Can information ethics be conceptualized by using the core/periphery model?

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A B S T R A C T

The term 'information ethics' (IE) is rapidly diversifying as new technologies enter the milieu and add to already existing 'entanglements'. Unsurprisingly, the term lacks a universally accepted definition, although there is some common ground as to its constitution. This paper explores the term using the most commonly co-occurring terms in IE literature as indexed in nine databases, namely the EBSCO-hosted Academic Search Premier (ASP); Communication and Mass Media Complete; ERIC; Library, Information Science and Technology Abstracts (LISTA); Newspaper Complete; Business Premier; and Master File Premier, and Wilson's Library Literature and Information Science (LLIS) Full Text. Core/periphery analysis, the co-occurrence of words as subject terms, and social network techniques were applied using UCINET for Windows, text STAT and Bibexcel computer-aided software to analyze data. The paper identifies the most common terms used to describe IE and the core terms with which IE can be defined. Other than informing LIS research and education, the results could potentially assist with the development of IE taxonomy and definitions (e.g. in understanding IE content and development) that may apply to the intercultural and global understanding of IE.

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1. Introduction

The concept of information ethics (IE) may not be new in information science circles, but a renewed interest in the topic in the 90s (and its 're-birth' in the term 'information ethics') is generally believed to have been inspired by the contributions of authors such as Rafael Capurro, Luciano Floridi and Robert Hauptman (see others noted by Thomas Froehlich in a "*Brief history of information ethics*", 2005), and the sterling work done towards the development of IE education by the University of Pittsburg through the initiative of Toni Carbo and Smith (2008). In South Africa, core work on the development of IE since the early nineties at the University of Pretoria eventually led to the first ever Africa Information Ethics conference in 2007. The proceedings of this conference have been published in the International Review of Information Ethics (IRIE) in 2007 (see http://www.i-r-i-e.net/).

The epistemology of information ethics largely resides in applied professional ethics, which is the fundamental theoretical framework behind the concept. Ethical theories that define what right actions and wrong actions people may take under different circumstances (also reflected in teleology and deontology) are generally accommodated under three main theories,

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i.e. consequence-based theories, duty-based theories, and virtue-based theories. Generally, all three ethical theories bear weight in information practice. For instance, Fallis (2007) reminds us that consequence-based theories are founded on utilitarianism and built on the premise that "*what distinguishes right actions from wrong actions is that they [actions] have better consequences*", and he associates this theory closely to the ethical dilemmas facing information providers in modern society. In duty-based theories, "*the right thing to do is determined by the rights that human beings have*", such as the rights agreed on in 1948s[1] Universal Declaration of Human Rights (UDHR) (United Nations, 1948). UDHR provides common standards for understanding the rights of all nations and information workers from all corners of the world. Article 19 in the declaration stipulates that: *"Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers"* (United Nations, 1948). Over time, recognizing such fundamental rights has meant defining information ethics and creating an inclusive paradigm with an emphasis on benefits and shared values and understanding. Virtue based ethical theories are also known as character ethics. As a theory it focuses on the character of individuals and their development of good traits. The question is therefore not what I should do (as is the case with duty based ethics) nor what the consequences will be (consequence base theories) but rather on "What kind of a person should I be?" (Tavani, 2007: 61). As such it is agent orientated because the focus is on the moral development and of the acting agent.

The problem with these theories is that they are difficult to apply in the real world, particularly because of the internal and relative contradictions that arise when attempting comparisons. This has led to ethical relativism. For example, an excellent consequence that brings happiness to an individual, a family, a community or an institution may not necessarily be either right or virtuous. Likewise, the way different people understand duty varies, and the most likely question is therefore duty to whom—family, beliefs/religion, employer, government or nation? Some of the most virile conflicts in family units, workplaces, governments and international relationships have largely arisen from conflicts in the interpretation and application of ethical values.

Furthermore, the interpretation and implementation of rights across communities around the world is not uniform. For example, marginalized groups (referring here to children, women, the illiterate, rural dwellers or others who are disadvantaged because of race, creed, religion, poverty, age, gender, unemployment, physical disability, etc.) may not necessarily benefit from the human rights that others (the more privileged) enjoy. In most cases, equality and human rights as experienced and perceived by these groups are utopian in nature—what is naturally right to them is often decided not by themselves, but by some 'superior' body (those at the top in a given social hierarchy through politics, culture, traditions and/or the religion of a community).

An alternative or supplementary approach to the question of ethical theories can be found in the relationships and tensions between mores, ethics and laws (Froehlich, 1997: 1–2). While distinguishing between the three concepts, Froehlich (1997: 3) notes that morals, ethics and laws may contravene one another. Ultimately, the nature, level and challenges of such contraventions must be understood by the information ethics scholar and professional.

From these definitions, ethics seem to primarily focus on the norms and standards of behavior of individuals or groups in a society based on normative conduct and moral judgment. Information ethics is generally believed to provide: "A critical framework for considering moral issues concerning information privacy, moral agency (e.g. whether artificial agents may be moral), new environmental issues (especially how agents should behave in the infosphere), problems arising from the life-cycle (creation, collection, recording, distribution, processing, etc.) of information (especially ownership and copyright, digital divide)" (Information Ethics, nd: np).

The purpose of this paper is to explore the term 'information ethics' using the most common co-occurring terms in IE literature as indexed in nine databases (highlighted under methodology) in order to identify the terms most used to describe IE and the core terms with which IE can be defined. The paper attempts to answer the following research questions: What are the most common subject terms related to IE in the databases? What core, commonly occurring single terms occur the most in IE literature? What are the most frequently used terms in IE's full-text articles? What is the distribution of the terms according to the number of records in which they occur? Can IE be conceptualised by using the core/periphery model?

