (Tan and Taizan, 2007) targeted scholars through interviews to ascertain the level of maturity of the IS discipline in Singapore. Delphi studies support the distillation of views within the
same group due to their iterative approach that involves summarising the results from each round of surveys before another set of questions is administered. (Snoke, 2007) demonstrated the value of such approach in an Australian study that examined the skills employers require from graduates following IS courses. Content analysis, either for the purpose of analysing job advertisements to catalogue graduate skills in demand (Kennan et al., 2008; Litecky et al., 2010; Prabhakar et al., 2005; Todd et al., 1995) or for surveying IS curricula (Anandarajan and Lippert, 2006; Hwang and Soe, 2010; Kung et al., 2006; White, 2004), is well established. In their discussion about content analysis as a method capable of facilitating empirical study, (Fico et al., 2008) trace the emergence of the method to the social sciences and captures the essence of content analysis through its application as part of a number of operational steps. We mapped the operational terms of content analysis as expressed by Fico et al. to our own study to test the validity of using it for our proposed research with encouraging results:

- Conceptualisation: survey IS degree courses in the UK
- Unitisation: undergraduate degree courses
- Sampling: individual course modules
- Operationalisation: codification of module content, mapping it to IS 2010 curriculum guidelines
- Reliability: 100% UK IS course coverage and module participation
- Validity: expansion of IS 2010 curriculum guideline concepts to achieve holistic content coverage

3.0 IS Curriculum Analysis Approach

As part of this section we first consider the overall dataset. We then discuss the admissions criteria affecting the courses. The aim of this approach is to draw attention to the differences in the requirements universities pose for entry, highlighting dissimilarities between seemingly identical courses. Finally, we present the framework we derived from IS 2010 to analyse the data of our survey.

3.1 Survey Dataset

The collection of the data was concluded in the spring of 2010 after a period of six months. We collected and analysed 228 IS courses from 84 universities across the UK. The IS course identification and selection process was carefully carried out by examining all UK universities and cross-referencing their online catalogues with the definitive list of courses available to applicants published by the Universities & College Admissions Service (UCAS). The identification of each IS course prompted
the recording of detailed information about its content. Particular attention was given to capturing sufficiently unambiguous individual module descriptions that subsequently became the basis for mapping modules to IS 2010 subjects.

The initial analysis of the data shows the distribution of core and option modules across universities. Overall, the ratio of core to option modules for the 228 courses stands at 1: 0.65, giving an average of 33 core and 20 option modules. A total of 7,475 modules make up the 228 courses, of which 62% or 4,598 of all modules are classified as core, while the remaining 38% are options. The average number of modules per course is 33.

3.2 Admissions Criteria
Entry to UK universities for undergraduate study is controlled by UCAS. Through its UCAS Tariff system, the organisation supports universities and candidate students by attributing points to qualifications, effectively setting minimum targets for entry for each course (http://www.ucas.ac.uk/students/ucas_tariff/how). A common way of expressing entry-level requirements is through A-Level score points. The proliferation of different UK-specific and international qualifications over the years has resulted in a tariff-based system that calculates the equivalency of scores between dissimilar qualifications.

We examined the entry-level requirements for each of the 228 courses by cross-referencing the information published on individual course websites against the data published by UCAS. The average number of entry points necessary to gain entry to an IS degree stands at 246, equivalent to just over two A grade A-Levels (A=120 points, B=100 points, C=80 points, D=60, E=40 points) (http://www.ucas.ac.uk/students/ucas_tariff/tarifftables/). Differential comparison of courses in terms of course entry requirements shows significant variations.
3.3 Course Survey Framework

