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## Visualizing Subjective Mapping in the Field of E-book Publishing in the Context of Users and Librarians

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### Abstract

The present paper reports the findings of a research which aimed to visualize subjective mapping of "e-books" in the context of users and libraries. The research is a kind of scientometrics studies via qualitative content analysis method. Node XL software was used to visualize the map. The research community included all papers in the subjective field of "e-books" in the context of users and libraries which were published in the journals indexed in the EBSCO database during 2005-2011. Results show that subjects of "e-books (general)", "e-book readers" and "electronic textbook" are the most important subjects which are allocated mental disturbances related to users through the papers. Moreover, in the field of "e-textbooks" the strongest subjective connections are related to "students and usages". Moreover, "students" and "children" are as the most important stratum. Furthermore, survey on the usage rate of e-books and analysis statistics of their usage are as the most significant discussions that are considered from library-related

approach. Additionally, the current situation of e-books in public and academic libraries is accentuated by researchers as another predominant subject. Visualizing subjective mapping including the mentioned contexts is not revealed by previous studies. Hence, it is included a novel contribution.

## Keywords

E-books; Subjective mapping; EBSCO database; Users; Libraries; Information visualization

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## Introduction

E-book developments are considered as the newest field in the book industry and also as the largest change since the invention of Gutenberg (Chen, 2003). Although the first e-book project in 1945 called Memex by Vannevar Bush was not practical, but vast improvements were developed in this field due to hardware and software developments. For instance, Gutenberg project by Michael Hart which provided content access possibility in 1971 was a huge advancement (Tedd, 2005).

Gradually, e-books were offered through compact discs and then Sony Company presented e-book readers in 1991. E-books were recognized more by users and libraries (Niknam, 2002). Further, companies such as iPad, Kobo, Nook, Nook Color, Digital Reader from Sony and Kindle have been competing and presenting great features such as text format, audio, video, and also accompanied them by sight and hearing senses simultaneously. As a result, e-books were considered as suitable tools for learning and found a great and fruitful situation in educational processes and scientific circles. Therefore, studies regarding effective usage of e-book publishing in the field of e-text book were propounded in terms of the most important studies of this field.

Previous studies in the context of e-book publishing shows that the most competitors launched some devices for more interaction of the e-books in order to convert silent environment of the print books to interactive, dynamic, and creative environment for readers. Progressively, more customization and more interactions of readers of e-books were as goals of publishers and producers. Therefore, some e-devices such as "LearnSmart" were offered. It has high compatibility and due to algorithmic technology can create customization possibilities for learning process. These devices can evaluate knowledge and skill levels of university students and design study process purposefully for them, so that, it helps students to perceive which fields to study more and also to concentrate on challenging subject fields and concepts (McGraw-Hill Education, 2013).

Features and benefits of e-book engendered many of outstanding and prominent international publishers turned into e-book publishing such as Pearson, McGraw-Hill, Elsevier, Cengage

Learning, Macmillan, John Wiley and Sons, Oxford University Press, Random House, Wolters Kluwer Group (Nicholls, 2012). But what's important is that what factors can encourage users and libraries to use e-books (Dvorak et al., 1992). It is visible that, needed requirements for e-books are totally different based on the type of publishing and readers, for instance, a novel vs an encyclopedia. On the flip side, an encyclopedia is classified according to entries, firstly should be searched and then will be read by users, so it is totally different with a textual novel (Wilson et al., 2002).

Therefore, it is vital and critical to know divergent aspects of e-books for successful and profit publishing. The results of several surveys revealed that some publishers have understood these needs of users and libraries. Therefore, they have started their activities in order to keep pace with technological advancements in the field of e-book publishing. In spite of this, studies about e-books indicate that producing these e-books have not been based on professional studies and have not been contemplated to some paramount aspects and crucial attributes. However, the field of e-book publishing, particularly in connection with users and libraries is a kind of area covered with various technical, economic, cultural, content, social, scientific, educational, and service dimensions. As a result, it is absolutely imperative to have a glimpse in this regard and explore each mentioned aspect before experiencing the field or even simultaneously. At the same time, it is necessary to identify each of these aspects and introduce them to newcomer publishers in order to achievable more influence achievements and clarify connections between these concepts and subjects.

This study visualizes and discusses various aspects of the subject of e-books and users and libraries to provide a general overview of publishing issues for these types of stakeholders. The value and originality of this paper are a novel contribution which is not revealed by previous studies such as Jamali (2013), Shekofteh and Hariri (2013), Zins (2007). Moreover, it aims to answer the following questions: what are details of science mapping of this field to demonstrate all aspects of the field of e-book publishing? How are connections between them? What are the most important and the highest priority aspects of the field of e-book with emphasis on studies of users and library viewpoints? The present study aims to answer these issues. In addition, Shneiderman (1998) categorized visualizing to one-dimensional data, two dimensional, three-dimensional, time visualizing (based-on time data), tree visualizing (hierarchical structure), and networked visualizing (network drawing). In the present research, network visualizing is used due to unclarity of tree or hierarchical structure. Finally, specific objectives of the study are to determine:

- Main and significant subjects in the field of e-books in the context of users;
- How to visualize subjective mapping in the field of e-books in the context of users;
- Main and significant subjects in the field of e-books in the context of libraries;
- How to visualize subjective mapping in the field of e-books in the context of libraries.

## Literature Review

Reviewing various papers revealed that so far, no study has been developed in regards to visualizing subjective mapping in the field of e-book publishing. Only a few studies have surveyed subjective mapping. Furthermore, authors did not locate any research paper focusing on qualitative content analysis and surveying abstracts and full texts in order to visualize subjective mapping. Most of papers related to this field are developed based on analysis of references or automated text mining software to elicit keywords in order to visualize subjective mapping. Generally, various studies have been conveyed by social network analysis (SNA) approach using micro- and macro-level SNA metrics to visualize different mappings of networks in various fields such as: library and information science (Erfanmanesh, Hosseini, 2015, Yan et al., 2010), Scientometrics (Erfanmanesh et al., 2012), social science (Moody, 2004), and Health (Godley et al., 2011).