2. Methodology

As noted in the introduction, the term 'information ethics' is relatively new, and this was strongly reflected in the absence of the term from EBSCO-hosted and other databases' subject thesauri. Apart from the ISI's citation indexes, none of the databases contained the term 'information ethics' in their subject fields. Several databases were therefore selected to significantly improve representation (the subject is multidisciplinary) and to extract as many records as possible in order to enhance the study's reliability and validity. We opted for nine databases, namely the EBSCO-hosted Academic Search Premier (ASP); Business Source Complete; Communication & Mass Media Complete; ERIC; Library, Information Science and Technology Abstracts (LISTA); MasterFILE Premier; MEDLINE; and Newspaper Source; and Wilson's Library Literature and Information Science (LLIS) Full Text database, to extract information ethics' specific records using a uniform search query ('information ethics') within the title, subject and abstract fields. Given that the concept 'information ethics' is relatively new, the search was limited to 'articles' published between 1991 and 2008. Besides aspiring for wide representation, the

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[1] See http://www.un.org/overview/rights.html.

inclusion of databases that are subject-specific (e.g. LISTA, LLIS and MEDLINE) was in the belief that IE is multidisciplinary and therefore its research is published and indexed in a variety of journals and databases, respectively. The subject domain is one of the emerging topics taught within the LIS curriculum in most LIS schools (see Ocholla, 2009). And, although IE is multidisciplinary in nature, we relied on our knowledge of the most probable databases that would yield a representative number of as well as relevant articles in selecting the databases. Finally, we relied largely on the EBSCO databases because of the indexing service's well developed thesaurus that provides for broader, narrower, related and 'used for' subject terms, which make a subject content analysis possible. Because the databases in the two indexing services (i.e. EBSCO and Wilson) do not share a search platform, the searches and subsequent analyses of the retrieved data were achieved separately. Emphasis was, however, placed on the analysis of data extracted from EBSCO-hosted databases because they provide several subject terms per record, unlike the LLIS database which tends to provide only one subject term per record.

The databases hosted by EBSCO yielded a total of 583 records, while Wilson's LLIS generated a total of 493 unique items. Some of the bibliographic data provided in each record included the article's title, author, publication source, abstract, date of publication, document type, subject terms, author-supplied keywords, and author affiliations. Only the subject terms were downloaded for analysis. The extracted data (i.e. subject terms) for each record was saved in text format to meet the requirements of the computer software that was used for data analysis. Data was analyzed using Bibexcel, TI, Simple Concordance Program (version 4.0) and UCINET 6 for Windows (version 6.170). Further analysis was carried out in order to identify the core terms with which IE literature is described using the core/periphery model as outlined in Onyancha and Ocholla's (2009) study: "*Conceptualizing 'knowledge management' in the context of Library and Information Science using the core/periphery model*". According to Borgatti and Everett (1999) and Borgatti et al. (2002), the core/periphery function simultaneously fits a core/periphery model to the data network, and identifies which actors (in this case, the terms) belong in the core and which belong in the periphery. The function uses a number of measures which start with the actor with the highest coreness score and place them in the core and all other actors are placed in the periphery. The core therefore constitutes of actors with highest scores, implying close proximity to or strength of association with each other. The actors in the periphery constitute of actors that have low scores or little association with the core actors. It follows therefore that terms that constitute the core or nucleus comprise the most relevant terms with which IE can be described or defined. A given concept's (in this case, IE) definition or description will be inadequate without the inclusion of the core concepts.

As a way of triangulation, 23 full-text articles[2] were identified and downloaded from the EBSCO-hosted databases (based entirely on their level of relevance). Their contents were then analyzed in order to find the most frequently and commonly used IE-related terms in the texts. It was assumed that the most frequent terms, both within a given text and across a number of documents, would form the core of the terms that are used to describe IE. In order to obtain accurate results, the data was cleaned of irrelevant data, such as acknowledgements and lists of references and authors' names, addresses and journal titles that are occasionally provided as headers or footers in some articles. Included in each analysis were the article's title, author-supplied keywords, abstracts, and contents in the body of the text.

The contextual use of words was used to describe or modify nouns or pronouns that appeared most frequently. In-text terms were also considered to help us determine the compound phrases that can be used to describe IE literature as well as to identify terms with which the IE course or curriculum can be developed. For instance, terms such as intellectual, legal, economic, moral, etc. are meaningless when looked at individually. It was believed that contextually analyzing them would render them more meaningful.

3. Results

The findings from the two indexing services are presented separately because the indexing subject terms used by EBSCO-hosted and Wilson's databases are mostly dissimilar. This section provides the frequency counts of both the compound and single subject terms used to describe IE literature. The levels of association of the most common subject terms in relation to each other are also illustrated.

3.1. Most common compound subject terms in EBSCO-hosted databases

Table 1 provides the compound subject terms that yielded 5 or more documents each. As expected, the first position (i.e. documents that recorded 30 or more hits) was held by the term *ethics*, which was used to index 167 documents, followed by *access to information/ethics* (81), *information technology* (57), *Internet* (32), *access to information/legislation & jurisprudence* (31) and *intellectual property* (31). These and other subject terms in Table 1 constitute the core subject terms that have been used to describe IE literature and to broadly define IE. Some of these terms originate from different disciplines, e.g. *Information Technology* (which generated 57 documents), *Information Science*, *Library Science*, *Technology*, *Political Science*, *Medicine* and *Health, Communication Science, Education, Publishing, Business, Philosophy, Sociology,* and *Computer Science*.