The analysis of the data is based on the course survey framework shown in Figure 4. The framework provides the context which defines the categories used to capture the content of modules. On average, the typical IS course in a UK university consists of about 33 modules (module sizes are normalised to 15-credits), 20 of which are core, with the remaining 13 being options. Irrespective of their type, for these modules to be catalogued in a meaningful and consistent way with IS 2010, they need to either be matched against the ISSKS, FKS, or DF categories, with the exception of the Final Year Project that exists outside these categories. The categorisation of modules becomes more complex because the structure of IS 2010 separates core and option subjects. So, a core or option module of an IS degree may potentially map to a core or option subject of IS 2010, which belongs to either the ISSKS or FKS or DF category, assuming it is not a project. As an illustration of the complexity involved, consider the following scenario: a BSc Information Systems course offers a first year core module called *Mathematics for Computer Science* measured as one unit or 4.2% of the curriculum that maps onto the FKS category. Another module, *Project Management*, is offered in year 2 of the degree, which IS 2010 considers a core subject, yet it is offered as an option module. A third module in year 3 called Human-Computer Interaction is offered as core but does not correspond to any of the declared core or option IS 2010 subjects, as it is part of FKS which IS 2010 does not elaborate on.
The level of convergence between graduate skills and the skills industry expects is independent of the framework since the right balance of IS skills requires curriculum development with input from multiple stakeholders (Lee et al., 2002; Lynch and Fisher, 2007). Whatever the exiting competencies graduates may bring to the professional world of IT, the conduit for acquiring such knowledge is expressed through the three fundamental categories of ISSKS, FKS, and DF. Even though the predominant interest of IS 2010 is placed in ISSKS through the specification of the seven core subjects (Figure 2), our framework expands the remaining two categories by deliberately mapping modules that belong to hierarchical knowledge domains (Business and Computing), and generic professional skills. It also considers the option subjects that IS 2010 uses to support career tracks through IS specialisations by capturing specific data about those modules as well. Since modules exist as core or options within university courses, the framework differentiates between them for every category. It also isolates the provision of the Final Year Project as a separate entity that is the culmination of the taught part of the vast majority of IS degree courses (Clear et al., 2001; McGann and Cahill, 2005; Surendran and Schwieger, 2011).

While the value of simply measuring the number the core modules of IS courses that map directly to the core subjects of IS 2010 alone is good at demonstrating how well
IS courses capture the essence of IS 2010 (ISSKS), it is important to note that such measurement only shows part of the overall picture. To better illustrate this point, Table 1 isolates the core and option subjects of IS 2010 by showing only the extent to which core and option IS degree modules map to them without taking into account the Final Year Project and modules that belong to other domains or address generic skills. Nearly half (46.8%) of core modules map directly to IS 2010 core subjects, effectively confirming the compulsory exposure that students have to ‘pure’ IS teaching. A further 18.2% of core IS 2010 subjects are covered by option modules, but the available data does not indicate how popular these modules are when compared with other options modules. A significant amount of core modules (16.4%) address topics that IS 2010 views as optional specialisation subjects, while a further 12.5% of option modules deal with option subjects. It is therefore worth remembering when examining the results of the survey that to judge the true contribution of a subject to the IS curriculum we must consider the mode of study of the module in relation to the mode of study (full or part time) of the subject to which the module maps onto.

| % CORE modules contributing to IS 2010 CORE SUBJECTS | 46.8 |
| % OPTION modules contributing to IS 2010 CORE SUBJECTS | 18.2 |
| % CORE modules contributing to IS 2010 OPTION SUBJECTS | 16.4 |
| % OPTION modules contributing to IS 2010 OPTION SUBJECTS | 12.5 |

Table 1. % of Core/Option IS Course Modules Contributing to Core/Option IS 2010 Subjects

4.0 Survey Results

In this section we present the main results of the study aided by a series of tables. The presentation of the results follows a logical pattern: We first examine data pertaining to ISSKS subjects. Specifically, we consider core and option module rankings in relation to the core and option subjects of IS 2010. We then proceed to the presentation of DF data, considering the contribution of core and option modules that belong to the Business and Computing domains. Subsequently, we present module data contributing to generic skills as suggested by the FKS category. Finally, we focus on the Final Year Project and the contribution it makes to the overall IS curriculum.
Figure 5 offers a synopsis of the overall module findings. The chart plots the contribution of IS degree modules to the three subject categories: non-IS subjects, covering modules that belong to the combined FKS and DF categories; the Final Year Project which exists outside the three categories of ISSKS, DF, and FKS and IS 2010 core and option subjects combined together. As the chart suggests, we examined separately course modules offered as core from those offered as options, namely 4,598 and 2,877 modules, respectively for the 228 courses in the survey. For the non-IS category, core modules such as HRM, Accounting, Graphics, and Multimedia (the former two correspond to the Business Domain and the latter to Computing Domain) were counted together along with modules such as Communications Skills and Maths (Skills Category) to produce the ‘Core’ set of figures. Similarly, modules from the same thematic background listed as options, produced the ‘Option’ figures of the chart. The Final Year Project follows the same pattern, as do IS 2010 core and option modules. It is worth noting that for the IS 2010 grouping in this case, we combined together all 18 subjects (seven core subjects and eleven proposed option subjects listed in Figure 1).
Overall, 67% of all core modules map directly to the 18 core and option subjects of IS 2010. This is also the case for an additional 48% option modules that match the IS 2010 subjects. As a rule of thumb, having two thirds of core modules map to what IS 2010 defines as the essential topics for IS appears to be reasonable. The figure for the Final Year Project suggests that IS course developers in the UK place strong emphasis on the value of projects. Non-IS modules make a significant contribution to the IS curriculum through the provision of Business and Computing modules (a very small ‘Other’ category is discussed later). Interestingly, IS course developers place the majority of non-IS modules in the option category, which suggests that the decision about what hierarchical domain subjects to study is mostly left to students. Nearly half of all option modules (48%) are modules that are part of one of the hierarchical domains of IS.