Shu et al. (2017) in their study visualized science using Library of Congress subject headings. In fact, the paper analyzed a map of science visualized from investigating non-fiction book subjects and their relationships as examined by Library of Congress Subject Heading (LCSH) co-assignments through a novel methodological contribution. Map of results indicates which sub-disciplines of science must be learned together, revealing that physics and mathematics are the central subjects required to practice science, which is not discovered by the other studies and are not covered by traditional citation-based maps. The new LCSH-based science map detected new relations between the major sub-disciplines of science to produce a more complete representation of scientific domains and their interactions.

Hosseini and Baradar (2017) in their study focused on "science overlay mapping" approach visualized interdisciplinary interactions of Cybernetics. Results showed 3 main clusters and 8 subject fields. Computer science is recognized as the strongest discipline. Moreover, Management, computer science and artificial intelligence as well as electronic and electrical engineering are the most citing subjective categories. Results also revealed that the intellectual structure of the field indicates a rich network and wide interdisciplinary interactions.

Jamali (2013) in a research entitled "*Mapping the domain of human information behaviour theories*" visualized scientific mapping of this field. Citation analysis, bibliographic coupling and subjective analysis of references are discussed in the paper. Bibliographic information of 51 information behavior theories in the Web of Science (WoS) database is used. The results showed that information behavior theories are elicited mostly from works in the field of library and information science but works of the other fields such as sociology, communications, psychology, management, computer science and educational science are also utilized and elicited as well.

Ying and Xiao (2012) visualized mapping in the field of tourism and determined 21 main subjects of this field and subjective connections as the same as the present paper, based on the ProQuest Dissertations and Theses–Full Text database (1994-2008). The article also discusses the relationships between subject areas and doctoral program distributions for tourism research at North American institutions.

Abedi Jafari et al. (2011) visualized subjective mapping in the field of "urban management" through the Web of Science database. Designing the search strategy, searching, analyzing search results, designing matrix of relationships between subjective sub-fields and finally usage clustering algorithm of cumulative hierarchy are used to visualize scientific mapping of urban management. Research results showed that the map of urban management includes 36 subject areas.

Mohammadi (2008) in a thesis entitled "*visualizing scientific mapping of Nanotechnology in Iran*" aimed to visualize scientific structure of Nano technology field in Iran through text mining and co-citation analysis method of papers to identify research priorities of the field and establishing infrastructure for a better policy.

Zins (2007) visualized mapping of "information science" field via Delphi technique by cooperation of 57 researchers from 16 countries. Panel discussion is used to analyse main categories. The model can offer a context to formulate information science theories and also to develop and evaluate academic programs of information science and bibliographic resources.

Furthermore, Lee and Segev (2012) in a research entitled "*knowledge maps for e-learning*" visualized the field through text-mining techniques. TA/IDF algorithm is utilized to elicit keywords. Finally, a subjective mapping based on ranking of keyword couplings according to number of presence in sentences and numbers of words in sentences is visualized. It can analyse numbers of relationships to identify significant and main ideas in the text.

Related works concluded that the present study with emphasizing on subjective mapping through in the context of users and libraries in the field of "e-publishing" includes a novel perspective contribution. Hence, the results would be fruitful to aware publishers about various dimensions of "e-book publishing". Moreover, it has the potential to accentuate the importance of the mentioned subjects through the subjective mapping, so publishers will be able to realize full view for principled and normative publishing in the electronic format.

## Materials and Methods

The present research is conducted using scientometrics techniques. The published works indexed in the EBSCO database (Peer-reviewed journals) during 2005-2011 are considered as some authoritative resources in the field of e-book, in context of users and libraries. Further, qualitative

content analysis of the research papers is used to extract subjective concepts (by thematic approach). Moreover, Node XL software is utilized to visualize informative infographics. The validity of EBSCO, covering the most significant international journals, vast and various subject scopes as well as professional thesaurus in order to search more accurately are considered as reasons to choose this database. The authors studied the papers during these mentioned years (6 years) in the time of data gathering because the sanctions prevented access to databases after those years. The authors surveyed abstracts of the articles and often the full texts to elicit conceptual keywords due to lack of professional thesaurus, lack of automatic terminology tank in this subject field as well as low accuracy of automatic extraction of text keywords. Consequently, the present research tried to answer the following research questions:

- Q1: What are main and significant subjects in the field of e-books in the context of users?
- Q2: How does visualize subjective mapping in the field of e-books in the context of users?
- Q3: What are main and significant subjects in the field of e-books in the context of libraries?
- Q4: How does visualize subjective mapping in the field of e-books in the context of libraries?

## Results

Findings are discussed in the form of answering to the mentioned research questions:

### Q1: What are main and significant subjects in the field of e-books in the context of users?

Subjective content analysis of papers shows that the main mentioned subjects including an approach to users involve “*e-book*”, “*e-textbook*”, “*audio book*”, “*e-talking book*”, “*digital picture story book*” and “*e-book readers*” as depicted in Figure 1.

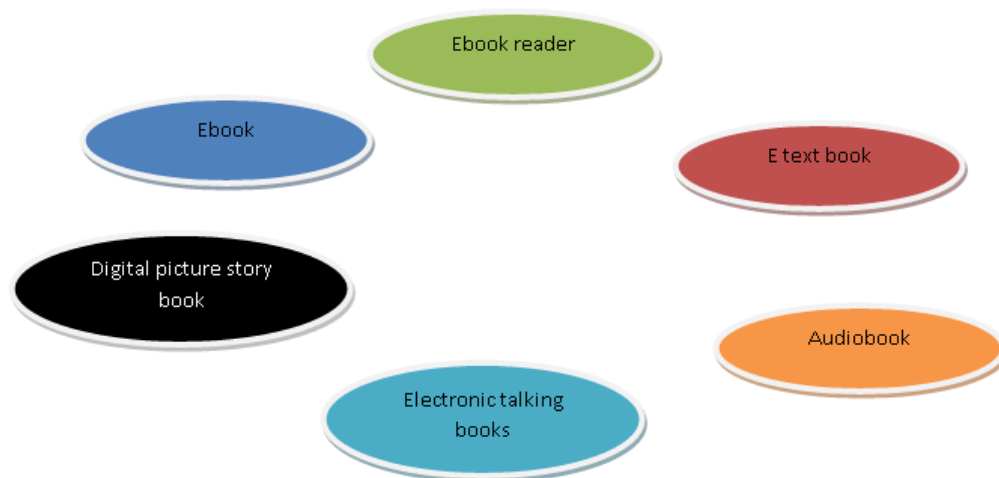


Figure 1. The main subjects of e-book studies in the field of users

### Q2: How does visualize subjective mapping in the field of e-books in the context of users?

Figure 2 shows the discussed subjects related to e-books with an approach to users. (It is worth mentioning that only level of preliminary connection<sup>1</sup> of all subjects of the field has been shown due to low clarity and complexity of the graphic scheme).