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[2] The articles were identified from among EBSCO's 583 and LLIS' 493 publications on IE with the assumption that the most relevant articles would contain the relevant terms with which IE can be described.

Table 1
Top 90 subject terms describing IE literature (EBSCO-hosted databases).

Subject terms	No.	Subject terms	No.
Ethics	167	Business ethics	8
Access to information/ethics	81	Computers	8
Information technology	57	Disclosure/legislation & jurisprudence	8
Internet	32	Genetic research/ethics	8
Access to information/legislation & jurisprudence	31	Guidelines as topic	8
Intellectual property	31	Associations, institutions, etc.	7
Information science	27	Personal autonomy	7
Web sites	27	Computer security/ethics	7
Library science	25	Decision making	7
Moral & ethical aspects	25	Ethics, research	7
Research	24	Informed consent/legislation & jurisprudence	7
Authorship	23	Intellectual freedom	7
Privacy	21	Peer review	7
Professional ethics	18	Political science	7
Librarians	18	Universities & colleges	7
Confidentiality/legislation & jurisprudence	16	Patient rights/ethics	7
Computer network resources	16	Research subjects	6
Confidentiality/ethics	16	Medical records systems, computerized/ethics	6
Publishers & publishing	15	Scientific misconduct	6
Disclosure/ethics	15	Mass media	6
Censorship	15	Information theory	6
Information services	15	Computer security	6
Information technology—moral & ethical aspects	13	Information dissemination	6
Social responsibility	13	Intangible property	6
Informed consent/ethics	12	Confidentiality	6
Information society	12	Standards	6
Copyright	12	Copyright infringement	6
Plagiarism	12	Patient rights/legislation & jurisprudence	6
Codes of ethics	11	Medical records systems, computerized/legislation & jurisprudence	6
Libraries	11	Values	6
Information resources management	11	Social aspects	6
Education	10	Editing	5
Information resources	10	Computer security/legislation & jurisprudence	5
Scholarly publishing	10	Social sciences	5
Authors	10	Disclosure	5
Technology	9	Computer crimes	5
Human rights	9	Business enterprises	5
Information policy	9	Medical records/legislation & jurisprudence	5
Higher education	9	Literature	5
Philosophy	9	Communication	5
Genetic privacy/ethics	9	Consumer health information/ethics	5
Privacy/legislation & jurisprudence	9	Students	5
Information & communication technologies	8	Information sources	5
Biomedical research/ethics	8	Scholars	5
Information behavior	8	Applied ethics	5

3.2. Most commonly occurring single terms in the IE literature's subject field

The compound subject terms in Table 1 were put through further analysis using a computer-based concordance program that generated single subject terms, illustrated in Table 2. Altogether, there were 938 unique single terms that occurred within the compound subject terms that described IE literature. As in Table 1, the most common term was *ethics* with 613 hits (in the compound subject terms), followed by *information* (380), *legislation* (200), *jurisprudence* (194), *research* (178), *access* (128), *technology* (101), *standards* (79), *health* (74), *computer* (71), *education* (68) and *library* (60). Others that produced a high number of hits include *Internet* (56), *economics* (55), *libraries* (53), and *privacy* (53). Table 2 shows that single terms yielded a higher number of hits than compound subject terms. For instance, while the term *ethics* as a compound subject term produced a total number of 167 records, it yielded 613 hits as a single term. The term *information* did not feature as a compound subject term but yielded a total of 380 hits as a single term that describes IE literature. Some of the terms, for example *Internet, research, librarianship, privacy, copyright* and *authorship* featured both as single and compound subject terms but recorded different frequency counts.

3.3. Core IE single subject terms

The core/periphery model illustrated in Fig. 1 reveals two clusters that were generated using the most common 75 single terms that appeared in the compound subject terms of IE literature. The complete illustration could not fit on a single page, therefore only the core single terms and their strengths of association are provided. Excluding the terms *ethics, informa-*

Table 2
Top 100 single subject terms in EBSCO-hosted databases.

Single subject term	No.	Single subject term	No.	Single subject term	No.	Single subject term	No.
Ethics	613	Intellectual	39	Informatics	18	Truth	10
Information	380	Professional	39	Electronic	17	Advocacy	9
Legislation	200	Records	38	Network	16	Colleges	9
Jurisprudence	194	Rights	37	Organization	16	Conflict	9
Research	178	Web	36	Publishers	16	Development	9
Access	128	Consent	35	Society	16	Dissemination	9
Technology	101	Periodicals	35	Theory	16	Employees	9
Standards	79	Communication	32	Censorship	15	Evaluation	9
Health	74	Security	32	Freedom	15	Materials	9
Computer	71	Informed	29	Media	15	Medicine	9
Education	68	Management	29	Responsibility	15	Retrieval	9
Library	63	Librarians	28	Screening	15	Reviewing	9
Internet	56	Business	27	Patents	14	Sources	9
Economics	55	Copyright	27	Universities	14	Corporations	8
Libraries	53	Behavior	24	Authors	13	Genomics	8
Privacy	53	Authorship	23	Plagiarism	13	Publications	8
Confidentiality	48	Computerized	23	Scholarly	13	Technologies	8
Services	48	Databases	21	Codes	12	Academic	7
Psychology	46	Peer	21	Computers	12	Citation	7
Publishing	46	Personnel	21	Ownership	11	Infringement	7
Systems	44	Philosophy	19	Scientific	11	Journalism	7
Disclosure	43	Policy	19	Attitude	10	Misconduct	7
Property	43	Relations	19	Consumer	10	Networks	7
Resources	42	Control	18	Trials	10	Values	7

