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Whither IS? Issues and Problems in Classifying CC2005 Programs Using CIP Codes

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Abstract: This paper considers a process to categorize computing programs, and its specific application to Information Systems programs. Information Systems is an inherently inter-disciplinary field. The essentially haphazard proliferation of programs has effectively created a broad but ill-defined discipline that often crosses boundaries between mathematics, science, engineering, and business. The authors propose to categorize programs specified in CC 2005 by incorporating the NCES Classification of Instructional Programs (CIP) codes. While there is currently no direct correlation between CC 2005 and CIP codes, an appropriate classification scheme is highly desirable for teachers, administrators, students, and prospective employers trying to make sense of the wide range of program offerings.

Keywords: information systems curriculum, CIP codes, model curricula

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Whither IS? Issues and Problems in Classifying CC2005 Programs Using CIP Codes

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Abstract

This paper considers a process to categorize computing programs, and its specific application to Information Systems programs. Information Systems is an inherently inter-disciplinary field. The essentially haphazard proliferation of programs has effectively created a broad but ill-defined discipline that often crosses boundaries between mathematics, science, engineering, and business. The authors propose to categorize programs specified in CC 2005 by incorporating the NCES Classification of Instructional Programs (CIP) codes. While there is currently no direct correlation between CC 2005 and CIP codes, an appropriate classification scheme is highly desirable for teachers, administrators, students, and prospective employers trying to make sense of the wide range of program offerings.

Keywords: Information Systems Curriculum, CIP Codes, Model Curricula

1. INTRODUCTION

A draft report of *Computing Curricula 2005* (CC 2005) produced an Overview Report, summarizing the content of various discipline-specific computing programs, including Computer Engineering (CE), Computer Science (CS), Information Systems (IS), Information Technology (IT), and Software Engineering (SE). In addition, many colleges and universities offer various computing programs, with program offerings and titles that are often different from the categories above. CIP codes, originally developed by the U.S. Department of Education's National

Center for Education Statistics (NCES), provide an updated taxonomy of instructional program classifications and descriptions that supports the accurate tracking, assessment, and reporting of fields of study and programs. To a certain extent CC 2005 and CIP 2000 compliment and, in some ways, contradict each other. This paper considers the correlation between CC2005 and CIP 2000, and offers a methodology for classifying programs in a manner consistent with both schemes. This process will be applied to Information Systems as defined in CC 2005.

Table 1 - Selected Classification of Instruction Programs (CIP)

CIP Categories and Descriptions	Schools
52.1201 Management Information Systems, General. A program that generally prepares individuals to provide and manage data systems and related facilities for processing and retrieving internal business information; select systems and train personnel; and respond to external data requests. Includes instruction in cost and accounting information systems, management control systems, personnel information systems, data storage and security, business systems networking, report preparation, computer facilities and equipment operation and maintenance, operator supervision and training, and management information systems policy and planning.	505
52.1299 Management Information Systems and Services, Other. Any program in business information and data processing services not listed above.	48
11.0101 Computer and Information Sciences, General. A general program that focuses on computing, computer science, and information science and systems as part of a broad and/or interdisciplinary program. Such programs are undifferentiated as to title and content and are not to be confused with specific programs in computer science, information science, or related support services.	845
11.0199 Computer and Information Sciences, Other. (NEW) Any instructional program in computer science not listed above.	16
11.0401 Information Science/Studies. A program that focuses on the theory, organization, and process of information collection, transmission, and utilization in traditional and electronic forms. Includes instruction in information classification and organization; information storage and processing; transmission, transfer, and signaling; communications and networking; systems planning and design; human interfacing and use analysis; database development; information policy analysis; and related aspects of hardware, software, economics, social factors, and capacity.	333
11.0501 Computer Systems Analysis/Analyst. A program that prepares individuals to apply programming and systems analysis principles to the selection, implementation, and troubleshooting of customized computer and software installations across the life cycle. Includes instruction in computer hardware and software; compilation, composition, execution, and operating systems; low- and high-level languages and language programming; programming and debugging techniques; installation and maintenance testing and documentation; process and data flow analysis; user needs analysis and documentation; cost-benefit analysis; and specification design.	53
11.9999 Computer and Information Sciences and Support Services, Other.	178