**Table 2. Betweenness centrality in the field of e-book with an approach to users**

Vertex	Degree	In-Degree	Out-Degree	Betweenness Centrality
E-book	43	0	43	2745
E-text book	10	1	9	655
E-book reader	13	0	13	576
Education	3	3	0	166.25
Student	3	3	0	166.25
Usage	3	3	0	166.25
Children	3	3	0	155.75
Public Library	3	3	0	155.75
Faculty	2	2	0	122.5
Open Access	2	2	0	112
Distracted Driving	2	2	0	43.75
Preference	2	2	0	43.75
Teaching	2	2	0	43.75

Moreover, the discussed subjects in the terms of “usage” are as follows:

*Usage of academic e-books, note of traditional resources, usage style, education and learning, children usage, student usage, professor usage, professor usage in education and research, effective factors on the usage, standards for reporting and registration, usage of kindle, distance learning, usage in the library of Spain, usage comparison with printed books, usage effect on acquisition, usage statistics in academic library.*

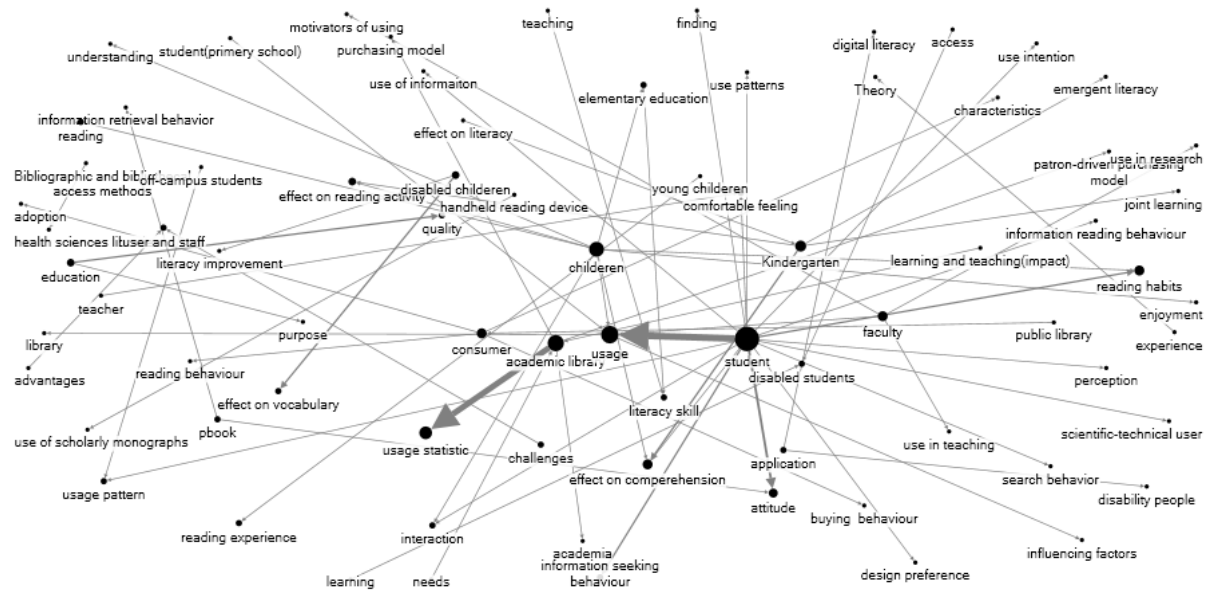
In order to more clarity and show the first level of connections of e-books with other infographic subjects, more detailed connections are visible in Figure 3.

The discussed subjects in the first level of connection in context of “e-book” through analysis of surveyed papers are as follows (Figure 3):

*Academic library, public library, impact of teaching and learning, Elementary education, formal education, children, kindergarten children, disabled children, teenagers, teacher, professors, printed book, applications, bibliographic and bibliographic access method, effect on literacy, effect on comprehension, impact on reading activity, impact on education, experience (general), reading experience, reading habits, reading skill, handheld reading device, advantages, challenges, bibliographic citation, interest, preferences, purchase, usage, needs.*