tion, legislation, and *jurisprudence* – terms that could have created unnecessary 'noise' in the model – 18 core terms were identified. These were: *access, advocacy, computer (and computerized), confidentiality, personnel, security, disclosure, codes, privacy, standards, records, systems, psychology, responsibility, research* and *organization.* The term *computerized* originates from the compound subject term(s) *medical records systems, computerized/ethics (legislation & jurisprudence),* which denotes the term(s) used to describe literature discussing ethical and legal considerations in creating, storing, and accessing medical records. The terms *records* and *computerized* produced the highest strength of association (i.e. 0.868) followed by *computerized* and *systems* (0.756), *records* and *systems* (0.656), *computerized* and *security* (0.623), *psychology* and *attitude* (0.592), *computer* and *security* (0.588), *access* and *confidentiality* (0.579), *systems* and *security* (0.545), and *records and security* (0.541).

Fig. 1. Core/periphery model of terms describing IE literature.

The second group consisted of terms that can be said to belong to the periphery of the clusters of IE terms. Their dissociatedness with some of the most commonly used terms does not, however, mean that they are not at all related to IE. These terms may be related to IE but less used as subject terms in indexing IE literature, hence their appearance in the peripheral cluster.

3.4. Most frequently used terms in IE full-text articles

Appendix A provides the top 102 terms that recorded over 15 hits each. A comparison featuring the contents of Table 2 above and Appendix A reveals a lot of similarities in the occurrence of terms in full-text articles and as subject indexing terms of IE literature. Leading the pack is i*nformation*, which recorded a total of 1862 hits in 23 full-text articles, followed by *ethics* (803), *ethical*[3] (770), *moral* (570), *society* (333), *behavior* (265), *privacy* (257), *students* (242), *justice* (210), *global* (178), *computer* (172), *access* (166), *values* (154), and *data* (149), to name a few. Besides examining the use of in-text concepts/terms as the subject indexing terms of IE literature, this triangulation exercise identified the core terms that describe full-text IE articles. In total, 8780 unique words occurred in the 23 IE full-text articles. Only 102 of these recorded over 15 hits each (1.16%). This implies that only about 1.16% of the words appear in IE literature.

3.5. Distribution of terms according to the number of full-text records in which they occur

Two or more documents are said to be closely related if they are co-cited in later literature (Ikpaahindi, 1985; Wallace, 1989), a phenomenon that is investigated through co-citation analysis. Onyancha and Ocholla (2008: 49) observe that the "more [frequently] the documents are cited together, the greater their co-citation strength". This principle applies to co-word analysis (Diodato, 1994: 54). Co-word analysis is defined as: "The process of analyzing the co-occurrence of two or more words in one document or in different documents." Thus, two or more documents are closely related if two or more terms co-occur more frequently in the documents. The articles were therefore analyzed to first consider the most frequently used terms to describe IE literature, and secondly, reveal the terms that can be used to access the most relevant and core IE research articles.

When analyzed according to the number of full-text articles in which they occurred, only 3 of the 102 terms co-occurred in all 23 articles, namely *information*, *ethics* and *ethical*. These words' dominance in IE literature was expected as the articles extracted from the databases were about information ethics. The terms *moral* and *society* appeared in 22 articles, while *values, research, technology* and *responsibility* were mentioned in 21 articles. 80 (78.4%) of the 102 terms occurred in 50% of the articles. Although terms such as *marginalized, entropy, infosphere, cognition, ideology, poor, attitude, traditions, virtue, ICTs, censorship,* and *libraries* recorded a high frequency of occurrence (as shown in Appendix A), they nevertheless only came up in 7 (6.86%) or less full-text articles. This implies that these terms, together with *normative, institutions, library, accuracy, services, behaviors, truth, discourse, protection* and *conflict*, were extensively used in only a small percentage of the articles, while a few terms featured in the majority.

3.6. Contextual use of non-proper nouns/pronouns

This subsection concentrates on the contextual use of some of the *most common terms that described the nouns or pronouns and verbs* in order to identify the phrases (from within the full-text articles) that can be used to describe IE. These terms include *ethical, moral, legal, intellectual, global, economic, political, public, cultural, morally, digital, electronic, academic, normative,* and *marginalized.* The term *ethical*, which occurred in all the full-text articles and was one of the terms with the highest frequency counts, *was associated* with terms such as *arguments, attitude(s), behavior, challenges, codes, conflict, correctness (corrections), decision(s), dilemmas, dimension(s), issues, judgment, norms, principles, problems, reasons and reasoning, reflection, standards,* and *theory or theories*. Words that accompanied the term **moral** include *action(s), agency or agents, agenda, behavior, belief, business, conflict, decision(s), deliberation, discourse, identity, nature, norm, principles, practice, responsibility, standing, standards, status, subject(s), turing test,* and *virtue.* The contextual use of the other terms was as follows: **legal**—*concerns, environment, framework, issues,* and *recognition;* **intellectual**—*property, freedom, capability, work(s),* and *entities;* **global**—*challenges, community, connectivity, digital divide, information society, justice,* and *social justice;* **economic**—*activities, social justice, development, expectations, growth, justice,* and *system(s);* **political**—*activities, advocacy, processes, power,* and *morality;* **public**—*international affairs, social matters, good(s), interest, library, policy,* and *sector;* **cultural**—*background(s), diversity, distance, differences, hospitality, information, influences, memory,* and *values;* **morally**—*acceptable, justified, protected, relevant, responsible,* and *wrong;* **digital**—*content, divide, information, rights, technologies,* and *world;* **electronic**—*information, communication,* and *age;* **academic**—*community, culture, discourse, discipline, library, publishers,* and *research;* **normative**—*evaluation, ethical theory or theories, guidelines, practices, principles, structure,* and *rightness;* and **marginalized**—*communities, people, societies,* and *information-poor.*

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[3] See the contextual use of the adjectives in the section on '*Contextual use of terms in the full-text articles*'.