Other research (e.g. Hilton, et al., 2003, Hilton et al., 2004, Kohum, 2004, Jones, 2004 MacKinnon and Butler, 2005) is attempting to examine the relationship between computing disciplines and accreditation standards, but a consistent set of guidelines for classifying programs with respect to curriculum standards does not yet exist. At least two groups offer competing classification schemes, CC2005 and NCES, both of which were developed with input from professional groups. The discrepancies between national, regional, and individual program standards are often confusing. These differences represent a potential misrepresentation of data suggesting growth or decline of IS related fields, the relative contributions of professionals graduating from various computing disciplines, and the appropriate recognition of the scope of program offerings within and among institutions.

First and foremost, it is important to note that schools assign the CIP codes for their

programs. Presumably, a larger group of schools (i.e. a state university system) could require a common set of CIP codes for related programs across multiple institutions, but the assignment of CIP codes is a subjective process which may be independent of curriculum guidelines that may exist outside a given program or institution.

One of the most important questions this research considers is the degree to which definitions of IS related majors defined in CC2005 correlates with the current application of CIP codes by individual institutions. In addition, this research attempts to identify where IS programs are actually located administratively as there are conflicting claims as to where they most appropriately belong. With that in mind, an initial examination of CIP codes suggests several places where an institution could appropriately report an IS or IS-related program. An abbreviated list of these codes is shown in Table 1. A compounding issue in classifying a program is where that program is administra-

Table 2 - Selected a priori assignments of CIP Codes to CC2005 Programs

CIP Code	Program Description in CIP Index	CC 2005 Classification
11.0101	Computer and Information Sciences, General	CS
11.0103	Information Technology	IT
11.0199	Computer and Information Sciences, Other	CS
11.0401	Information Science / Studies	IS
11.0501	Computer Systems Analysis / Analyst	SE
11.0701	Computer Science	CS
11.9999	Computer and Information Sciences and IT Support Services, Other	IT
14.0903	Computer Software Engineering	SE
52.1201	Management Information Systems, General	IS
52.1299	Management Information Systems and Services, Other	IS

tively associated with (housed in) an institution. For example, while many Management Information Systems (MIS) programs have historically been positioned in schools of business, it is not clear that this is the case within the broader definition of IS as defined in CC 2005. This confusion has not been reduced given the history of IS programs within academe.

Many IS-related programs have evolved in business programs, particularly in accounting settings reflecting the early use of information systems in automating record-keeping functions. Others have come from library science, reflecting the theme of information storage and management. A third model is based on the evolution of data processing into information management, thus IS programs find themselves appropriately located in computer science departments or other independent. This issue has been frequently debated within the IS academic community [i.e. Nezlek, 1999] and the historical ambiguity in program naming and classification is for many individuals and institutions a source of confusion. The process described in this research will contribute to the computing discipline by helping to clarify the factors that distinguish programs from one another.

2. THE DATA

This research evaluated data concerning over 2,200 programs that may potentially be classified under the general heading of Information Systems. The initial data consisted of the list of all institutions offering programs with specific CIP codes, as reported by CollegeSource. (www.collegesource.org) Descriptive data were then added to identify the type of pro-

gram, and the organizational unit providing the degree. These data were collected from the web sites of the institutions offering degree programs. On the basis of program requirements, (e.g. required courses) programs were classified according to the appropriate parent discipline, such as Information Systems or Computer Science.

The initial question is to consider in which of the general areas of CC 2005 a particular CIP coded program would be likely to appear. Some codes are representative of relatively 'mainstream' offerings while others are more difficult to classify. Of the numerous possible CIP codes describing programs that would potentially fall within the CC 2005 descriptions, a total of ten were identified in the programs for which data were collected in this research. The authors suggest, *a priori*, that these programs might be categorized as indicated in Table 2.