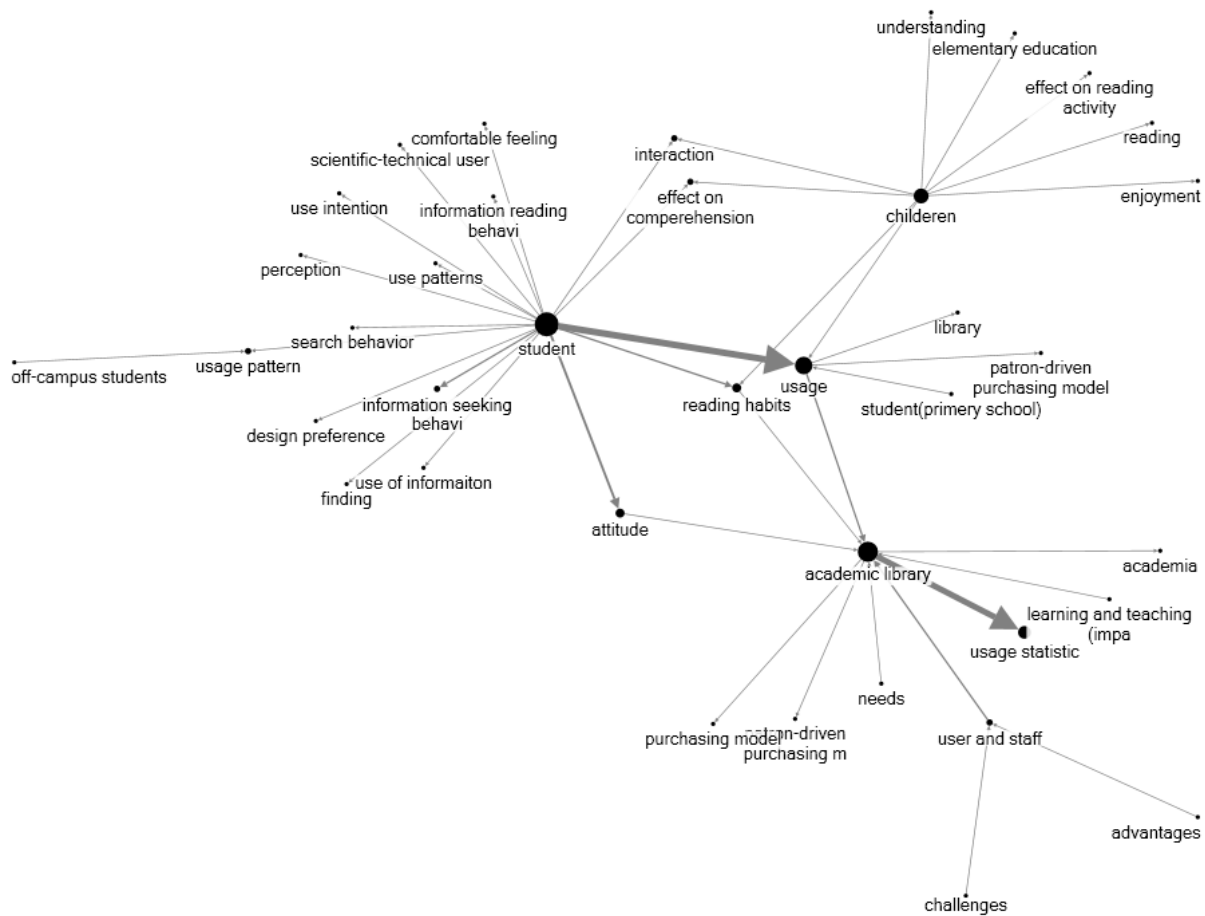
**Figure 4. Subjective mapping of e-book (next level of connections)**

Moreover, due to the large volume of detailed figures, subjective connections between the second ranks of subjects includes the highest size of nodes as depicted in Figure 5. “Students” are expressed by subjects such as:

*Usage pattern, usage intention, perception, off-campus students, information-seeking behavior, search behavior, information usage, finding, attitude, usage, reading habits, effect on comprehension, interaction, comfortable feeling, scientific and technical user, and design preferences.*

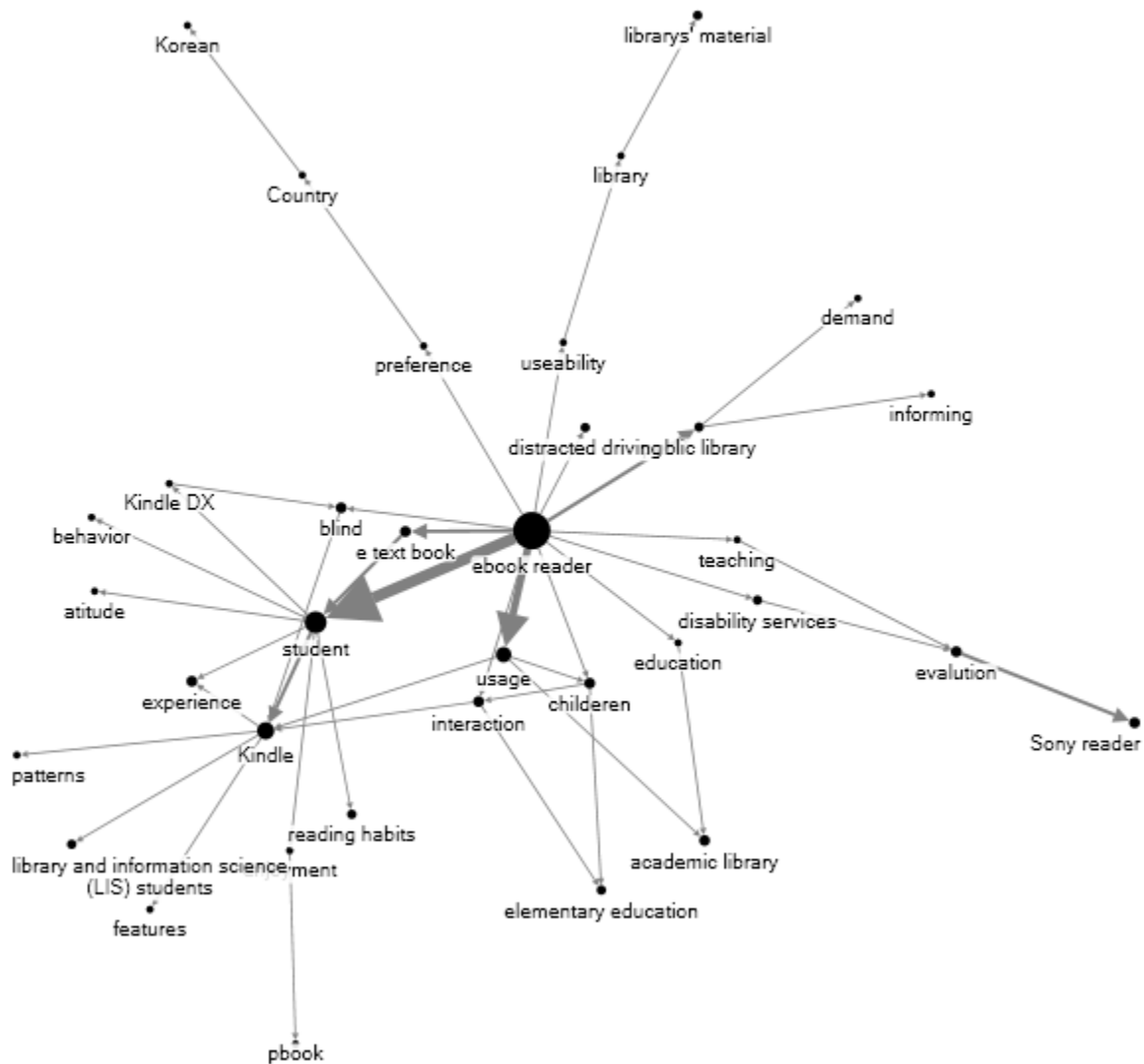
Furthermore, “usage” subject is mentioned in connection with: *usage in library, patron-driven purchasing model, elementary student, academic library.* And also, “academic Library” subject is decelerated by: *usage statistics, staff and users, needs, purchasing model, patron-driven purchasing, faculties, learning and teaching.*