Table 3
IE indexing subject terms in LLIS.

Subjects	Records	Subjects	Records
Ethics	101	Reference services	3
Information retrieval/social aspects	25	Information brokers/legal aspects	3
Scholarly publishing	18	Scientific research/evaluation	3
Right of privacy	13	Research	2
Ethics/internet resources	9	Forgeries, frauds, etc.	2
Intellectual freedom	8	Scholarly publishing/evaluation	2
Internet/legal aspects	8	Digital millennium copyright act	2
Librarianship as a profession	7	Information policy/developing countries	2
Information policy	6	Obscenity and pornography	2
Ethics/teaching	6	Human rights/internet resources	2
Authorship	6	Pressure groups and the library	1
Computer security	6	Library legislation	1
Censorship	5	Libraries/legal aspects	1
Copyright	5	Library bill of rights	1
Censorship/internet	5	Surveys/ethics	1
Freedom of information	5	Surveys/intellectual freedom	1
Internet	5	Copyright/internet resources	1
Internet/security measures	4	Copyright/music	1
Internet searching	4	Copyright/finance	1
Citation analysis	3	Copyright/great britain	1
Internet/public libraries	3	Electronic mail/legal aspects	1
Plagiarism	3	Ethics/case studies	1
Ethics/bibliography	3	Ethics/evaluation	1
Scientific research	3	Computer hackers	1
Copyright/computer-stored information	3	Informers	1
Corporations/internet resources	3	Librarianship/legal aspects	1

3.7. Subject terms used to index IE literature in the LLIS database

Table 3 shows the indexing terms used to index IE literature in the LLIS database. The most common terms, which may constitute the core terms with which IE can be described, include *ethics* (101), *scholarly publishing* (25), *right of privacy* (13), *intellectual freedom* (8), *internet/legal aspects* (8), *librarianship as a profession* (7), *information policy* (6), *ethics/teaching* (6), *authorship* (6), and *computer security* (6). Some subject terms were used to index IE literature in LLIS but not in the EBSCO-hosted databases. These include *computer hackers, informers; electronic mail/legal aspects; obscenity and pornography; Digital Millennium Copyright Act; forgeries, fraud, etc.; information brokers; corporations/internet resources;* and *citation analysis.* Most of the terms presented in Table 3 are, however, in keeping with the terms described in Tables 1, 2 and 4.

4. Discussion, conclusion and recommendations

The core and periphery model seems to be widely used in many disciplines for reasons that can, by their nature, be developmental, interventionist and/or highly prioritized. We have considered these three strands by exploring some elements of co-word/co-occurrence analysis (see Onyancha and Ocholla, 2005) to assess the strengths of association between information ethics and other related terms in order to determine what constitutes the core and the periphery of IE terms. A total of 1099 records, including 23 full-text articles, were analyzed from nine databases. Although the indexing subject terms used by EBSCO and LLIS were not similar, the frequency counts of both compound and single subject terms showed distinct core subject terms with which IE can be associated (see Tables 1 and 2). For instance, the top compound subjects (i.e. terms that generated 30 or more hits) were **ethics**, *access* **to information**, **information** *technology, Internet,* **access to legislation and jurisprudence** and *intellectual property*. Single subject terms (with 56–613 hits) were **ethics, information, legislation, jurisprudence**, *research,* **access, technology,** *standards, health, computer, education and library (ies),* **Internet**, *economics* and *privacy*. The term *intellectual property* was split into two in the single subject term category. Although legal aspects/issues are not articulated in some of the definitions of information ethics (see Information Ethics, nd: np), there is a strong association between IE and legal issues. There were, of course, other IE applications and associations suggesting a strong link between IE and other fields (e.g. with computers, the Internet, education, economics, health, etc.). As illustrated in Fig. 1, the terms *records* and *computerized* produced the highest strength of association. We also noted that the most frequently used terms in the IE full-text articles (Table 4) often resembled the results of previous analyses (Tables 1 and 2).

The most common core single terms in IE literature (803–146 hits) were *ethics,* **ethical**, *moral,* **society,** *behavior, privacy,* **students,** *justice,* **global,** *computer, access, values,* and *data*. Note that all single terms without meaning unless used as compound terms are highlighted in **bold**. Through triangulation, we noticed that the most frequently used terms in IE full-text

Table 4
Distribution of most common terms by the number of IE full-text articles (*N* = 23).