4.1 IS Specific Knowledge and Skills

We earlier argued about the importance of considering module data that goes beyond the seven core subjects that IS 2010 has put forward. Table 2 provides the complete listing of the 18 core and option IS 2010 subjects in order of popularity. Application Development, a subject that IS 2010 lists as optional, is the most popular by far with 21.4% of all teaching, excluding non-IS topics and projects, devoted to it. Foundations of IS (13.1%) is the second most popular subject that IS 2010 suggests should receive the highest teaching coverage irrespective of the career track(s) promoted by the course in question (Figure 1). The next three subjects, Systems Analysis & Design (11.4%), Enterprise Architecture (11.2%), and IT Infrastructure (10.2%), are core subjects with almost equal importance to the IS curriculum. At the bottom end of the popularity list, a cluster of 6 subjects attract small coverage that implies very little interest in their content: Business Process Management (3%), Enterprise Systems (3%), Knowledge Management (3%), Collaborative Computing (1%), Information Search and Retrieval (1%), and IT Audit and Controls (<1%).
## Table 2. Core and Option Module Rankings excluding Final Year Project and Non-IS

<table>
<thead>
<tr>
<th>IS 2010 CORE+ OPTION Subjects</th>
<th>Ranking</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Development</td>
<td>1</td>
<td>21.4</td>
</tr>
<tr>
<td>Foundations of IS</td>
<td>2</td>
<td>13.1</td>
</tr>
<tr>
<td>Systems Analysis &amp; Design</td>
<td>3</td>
<td>11.4</td>
</tr>
<tr>
<td>Enterprise Architecture</td>
<td>4</td>
<td>11.2</td>
</tr>
<tr>
<td>IT Infrastructure</td>
<td>5</td>
<td>10.2</td>
</tr>
<tr>
<td>Human Computer Interaction</td>
<td>6</td>
<td>6.8</td>
</tr>
<tr>
<td>IT Project Management</td>
<td>7</td>
<td>5.1</td>
</tr>
<tr>
<td>Data and Information Management</td>
<td>8</td>
<td>4.9</td>
</tr>
<tr>
<td>IT Security and Risk Management</td>
<td>9</td>
<td>2.6</td>
</tr>
<tr>
<td>Data Mining / Business Intelligence</td>
<td>10</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>IS Strategy, Management &amp; Acquisition</strong></td>
<td>11</td>
<td>2.3</td>
</tr>
<tr>
<td>Social Informatics</td>
<td>11</td>
<td>2.3</td>
</tr>
<tr>
<td>Enterprise Systems</td>
<td>12</td>
<td>2.0</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>13</td>
<td>1.7</td>
</tr>
<tr>
<td>Business Process Management</td>
<td>14</td>
<td>1.5</td>
</tr>
<tr>
<td>Information Search and Retrieval</td>
<td>15</td>
<td>0.6</td>
</tr>
<tr>
<td>Collaborative Computing</td>
<td>16</td>
<td>0.4</td>
</tr>
<tr>
<td>IT Audit and Controls</td>
<td>17</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>

The IS Knowledge and Skills category contributes 60% of the modules to the typical IS degree course. The popularity of Application Development is evident both as a core and an option subject. In terms of volume in the core category of modules, there are 692 15-credit programming modules (15% of all core modules, including those in the FKS, DF, and the Final Year Project category) out of a total of 4,598.