As it is observable in Figure 4, the most connections (the most weighted links) are related to *usage pattern of students* through e-books that are discussed by many papers. On the other, “academic library” subject is expressed in the context of: *usage statistic, user and staff, needs, purchasing model, patron-driven purchasing, academia, learning and teaching.* As it is shown in Figure 5, the most connection (the most weighted link) is related to usage pattern of students that are surveyed by many papers as well.



**Figure 5. Subjective mapping of the most important e-book subject**

Figure 6 shows subjective connections in relation to “users” and in the subject of “e-book reader” and its related sub-subjects. About “e-book reader”, connection weight with “students” and also related issues to “usage” are more than other subjects. Therefore, it indicates the high importance of the subject. Also, among other kinds of e-reader books, “Kindle” has the highest size and also the most out-degree. It demonstrates the importance of Kindle and its development by Amazon. It should be mentioned that Amazon is one of the powerful publication institutes and also one of the most prominent producers of various Kindle generations since 2007. It has a special format, so books with this format and also PDF are readable by it. Lending e-book to friends for limited 14 days is one of notable advantages of this device. It is worth mentioning that when a person lends an e-book to a friend, the usage possibility is forbidden for the first person due to the copyrights of authors and also preventing information copying (McDermott, 2011).



**Figure 6. Subjective mapping of e-book readers and users**

In the field of “*e-text book*” the most weighted subjective connections are in the context of “*students*” and “*usage*”. Figure 7 shows subjective scheme of “*e-text book*” in connection with “*users*”. Importance of *e-text book* has been increased among famous and superior publishers. So that, many commercial companies of *e-book* moved to educational market in 2010 such as Copia and Google Books (Reynolds, 2011). For instance, McMilan publishes dynamic Books as a new generation of interactive books. Further, professors can customize contents of *e-text books* by these interactive tools and also merge *e-text books* in order to match with their students’ needs.

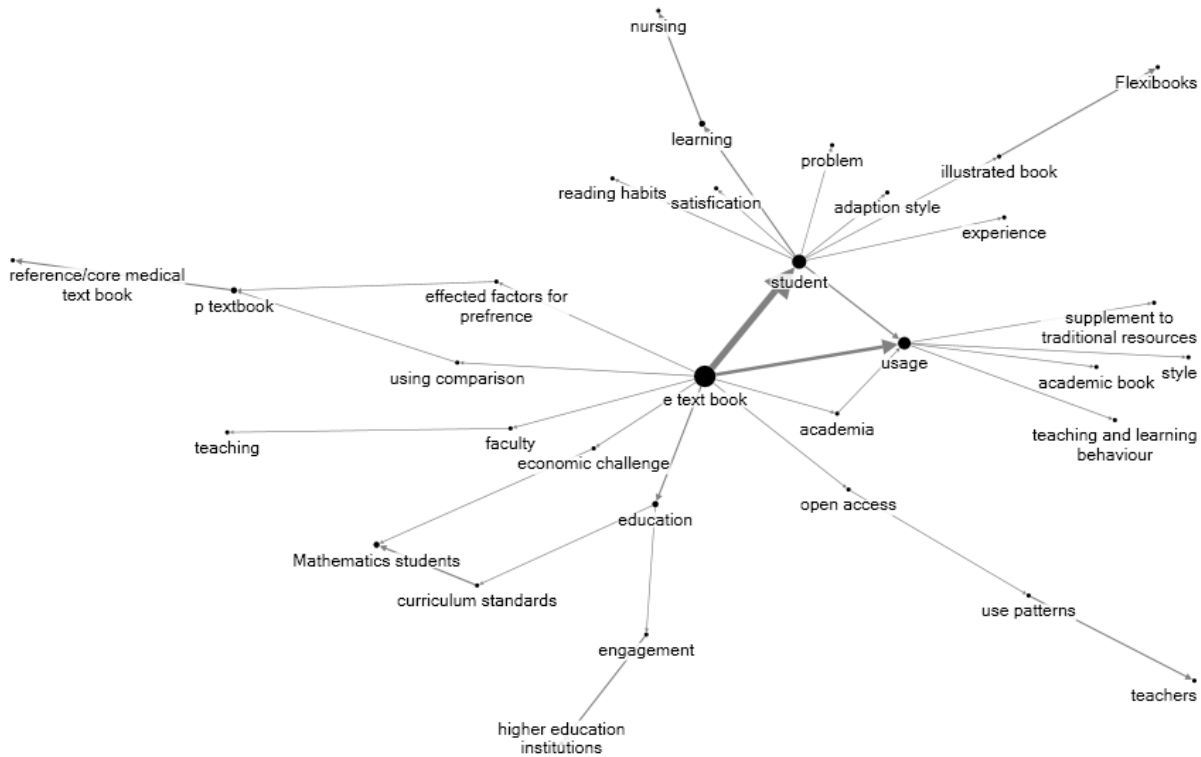


Figure 7. Subjective mapping of e-text books and users

**Q3: What are main and significant subjects in the field of e-books in the context of libraries?**

Content analysis of scientific papers of “e-books and libraries” indicates that Subjects of “e-book”, “e-reference book”, “digital picture book”, “audio book”, “e-text-book” and “e-book reader” are the main subjects through studies of e-book publishings in the context of libraries (Figure 8).