Term	Records	%	Term	Records	%	Term	Records	%
Information	23	100.0	Computers	15	65.2	Electronic	12	52.2
Ethics	23	100.0	Principles	15	65.2	Academic	12	52.2
Ethical	23	100.0	Management	15	65.2	Law	12	52.2
Moral	22	95.7	Communication	15	65.2	Justice	11	47.8
Society	22	95.7	Economic	15	65.2	Cultures	11	47.8
Values	21	91.3	Sense	15	65.2	Codes	11	47.8
Research	21	91.3	Community	15	65.2	Theories	11	47.8
Technology	21	91.3	Processes	15	65.2	Policies	11	47.8
Responsibility	21	91.3	Standards	15	65.2	Authors	11	47.8
Privacy	20	87.0	Security	14	60.9	Societies	10	43.5
Business	20	87.0	Decision	14	60.9	Principle	10	43.5
Rights	19	82.6	Knowledge	14	60.9	Beliefs	10	43.5
System	19	82.6	Public	14	60.9	Normative	9	39.1
Computer	18	78.3	Political	14	60.9	Institutions	9	39.1
Access	18	78.3	Software	14	60.9	Library	8	34.8
Systems	18	78.3	Education	14	60.9	Accuracy	8	34.8
Property	18	78.3	Morality	14	60.9	Services	8	34.8
Internet	18	78.3	Respect	14	60.9	Behaviors	8	34.8
Right	18	78.3	Professionals	14	60.9	Truth	8	34.8
Analysis	18	78.3	Interests	14	60.9	Discourse	8	34.8
Practices	18	78.3	Students	13	56.5	Protection	8	34.8
Legal	17	73.9	Cultural	13	56.5	Conflict	8	34.8
Intellectual	17	73.9	Managers	13	56.5	Libraries	7	30.4
Freedom	17	73.9	Organizations	13	56.5	Censorship	7	30.4
Relationships	17	73.9	Philosophy	13	56.5	Icts	6	26.1
Policy	17	73.9	Government	13	56.5	Virtue	6	26.1
Behavior	16	69.6	Morally	13	56.5	Traditions	6	26.1
Culture	16	69.6	Media	13	56.5	Attitude	5	21.7
University	16	69.6	Norms	13	56.5	Poor	4	17.4
Technologies	16	69.6	Professional	12	52.2	Ideology	4	17.4
Resources	16	69.6	Digital	12	52.2	Cognition	3	13.0
Organization	16	69.6	Control	12	52.2	Infosphere	3	13.0
Global	15	65.2	Theory	12	52.2	Entropy	3	13.0
Data	15	65.2	Attitudes	12	52.2	Marginalized	2	8.7

articles often resembled those indexed from non-full text records. Table 4 therefore suggests that it is possible to identify core and periphery terms with the use of only full-text articles. In this particular full-text analysis, we observed no legal terms. In terms of the distribution of the terms according to the number of records or full texts in which they occurred (see Table 4), it emerged that only 3 of the 102 terms (*information, ethics* and *ethical*) co-occurred in the 23 articles. Other close terms were *moral, society, values,* **research, technology** and *responsibility*.

The main research question was: Can IE be conceptualised by using the core/periphery model? The answer is yes. It is possible to identify the core and periphery terms and show the strengths of association between the various terms. It is also possible to identify the ties that bind information ethics and legal aspects of information. However this link was not clear in the content and concepts of the 23 full-text titles. For instance, whereas the occurrence of terms such as *copyright, publishers & publishing, censorship, plagiarism, scholarly publishing, computer security/ethics, information dissemination, copyright infringement,* and *information sources* in IE literature can be clearly explained, terms that relate to legal and medical aspects of information handling in the terms that describe IE are more obscure. The library seems to be at the center of teaching/imparting IE to its users because of the high frequency counts of *librarianship* and *libraries. Scholarly publishing, research, authorship, authors, citation analysis, plagiarism, copyright, publishing* and *publishers* are some of the words that seem to emphasize ethical considerations in scholarship. We also assume that the terms *universities* and *colleges* that were associated with IE refer to elements of information ethics education (see Ocholla, 2009).

We conclude that the *Internet, information and communication technologies (ICTs), email,* and *websites* pose new challenges to IE norms and standards. It is perhaps necessary to re-visit the relationship between information ethics and legal aspects/issues of information in order to link the two more closely. Re-visiting this relationship would strongly serve future decisions on IE and legal issues/aspects of education and research.