For those unfamiliar with previous editions of model curricula, it may appear odd that IS 2010 considers Application Development to be included as option subject of IS, and as such, not part of the seven compulsory topics illustrated in Figure 2. In their discussion about the differences between IS 2010 and IS 2002, (Topi et al., 2010) argue that: “By offering application development as an elective [option] the IS 2010 model curriculum increases its reach into non-business IS programs while also creating flexibility for curricula that choose to include an application development
“course.” This argument may be stronger for business schools that are the main provider or IS courses in the US (Pierson et al., 2008) as opposed to the UK, where 203 (89%) of the 228 courses are offered by computing departments, with only 25 (11%) of IS courses being affiliated to business departments (Stefanidis and Fitzgerald, 2010).

Beyond Application Development, the ranking of subjects reveals the next four positions on the list to be occupied by Foundations of IS, Systems Analysis & Design, Enterprise Architecture, and IT Infrastructure, all of which are core IS 2010 subjects (Table 2). Human-Computer Interaction is the next most popular subject, which IS 2010 classifies as an option. As the sixth most popular subject, it appears above IT Project Management and Data Information Management, both of which are core subjects. More surprisingly, IS Strategy, Management & Acquisition, a core subject, only manages position eleven, with a relatively small 2.3% of subject contribution to IS teaching. At the bottom of the list Collaborative Computing is the subject that appears in the courses of every university group. IT Audit and Controls, however, has a small presence in two of the five groups only.

5.2 Domain Fundamentals

Subjects belonging to the DF category make up 24% of the entire curriculum. These subjects are primarily derived from the hierarchical Business (58%) and Computing domains (33%), with the remaining 9% attributed to a general category conveniently named ‘Various’. In total, there are 1,038 business modules (Table 3) whose descriptors indicate that these are not hybrid business modules adjusted to serve the curriculum needs of IS courses which predominantly reside in computing departments. In fact, they are modules which very often are being ‘borrowed’ from business courses that reside in business departments.

We present the DF data as three tables below: Business, Computing and Other. DF modules account for 39% of option and 14% or core modules, respectively. Modules from the domain of Business are by far more popular in occurrence and number of different modules. Within the DF category Business modules provide 58%, Computing 33%, and Various 9% of the combined core and option subjects.
Table 3 shows the list of business subjects in order of popularity. General Business became necessary as a category so as to include those subjects with very low occurrence to be statistically significant and to deal with modules with mixed content. Apart from Marketing, general Management, Enterprise, and Accounting feature strongly in the list of business modules.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Ranking</th>
<th>Total Modules</th>
<th>% of Business DF</th>
<th>% of All DF Modules</th>
<th>% of All Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Business</td>
<td>1</td>
<td>192</td>
<td>19%</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>Marketing</td>
<td>2</td>
<td>178</td>
<td>17%</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Management</td>
<td>3</td>
<td>100</td>
<td>10%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Enterprise</td>
<td>3</td>
<td>105</td>
<td>10%</td>
<td>10%</td>
<td>2%</td>
</tr>
<tr>
<td>Accounting</td>
<td>4</td>
<td>98</td>
<td>9%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>Finance</td>
<td>5</td>
<td>65</td>
<td>6%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>HRM</td>
<td>5</td>
<td>59</td>
<td>6%</td>
<td>1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Operational Management</td>
<td>6</td>
<td>57</td>
<td>5%</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Organisational Behaviour</td>
<td>6</td>
<td>49</td>
<td>5%</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>Global Business</td>
<td>7</td>
<td>37</td>
<td>4%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>Economics</td>
<td>8</td>
<td>34</td>
<td>3%</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>Supply Chain Management</td>
<td>8</td>
<td>28</td>
<td>3%</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Strategy</td>
<td>9</td>
<td>21</td>
<td>2%</td>
<td>1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Business Law</td>
<td>10</td>
<td>15</td>
<td>1%</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1038</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Domain Fundamentals (Combined Core & Option)

The introduction of General Computing in Table 4 shares the same rationale as General Business in the previous table. Multimedia and AI are the two subjects that record the highest module occurrences, with End User Computing, Bioinformatics and GIS barely making the list.
### Table 4. Computing - Domain Fundamentals (Combined Core & Option)

Table 5 captures a small number of subjects that are not part of either of the previous domains. Although the numbers for these modules are small when taking into account the total number of modules, the ranking and occurrence of Research Methods deserves an explanation. Based on the Final Year Project descriptors we examined, research methods are often embedded into the project module. We chose to include a separate category for Research Methods to reflect those modules which purely concentrate on that subject, often being the precursor to the project in the form of a pre-requisite.