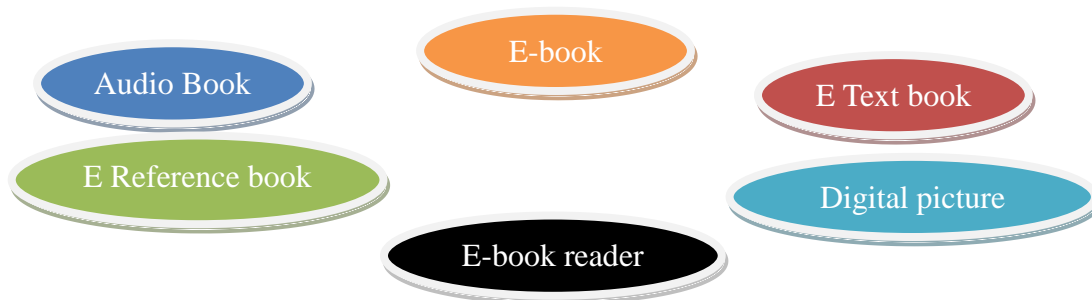
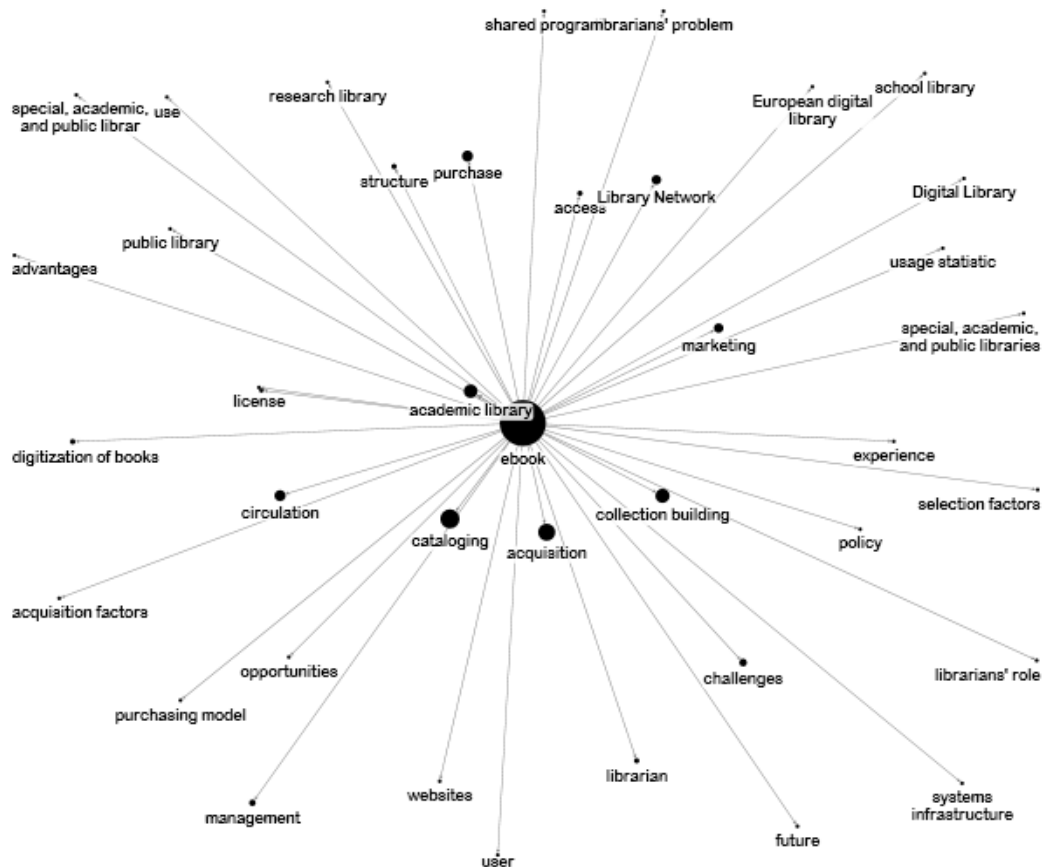


Figure 8. Main subjects of Studies of e-book publishing with an approach to libraries

**Q4: How does visualize subjective mapping in the field of e-books in the context of libraries ?**

Related subjects with “e-book and libraries” in the preliminary connections are shown in Figure 9. As volume of nodes shows the most important discussed subjects through the papers are: “cataloguing”, “acquisition”, “collection building” and also “academic library”. According to the weighting of links, the strongest connections are between “e-book” and “academic library”. After that, subjects such as “cataloguing”, “acquisition”, “collection building” and “circulation” are

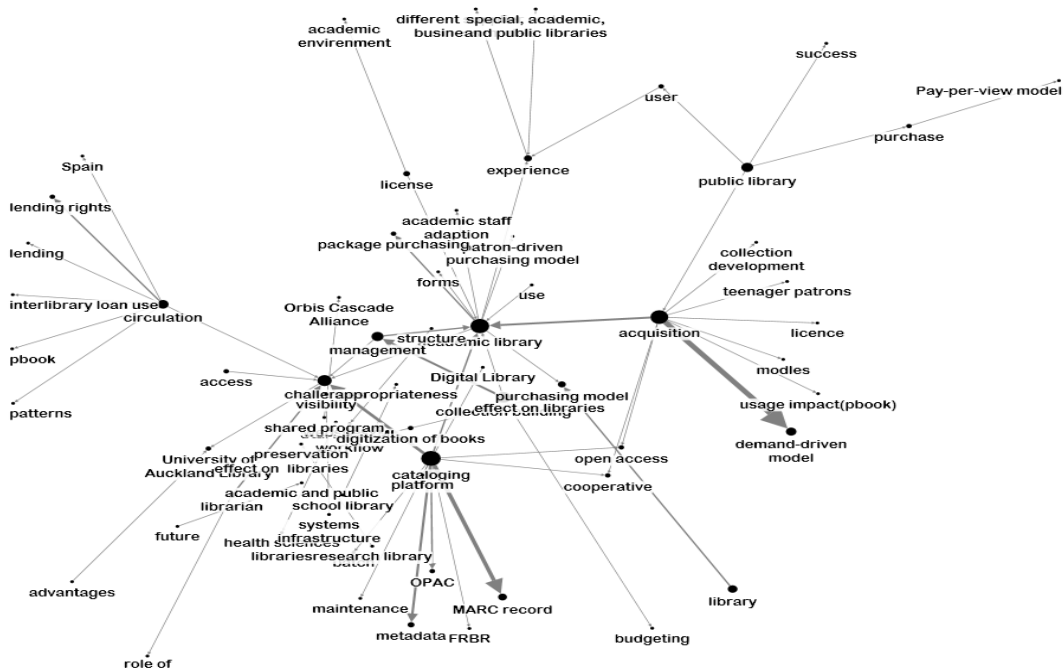
considered as the strongest subjective connections. Figure 10 shows the second connection level (more detailed) in the context of “e-book and libraries”.