3. OBSERVATIONS

The next consideration is where different programs are found in the institutions identified in the sample data. Recall that CIP code assignments and administrative affiliations are the actions of individual institutions, and do not necessarily take the CC 2005 or any other guidelines into account. As this is an on-going research project, in the following tables, and in the interest of concise presentations, categories for which data are not available at the time of this writing have been omitted. Table 3 shows the distribution of programs as being CS, IS, or other (not identified at the time of this writing).

These data seem to suggest that CS programs are typically classified in a manner consistent with CC 2005, while IS programs may be a bit more problematic. Considering

the data in terms of actual program names rather than CIP codes will perhaps better serve to illustrate this point. The 128 programs in the sample data with a program name of "Information Systems" are spread out over five different CIP codes (although it can be argued that two of those five codes represent potentially insignificant outliers) as illustrated in Table 4 below.

Table 3: Distribution of programs by CIP Code

CIP Code	CS	IS	Other	Total
11.0101	487	220	53	760
11.0199	9	0	0	9
11.0401	30	198	26	254
11.9999	28	49	35	112
52.1201	0	371	35	406
52.1299	0	20	4	24

Table 4 – Distribution of CIP Codes for Information Systems Programs

CIP Code	CS	IS	Other	Total	Total %
11.0101	2	34		36	28.1
11.0401	1	50	2	53	41.4
11.9999	1	2		3	2.4
52.1201		35		35	27.3
52.1299		1		1	0.8

Table 5 presents the corresponding view for programs in the sample with a program name of "Computer Science." While there is still some ambiguity with respect to titles v. CIP codes, these data suggest that CS programs are more consistently mapped.

Table 5 – Distribution of CIP Codes for Computer Science Programs

CIP Code	CS	IS	Other	Total	% of total
11.0101	361	16	2	379	87.1
11.0401	23	7		30	6.9
11.0501	6	1		7	1.6
11.9999	13	5	1	18	4.1
52.1201		1		1	0.3

In terms of administrative associations, it is important to consider the long running issue of whether IS programs are business, computer science, or other disciplines. These summary data are shown in Table 6. The traditional debate about where IS and MIS programs "belong" seems to be addressed well by these data. IS programs, it may be argued, are better set in a non-business environment, whereas MIS programs, as their CIP code definition suggests, are best set in a curriculum located in business education context. The data clearly reflect that MIS

programs are typically found in business colleges/schools/departments, while a considerable majority of IS programs are not.

Table 6: Administrative Associations by CIP Code

CIP Code	EG R	BUS	Math /Sci	Ind. Dept	Ot her	Total
11.0101	94	157	154	154	214	773
11.0401	11	67	28	99	55	260
11.0501	3	7	2	10	10	32
11.9999	9	8	7	41	48	113
52.1201	2	356	6	14	44	422
52.1299		17		3	5	25

But it is also possible to look at the data in terms of program name rather than CIP code, despite the ambiguity of program names as previously discussed. Table 7 presents the administrative associations of the most common IS programs by name.

Table 7: Administrative Associations for Common IS programs by Program Name

Program Name	Enclosing Unit	Total
Computer Information Systems	Business	107
	stand-alone	45
	Other	16
	Math/Sci	12
	Engineering	3
Management Information Systems	Business	169
	Other	3
	stand-alone	3
	Math/Sci	2
	Unknown	1
Information Systems	Business	72
	stand-alone	23
	Other	14
	Math/Sci	6
	Engineering	3
	Unknown	3

The most common program names encountered in the sample data for IS programs are presented below in Table 8. Of the 871 IS programs identified in the sample thus far, 147 different program names are used to describe them!

Another important dimension of administrative association is to consider whether or not programs are found in departments within larger units, schools within colleges, or independent colleges within a university. Particularly of interest are programs located in larger units (schools / colleges) suggesting that related disciplines may be located within the

same school or college. These data are presented in Table 9.