### Table 5. Various - Domain Fundamentals (Combined Core & Option)
A Comprehensive Survey of IS Undergraduate Degree Courses in the UK

5.3 Foundation Knowledge and Skills

IS 2010 suggests the five categories that capture the essence of FKS listed in Table 6. Communication Skills is the most popular subject in this category, with Negotiation only registering 3 modules.

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Total Modules</th>
<th>% of Various FKS</th>
<th>% of All Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Skills</td>
<td>1</td>
<td>194</td>
<td>37%</td>
</tr>
<tr>
<td>Collaboration / Teamwork</td>
<td>2</td>
<td>107</td>
<td>21%</td>
</tr>
<tr>
<td>Maths</td>
<td>3</td>
<td>111</td>
<td>21%</td>
</tr>
<tr>
<td>Analytical Thinking</td>
<td>4</td>
<td>103</td>
<td>20%</td>
</tr>
<tr>
<td>Negotiation</td>
<td>5</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>518</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. FKS Data

Four out of five types of subjects that make up the FKS category in IS 2010 mapped the modules we surveyed accurately. The only exception is Negotiation, which as (Topi et al., 2010) suggest, can be an extension to Communication Skills. The most popular subject in this area with a 37% total is indeed Communication Skills. The overall size of the FKS category (7%) was lower than we anticipated.

5.4 Final Year Project

We decided to treat the Final Year Project as a separate category for two reasons. Firstly, IS 2010, along with previous editions of model curricula, does not explicitly include the project within the recommended topics for teaching. Secondly, we wanted to measure how strongly projects feature in the IS curriculum. The best practical way to achieve these aims suggested the creation of a separate category. Out of the 228 courses in this study, only 4 do not offer a project of any kind in any year. Invariably, the Final Year Project, as the name suggests, appears in the last year of study, although a number of courses offer project modules in earlier years. We combined these two types of ‘projects’ into the same category. Table 7 shows the provision of projects in the IS curriculum. By far the largest occurrence of projects takes place in year 3 as a compulsory element of the overall diet of IS modules.
6.0 Conclusions

The work we present in this article is underpinned by our desire to support the IS academic community in the UK and elsewhere in its endeavour to devise increasingly more relevant IS curricula. Although similar studies have been carried out in the past, most of them were undertaken outside the UK. As a result, our efforts constitute an early step in an attempt to understand the level of correlation between academic knowledge and skills imparted to IS students in the UK, and the skills that are in demand by the UK industry. The survey was based on the overall structure and basic concepts of IS 2010 curriculum guidelines, which is the latest edition of curricula recommendations. It examined the provision of IS courses across all countries of the UK. Eighty-four universities offer 7,475 fifteen-credit modules as part of 228 IS undergraduate degree courses. To synthesise an accurate view of the curriculum, we first considered the admissions criteria requirements set by different universities. Universities were clustered into different groups according to their affiliations. Significant discrepancies exist in setting entry standards for IS courses between different groups, with traditional research-led universities setting an average entry standard that is over 50% higher that modern universities.

The results show that Application Development is the most frequently taught subject on IS courses in the UK regardless of its recently ‘downgraded’ status to option by IS 2010. Although technically not an IS 2010 subject, the Final Year Project is the second most popular element of the curriculum only absent from 4 out of 228 courses. A total of 60% of the curriculum is covered by subjects IS 2010 describes as core and option. An additional 24% of courses are classified to be mainly part of the Business
and Computing hierarchical domains, with the majority of the subjects in those areas being offered as options. Foundational Knowledge and Skills that are deemed necessary elements for the rounded education of any professional make up a further 7% of modules. Communication, collaboration, maths and analytical skills are the four most popular subjects in this category. The remaining 9% of the curriculum is devoted to the Final Year Project. This is an integral element of IS education that acts as the culmination of efforts to assimilate the knowledge and skills present in the conventional taught part of the curriculum.

Further work is necessary to identify the career tracks that the surveyed IS courses promote. Such analysis should offer the first part of tangible evidence that is necessary to understand the level of skills alignment between universities and industry. The second part should become available by cataloguing the IS jobs skills required by industry in the UK. A comparison between the skills that universities cultivate and the skills the industry professionals of tomorrow require, should identify areas in the IS curriculum that could benefit from updating.

References

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