**Figure 9. Subjective mapping of e-book with an approach to library (preliminary connection)**

As Figure 10 shows, the strongest connections in the second connection level in the context of “e-book and libraries” are: “*acquisition based on demand-driven model*”, “*cataloging based on MARC records*” and “*cataloging challenges*”.

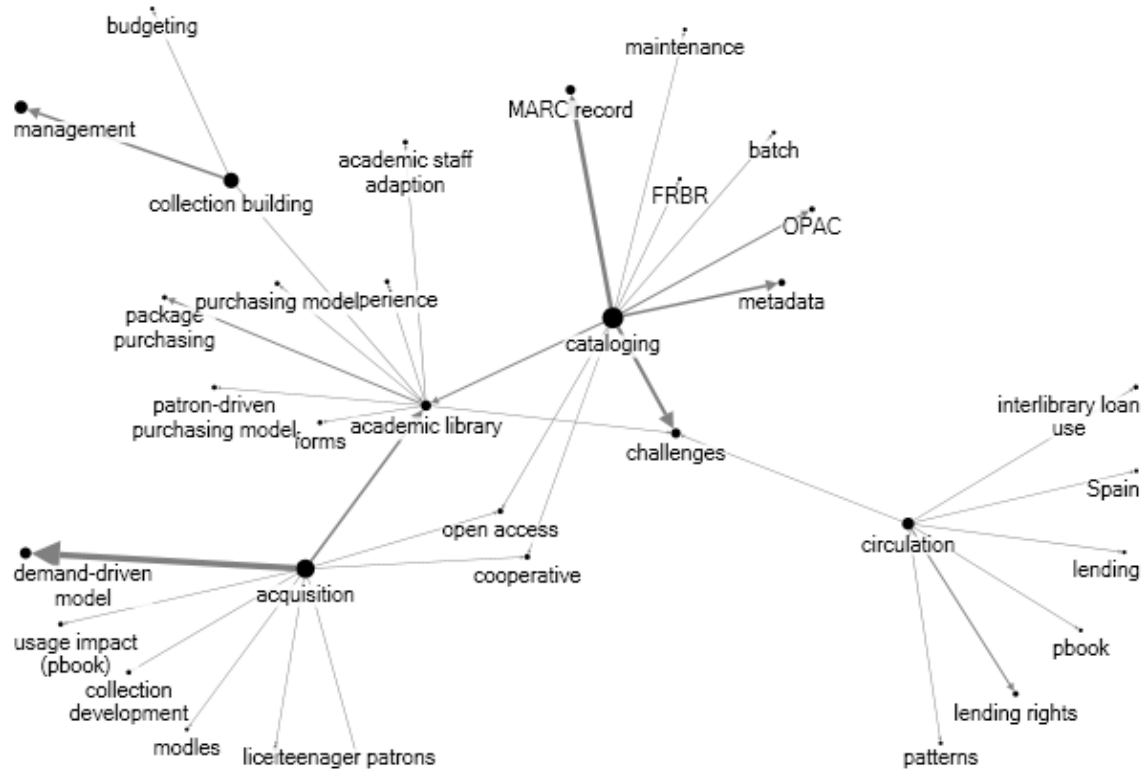
Note that demand-driven model is one the most prominent benefits of e-publishing for publishers and stakeholders of e-books. According to this model, libraries can provide e-books based on needed assessment and special demand of their users. This model definitely will make saving for both libraries and publishers. Cataloging in today’s world is considered on accessing and organizing resources. Moreover, libraries faced some new problems such as licensing, purchasing, ownership and even cataloging when started purchasing e-books. Further, e-books are attracted attention in keeping with the publishing industry, suitable markets and being able to be seen as a product recently (Bothman, 2004). Moreover, in the field of MARC records some publishers - which offer e-book services such as Springer, Taylor and Francis, Net library and so on- give related MARC records to customers in order to facilitate organizing these books.



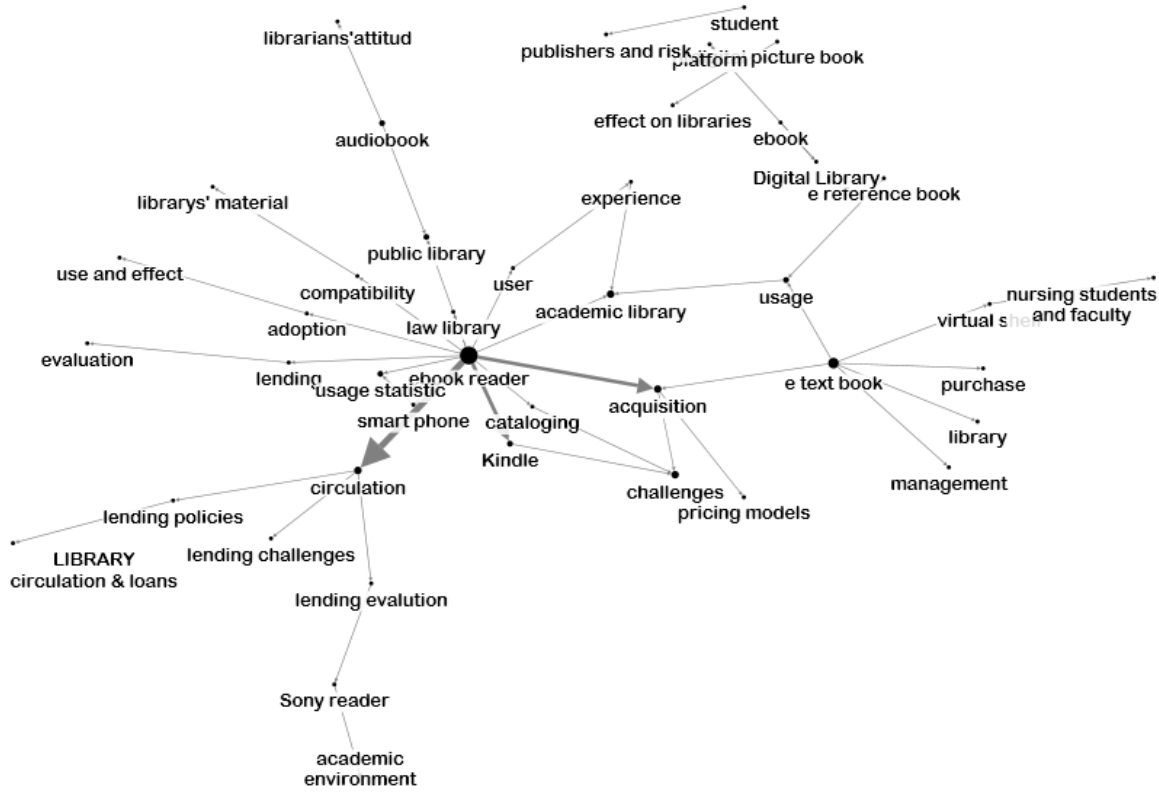
**Figure 10. Subjective mapping of e-book with an approach to library (the second connection level)**