Table 8: Common Names for IS Programs

Top 10 Names of "IS" Programs	Totals
1. Computer Information Systems	185
2. Management Information Systems	178
3. Information Systems	128
4. Information Technology	60
5. Business Information Systems	27
6. Computer Information Sciences	26
7. Information Science	15
8. Information Sciences and Technology	11
9. Information Systems Management	10
10. Information Technology Management	9
Other: (137 program names with less than 9 instances)	222

Table 9: Distribution of Programs by Academic Unit

CIP	Dept	Sch	Coll	Unk	Tot
11.0101	322	72	332	47	773
11.0401	21	4	209	26	260
11.0501	9	3	14	6	32
11.9999	7	2	69	35	113
52.1201	8	5	374	35	422
52.1299		1	20	4	25

These data suggest that IS programs, reflecting the inter-disciplinary nature of the field, are found more appropriately at a college or school level rather than in individual departments.

4. DIRECTIONS FOR FUTURE RESEARCH

This research considers a smaller subset of the overall range of programs identified by CIP codes. Although more than 2,000 programs were identified at the time of this writing, the analysis of the relevant data is still at a nascent stage. Several categories of programs considered in terms of CIP code have not been sufficiently analyzed to include in this work. Much more data may need to be collected and analyzed before a clear picture will emerge. A more in-depth analysis of the potential CIP code set shows several dozen potential programs that should also be considered in the interest of completeness. Data concerning these programs have yet to be collected, but will be integrated into future studies. An analysis of formal program titles, units offering them, and individual required courses of study is also planned.

For the present, this research has taken an important first step in identifying the dimensions of a framework that will eventually lead to a more coherent picture of the relationship among the computing and information related disciplines. It might even be argued that this research has generated more questions than it has answered.

5. CONCLUSION

What's in a name? For IS related programs, confusion, among other things. While the authors do not anticipate that this research will spark a broad movement to appropriately re-name programs in the computing and information related disciplines, it must be recognized that the absence of a consistent set of standards for naming programs and assigning academic programs to appropriate disciplines and academic units has resulted in considerable confusion among faculty, administrators, students and prospective employers.

One approach to reducing this confusion is to consider the mapping of programs to relevant sets of standards. Two of these sets of standards are reflected in the CC 2005 Curriculum Report and in the NCES CIP codes. Although the correlation of these two sets of standards is far from perfect, attempting to consistently associate definitions of programs by institutions with definitions by a recognized standards body provides useful insights into the appropriateness of programs as identified by their offering institutions. The authors anticipate that this research will illuminate the need for further research and correlation between these two standards.

The issue of "where do IS programs belong" has long been considered within academic and professional circles. This paper presents preliminary results from the first stages of a larger investigation of curricula as they relate to standards. Data collected to date do suggest that while MIS programs are typically well positioned in business curricula, IS programs (with more technical content typically offered at the expense of general business background) are less consistently placed in more CS oriented environments, while the majority of IS programs are appropriately found in non-business contexts.

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7. REFERENCES

- Hilton, Thomas S. E. (2003), MIS Program Accreditation: Comparing AACSB and ABET, ISECON 2003, 20
- Hilton, Thomas S. E., Dale A. Johnson, George M. Kasper (2004), ABET Accreditation of MIS Programs in AACSB Schools, ISECON 2004, 21, 1-16.
- Kohum, Frederick G., David F. Wood (2004). The ABET CAC Accreditation: Is Accreditation Right for Information Systems? IACIS 2004, V, 2, 579-583.
- Jones, Christopher G. (2004) An Analysis of Programmatic Differences Between Dual ABET/AACSB and ABET-Only Accredited Information Systems Programs, IACIS 2004, 2, 544-530.
- MacKinnon, G, and E. Butler (2005) "How do IS Programs Compare with ABET Accredited Programs?" *IACIS 2005 Proceedings*, (forthcoming), Atlanta, GA, October 6-9, 2005.
- NCES National Center for Educational Statistics, *Classification of Instructional Programs Code Index*; <http://nces.ed.gov/pubs2002/cip2000/index.asp>
- Nezlek, G. et al (1999) "Information Systems: A Business or Computer Science Discipline?" *Fifth Americas Conference on Information Systems*, Milwaukee, WI, August, 1999.
- Shackelford, R. et al (2005) *Computing Curricula 2005; The Overview Report by the Joint Task Force for Computing Curricula 2005*, Association for Computing, Association for Information Systems, Computing Society, 2005