Acknowledgements

Appendix A. Most frequently used terms in the IE full-text research articles

	Article number																							Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Information	228	151	36	33	162	65	218	23	41	117	76	94	92	31	15	30	109	80	105	70	26	26	34	1862
Ethics	24	50	22	16	102	59	1	14	37	57	64	67	29	38	16	6	61	14	66	16	23	17	4	803
Ethical	13	40	20	97	63	4	32	18	20	23	46	21	18	45	24	1	58	34	36	43	12	94	8	770
Moral	8	122	7	0	94	3	42	0	15	5	18	15	17	2	39	3	15	11	138	11	2	1	2	570
Society	6	5	8	2	7	1	170	17	10	36	6	15	3	2	6	0	6	12	0	8	8	1	4	333
Behavior	0	0	4	33	2	122	5	1	1	0	0	1	11	8	2	0	11	3	27	15	0	19	0	265
Privacy	1	1	5	9	3	32	4	1	0	36	7	1	2	1	5	104	0	1	6	2	25	3	9	257
Students	0	1	0	11	0	72	1	0	0	1	83	5	1	0	0	1	35	1	0	27	0	3	0	242
Justice	11	0	1	0	2	0	167	9	0	4	2	10	0	0	1	0	0	2	1	0	0	0	0	210
Global	15	0	2	0	0	3	115	1	6	8	1	13	8	0	1	0	1	1	2	1	0	0	0	178
Computer	2	25	2	0	6	44	0	6	2	2	1	3	5	5	11	0	0	0	25	17	12	3	1	172
Access	5	2	10	0	13	15	39	0	0	11	0	1	2	6	2	0	9	13	1	32	1	1	3	166
Values	3	1	11	10	4	1	11	7	13	10	6	1	10	5	2	0	5	4	0	9	3	37	1	154
Data	0	36	5	0	11	3	0	0	4	0	0	1	10	45	7	0	3	1	1	6	0	9	7	149
Security	1	0	0	2	1	0	0	2	0	2	2	3	3	1	116	0	0	0	1	2	0	8	2	146
Computers	2	98	0	0	6	11	0	4	1	0	0	1	1	1	1	0	0	1	12	1	5	1	0	146
Research	5	6	5	0	1	6	6	4	2	12	4	11	2	3	18	0	11	8	1	18	4	8	2	137
Technology	9	7	5	1	6	5	1	7	0	18	5	11	5	7	10	0	1	1	7	13	7	3	3	132
Cognition	1	0	0	0	0	119	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124
Legal	3	0	3	65	1	2	4	0	2	0	2	3	2	7	5	0	7	7	2	6	0	0	2	123
Business	0	1	6	4	1	3	2	3	0	1	5	3	23	5	4	0	26	2	0	17	6	5	2	119
Systems	5	4	1	7	20	0	1	2	0	0	8	4	22	5	8	0	2	10	0	8	2	3	3	115
Professional	0	0	2	3	3	0	0	0	0	0	3	5	1	2	0	2	43	40	1	0	2	0	0	107
Property	4	1	5	0	1	31	7	1	0	1	1	7	1	1	2	0	2	5	12	21	4	0	0	107
Principles	0	1	4	0	13	0	26	6	4	7	10	7	1	1	0	0	10	0	13	2	1	0	0	106
Library	0	0	0	0	1	0	1	0	0	2	26	10	0	0	0	1	42	16	0	0	0	0	0	99
Decision	1	4	12	15	3	0	3	0	0	0	19	0	2	4	0	0	4	2	0	26	0	3	1	99
Digital	57	0	1	0	15	1	1	0	7	6	2	3	0	0	3	1	0	0	1	0	0	0	0	98
Internet	7	1	1	0	4	24	12	2	1	15	1	2	0	4	2	9	1	2	1	0	1	0	0	90
Management	0	0	18	1	1	0	0	0	1	0	14	2	5	16	2	0	11	1	0	4	0	5	6	87
Cultural	11	0	11	1	3	0	2	0	10	14	15	2	6	1	0	0	0	2	0	8	0	0	0	86
Right	5	2	3	1	4	2	10	0	2	3	1	3	0	0	12	1	4	13	12	4	0	0	2	84
Communication	7	3	0	0	18	3	4	7	3	18	2	5	0	6	2	0	0	3	1	0	0	2	0	84
Accuracy	1	1	5	0	0	47	0	0	0	0	2	0	0	2	0	5	0	0	0	21	0	0	0	84
Culture	1	0	9	2	1	2	0	0	8	4	1	0	10	2	0	0	2	1	1	37	0	1	2	84
Knowledge	5	2	0	0	6	0	14	5	2	18	9	7	0	0	1	1	5	5	3	0	0	0	0	83
Analysis	1	8	0	4	4	0	2	1	5	7	3	2	1	0	13	0	0	1	11	9	1	9	0	82
Economic	11	1	1	0	1	2	30	0	1	7	0	0	12	0	3	0	1	3	1	5	2	0	0	81
University	3	1	1	3	2	0	0	0	2	9	19	14	2	0	0	0	5	3	0	7	6	3	1	81
Sense	8	12	0	0	4	0	3	4	7	3	0	1	1	0	2	3	5	0	19	4	0	4	0	80
Rights	0	2	8	0	2	0	14	0	2	3	7	2	1	1	6	1	3	7	8	6	2	0	4	79
System	30	0	3	3	5	0	4	3	2	1	0	2	2	2	4	0	1	5	3	6	1	1	1	79
Control	0	1	3	1	15	0	0	3	1	0	0	4	1	0	0	0	0	0	1	1	0	40	5	76
Technologies	7	0	2	3	11	1	1	8	1	5	1	3	3	0	5	0	0	1	20	0	0	2	0	74
Public	2	0	0	0	4	0	6	2	0	1	4	3	1	0	1	0	23	12	0	2	7	0	5	73
Cultures	4	0	2	0	1	0	1	0	12	8	8	0	23	0	0	0	4	2	0	7	0	0	0	72
Political	0	0	3	0	14	0	16	0	2	5	3	4	8	0	3	0	5	5	1	1	1	0	0	71
Managers	0	0	31	1	1	0	0	2	0	0	1	2	1	8	0	0	9	1	0	2	0	9	2	70
Poor	37	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	5	0	0	1	0	0	0	69
Intellectual	1	2	2	0	2	0	9	4	1	1	3	7	4	0	2	0	7	7	6	7	2	0	0	67
Responsibility	0	13	1	0	1	0	14	4	2	2	1	3	3	1	1	1	6	3	4	2	2	2	1	67

Appendix A (*Continued*)