For clarity of graphical scheme, main functions of “collection building”, “acquisition”, “cataloguing” and “circulation” of e-books in library are associated with their connections with other sub-subjects in Figure 11. The strongest connections are between “cataloguing” and “MARC records” and also “challenges”, between “acquisition” and “demand-driven model”, between “collection building” and “management” and finally between “circulation” and “law” (Figure 11).

The other surveyed subjective connections through papers such as “e-book reader”, “e-text book” and so on are visible in Figure 12. As it is obvious, the strongest link connections are between “e-book reader” and “circulation”. One of the significant concerns of libraries is about lending e-book readers. Because when a special e-book needs a reader, library must provide e-book readers as many as e-books, in fact, it is impossible practically.



**Figure 11. Subjective mapping of main functions in libraries**



**Figure 12. Subjective mapping of other main subjects and libraries**



## Discussion

The most studies in this field of ebook and also visualizing scientific mapping were conducted through the usage of citation analysis and analyzing references of papers. Results show that subjects of "e-books (general)", "e-book readers" and "electronic textbook" are the most important subjects which are allocated the most numbers of approach of users through papers. Moreover, in the field of "e-textbooks" the strongest subjective connections are related to "students and usages". In addition, "students" and "children" are as the most important stratum. Furthermore, surveying the usage rate of e-books and analysis of statistics of their usage are as the most significant discussions that are considered from library-related approach.

It is worth mentioning that the subjects of "children", "teaching", "public libraries", "academic libraries", "students", "e-text books", "usage", and "e-book reader" are the most prominent discussed subjects related to e-books. Therefore, it indicates the importance of two groups of children and students in terms of the usage of these types of books.

Log analysis of Dennis showed that the most students (68%) do not print any contents. Further, they conclude that students use their computers and laptops for studying books at first, and the usage rate of mobile phones and e-readers such as iPad is at low level (Denis, 2011). Moreover, in Simon's research (2001), the community population was satisfied with usage of e-books and they highly recommend them to their friends for academic lessons. Additionally, 95% of students demand e-book utilization in their future lessons and they expressed that this kind of media is effective in choosing their units. In addition, research of Anuradha and Usha (2006) showed that a high percentage of university students will purchase or utilize an e-book in the future. On the other hand, study of Oliveira (2012) and Shepperd et al. (2008) indicated that students have more tendencies to use printed book rather than e-book. It demonstrated that just one-third of students will purchase an e-book accordingly. According to the Washington Post (2013), 46% of children between 4-17 years old studied at least an e-book in 2012. This rate has increased in comparison in 2010 (25%).

Besides, the most important subjects in context of libraries are "cataloguing", "acquisition", "collection building" and finally "academic library". Based on weighting of links, the strongest connection is between "e-book" and "academic library". The Followings are "cataloging", "acquisition", "collection building" and "circulation" as the strongest subject connections. Further, among types of libraries, "public libraries" and also "academic libraries" seem to be as the main customers of these kinds of books. The importance of ease of access to different kinds of books for users of public libraries as well as priority of e-text books for university students due to teaching and learning can be expressed as reasons for the mentioned point. Meanwhile, e-book readers have converted a market for competitions among hardware companies. These devices due to facilitating the study process and special facilities have been welcomed by end-

users and newer models are offered day to day. Although some ebook readers are only produced for e-book reading because of security issues, they should be able to serve as multi-purpose devices for users to attract more audiences.

## Conclusion

According to the findings of the present research, publishers should find suitable answers to these following questions: who are the usage community of e-books? Is the extent of the distribution of e-books individually or aimed for library users or both? What kind of issues do libraries face with? What are the significant dimensions for e-book designing? How is usage pattern of users? Who are the most important users of these kinds of books? Therefore, the results of the present paper could offer a checklist to them in order to consider fruitful measures for each item.

With the fact that e-book reader is one of the most important issues related to e-books and also in relation to users, it is highly suggested that hardware producers work and cooperate with e-book publishers to produce user-friendly devices based on their users' needs. In addition, users do not like to miss the familiarity with the printed books in the e-book productions. Therefore, similar usage and close appearance of e-book devices and printed books can dispel this concern for many users. Also, given the importance of e-textbooks, it is greatly offered that the desired features of printed books and added-values related to users' expectations of the electronic environment to be applied and adjoined in the e-book productions. Also, university authorities as an interface between students, producers, and e-book publishers would help them to increase the growth of e-textbooks.

It seems that producers should consider this point more deeply. An interesting direction for the future research would be to analyze other approaches of stakeholders of e-book publishing such as publishers, librarians, and vendors to determine subjects of the common approaches and various perspectives. It helps to pave the way of improvement of e-publishing.

## Endnotes

<sup>1</sup>. “Preliminary connection” means showing only the first and the second subject hierarchy and non-display of more detailed information related to the second subjects. For instance, “e-book” is used as the first keyword of the paper and “teacher” as the second keyword. The suitable hierarchy phrase may be considered as more detailed such as ebook-teacher-attitude.

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