	Article number																							Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Freedom	0	1	0	0	9	0	8	11	3	5	5	3	1	0	1	6	5	3	1	1	0	2	1	66
Theory	16	6	3	1	6	0	0	4	3	0	0	0	3	0	10	0	0	0	9	2	1	0	0	64
Software	0	1	7	0	1	0	0	1	0	1	0	2	4	2	8	0	3	0	0	26	2	2	3	63
Resources	10	0	1	0	2	1	13	1	0	0	2	0	11	2	2	0	2	1	4	7	0	2	1	62
Organization	0	0	5	4	1	1	0	2	0	2	2	1	1	20	3	0	11	1	0	3	0	2	3	62
Relationships	0	3	4	1	1	6	7	0	3	1	1	3	3	0	6	0	3	4	0	6	1	7	0	60
Education	0	0	2	1	1	4	10	0	0	2	19	3	2	0	0	1	7	1	0	5	0	1	0	59
Societies	1	1	4	0	3	0	17	0	5	6	0	0	2	0	0	0	1	0	0	16	0	0	0	56
Attitudes	3	0	5	5	0	1	2	0	1	1	2	0	2	0	0	0	8	0	0	20	0	6	0	56
Organizations	0	0	0	3	1	0	0	0	0	3	6	3	6	5	4	0	9	0	0	1	3	3	8	55
Principle	0	0	0	0	3	0	21	0	9	0	1	10	1	0	0	0	2	2	3	0	1	0	0	53
Community	0	0	0	2	1	1	7	2	1	13	2	1	1	0	0	2	6	8	3	3	0	0	0	53
Morality	0	15	1	0	2	0	0	0	5	1	1	2	1	0	3	0	6	6	7	2	0	0	1	53
Infosphere	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	6	0	0	0	0	52
Services	0	0	0	0	1	0	15	0	0	0	1	2	4	0	0	0	20	7	0	0	0	0	1	51
Respect	0	0	2	0	1	0	5	0	3	5	4	2	2	1	2	1	0	0	18	0	0	2	2	50
Attitude	0	0	0	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	20	0	26	0	50
Electronic	0	0	0	0	8	1	0	4	1	2	2	1	9	15	1	0	0	0	0	0	2	0	3	49
Practices	0	0	5	0	6	0	1	2	1	1	1	1	1	11	7	0	1	1	1	6	1	1	1	49
Philosophy	5	5	0	0	0	0	1	0	7	11	3	2	1	0	4	1	2	0	3	1	2	0	0	48
Processes	0	4	3	2	23	0	4	0	1	1	1	1	1	1	1	0	0	2	0	0	1	0	1	47
Government	0	0	1	4	1	0	8	4	1	5	2	3	3	0	1	0	0	0	0	3	1	0	10	47
Codes	0	0	0	1	2	0	0	0	0	1	6	2	1	4	0	0	15	4	0	0	0	7	2	45
Morally	1	10	0	0	2	0	4	0	1	2	1	6	0	0	3	0	1	0	12	1	0	0	1	45
Theories	1	13	0	1	1	0	0	0	2	3	1	0	0	0	1	0	2	0	17	0	1	0	0	43
Professionals	0	0	0	0	1	1	0	2	0	1	3	4	1	2	0	0	8	9	3	0	4	1	2	42
Behaviors	0	0	3	2	0	11	0	0	0	0	0	0	3	0	0	0	4	0	2	1	0	16	0	42
Ideology	0	0	2	0	0	0	0	0	0	0	1	0	0	0	37	0	0	1	0	0	0	0	0	41
Standards	0	1	2	0	3	1	0	1	1	0	2	0	1	2	0	0	6	9	9	1	1	0	1	41
Policy	1	0	1	1	3	0	0	3	0	2	2	3	2	6	2	1	2	0	0	1	2	2	4	38
Media	3	0	1	0	5	1	0	0	5	4	2	5	0	1	1	3	2	4	0	0	0	0	0	37
Norms	4	3	2	0	0	0	9	0	4	2	2	3	1	0	2	0	1	2	0	1	0	0	0	36
Interests	1	0	1	0	1	0	1	0	2	1	1	6	0	0	13	0	1	3	1	1	0	1	0	34
Policies	0	0	1	0	0	0	3	6	0	0	7	0	0	0	2	0	2	1	0	1	2	3	2	30
Academic	1	3	0	1	0	0	0	3	2	2	4	3	0	0	0	4	5	0	1	0	0	1	0	30
Marginalized	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	30
Authors	0	2	0	0	4	0	2	0	0	2	1	9	0	3	1	2	0	0	1	2	0	0	0	29
Truth	0	11	0	0	5	0	1	0	4	1	0	0	0	0	4	1	0	0	0	1	0	0	0	28
Normative	1	4	0	0	1	0	6	0	1	0	0	2	0	0	3	0	1	0	8	0	0	1	0	28
Discourse	3	2	0	0	4	0	0	0	1	1	2	1	0	0	14	0	0	0	0	0	0	0	0	28
Institutions	0	0	1	2	5	0	7	0	0	0	4	4	0	0	0	1	0	1	0	0	0	0	2	27
ICTS	1	0	0	0	0	3	11	0	0	5	0	3	0	0	0	0	0	0	4	0	0	0	0	27
Protection	0	0	0	0	0	0	4	0	4	3	0	5	0	0	3	0	3	0	1	0	0	0	4	27
Law	0	0	1	0	0	0	0	1	1	2	0	4	0	0	0	2	7	3	1	1	1	0	2	26
Libraries	1	0	0	0	0	0	2	0	0	1	10	2	0	0	0	0	2	8	0	0	0	0	0	26
Virtue	0	0	0	0	6	0	2	0	0	0	0	0	0	0	3	1	2	0	12	0	0	0	0	26
Beliefs	1	0	2	0	0	0	0	0	1	1	0	0	4	0	0	0	4	6	2	4	0	1	0	26
Conflict	0	0	1	0	12	0	1	0	1	3	0	0	0	0	0	0	0	1	0	2	0	0	1	22
Traditions	1	0	1	0	0	0	0	0	7	0	0	1	10	0	0	0	0	1	0	0	0	0	0	21
Entropy	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	10	0	0	4	0	0	0	0	18
Censorship	0	0	0	0	2	0	3	0	0	0	1	1	0	0	0	1	2	7	0	0	0	0	0	16

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