New Trends and Issues Proceedings on Humanities and Social Sciences

Issue 1 (2017) 228-232

ISSN 2421-8030
www.prosoc.eu

Selected paper of 8th World Conference on Educational Sciences (WCES-2016), 4-8, February 2016, University of Alcala, Madrid, Spain

Makerspace built on innovation service: A study in the library

Ying Guan[a] *,Library, University of Electronic Science and Technology of China, No.2006, Xiyuan Ave, West Hi-Tech Zone, 611731, Chengdu, P.R. China.

Xuan Zhou[b] , Library, University of Electronic Science and Technology of China, No.2006, Xiyuan Ave, West Hi-Tech Zone, 611731, Chengdu, P.R. China.

Ping Lei[c] , Library, University of Electronic Science and Technology of China, No.2006, Xiyuan Ave, West Hi-Tech Zone, 611731, Chengdu, P.R. China.

Kankam Raymond[d] , School of Political Science and Public Administration, University of Electronic Science and Technology of China, No.2006, Xiyuan Ave, West Hi-Tech Zone, 611731, Chengdu, P.R. China.

Suggested Citation:

Guan, Y., Zhou, X., Lei, P. & Rayond, K. (2017). Makerspace built on innovation service: A study in the library. *New Trends and Issues Proceedings on Humanities and Social Sciences*. [Online]. 01, pp 228-232. Available from: www.prosoc.eu

Selection and peer review under responsibility of Jesus Garcia Laborda, University of Alcala, Spain

Abstract

As more libraries have made a persistent effort to build Makerspace expecting to proceed to innovate, there have been a growing number of studies accessing this practice. However, few studies have explored gender orientation and preferences produced when Makerspace is used. Through the questionnaire, this study investigates the service condition of Makerspace. The results indicate that the gender colonies' differences and preference exist: male students are more addicted to the 3D service; female students feel more interested in drone service to a huge extent; digital modeling is most welcome by the colony. This provides valuable information for librarians how they could promote the service quality and make their future plan. In addition, implications and recommendations are also addressed.

Keywords: Makerspace,innovative service,gender orientation,preference.

* ADDRESS FOR CORRESPONDENCE. **Ying Guan**, Library, University of Electronic Science and Technology of China, No.2006, Xiyuan Ave, West Hi-Tech Zone, 611731, Chengdu, P.R. China.
E-mail address: guanying@uestc.edu.cn / Tel: +86 18208110611

1. Introduction

The Library of University of Electronic Science and Technology of China (UESTC) started in 1956 and benefits from favorable policies. It rapidly emerges as one of the most large-scale research libraries in China as the Qingshuihe Library (QSH Library) came into service in 2009. Up till now, the Library, with 67,000 square meters and a unique collection system characterized by documents and resources in electronic and non-electronic form, has deposited a total of 2.8 million printed items and 10 million electronic items used by around 6,000 patrons every day.

From the early days when the library merely provided basic service to today's users who could access any information online via a variety of digital devices when visiting it, its role has dramatically changed as the electronic gadgets are applied by more and more people. This not only increases the amount of user's online to some extent, but also directly puts forward two questions; how could we abstract more and more patrons to step into the library and in person experience something distinctive and innovative with the gradually decreasing amount of patrons entering physical libraries; how could we make the innovation inspire more patrons with fervor of scientific research. The library ought to be a place full of wisdom where the interest could be stimulated, the creativeness explored and the courage aroused, which is the core concept of UESTC Library. Based on these two questions and one concept, the Makerspace was established in 2014.

In 2009 when the Qingshuihe Library was put into use, Taifeng Li, the librarian director, required all the librarians to take part in the innovative planning. Challenge is required, so change is acquired. Thus a distinctive library with a strong IT background and a variety of high-tech facilities emerges. Subsequently, a series of projects including the Memory of the UESTC, the Audio-Visual Space and the Makerspace were carried out, which attracted many visitors home and abroad.

The Makerspace is a platform where some high-tech facilities, like iMacs, iPads, 3D movies, the 3D printer, and the drone, are provided to patrons for their research and entertainment. The library of University of electronic science and technology has been committed to fostering talents of electronic industry to meet the needs of the national strategy, which the innovation of the library is required to contribute to consistently. To date, the Makerspace have served numerous patrons and conducted abundant significant activities.

Innovation here is defined as "a more or less radical and possibly disruptive change in products and processes" (Schumpeter, 1974). However, for all its radical change to work, innovation in libraries is rarely disruptive in the way (Christensen, 1997). Innovative approaches in libraries are evolutionary, the resultant change most often characterized by being the latest step in a line of sustained innovative work, and that innovation has produced a platform of discovery technology (Bradley, 2014). Innovation concepts balance two opposing approaches of evolution and disruptive transformation (Balk et al., 2014). The concepts of user innovation and open innovation have been widely researched for factors that determine success (Enkel, Bell & Hogenkamp, 2011). Since the Industrial Revolution stepped into the 21st century, the new technologies emerged one after the other, and libraries accordingly shoulder the responsibilities of displaying those new technologies and inventions. 3D technology had led a heat era of scientific and technologic innovation, which will undoubtedly produce the service revolution in libraries. Otherwise, new technology should be popularized and spread promptly when it is burst into sight. Libraries should be a place to provide the experience of the inaccessible high technologies. Therefore, there has been a hot research on Makerspace in recent years. Tara Brady et al (2014) explore "the planning and execution of the accessible library makerspace event for the people with disabilities". Craddock (2015) studies the implementation of a mobile makerspace program in a public school setting.

2. Problem statement

Since the Makerspace was put into use in 2014, its service condition and the students' reaction have not been studied yet. Consequently, it is time to discuss whether the innovation service the Makerspace produced is effective and functioning properly and to also know whether the students are satisfied with it and whether it has brought more attractiveness.

3. Methodology

Based on one questionnaire with 35 items, the author specifically analyzed the function, service condition, attractiveness and the students' satisfaction the Makerspace produced. The 35 items included 15 items about satisfaction, 15 about attractiveness and 5 about the service condition. A total of 400 copies have been filled. Out of that total amount, 27 copies failed and therefore only 373 copies were valid for the research. Therefore, 209 undergraduates and 164 postgraduate students from 12 schools of the university of electronic and science technology took part in the research. 311 constituted males and 62 constituted females.

4. Results

According to the statistical analysis from the questionnaire items, it was discovered that male students are more addicted to the 3D service from the Makerspace than female students. It was found that the female students feel more interested in the drone service than the male ones. In addition, 3D printing service is praised more highly than the drone service for the postgraduates; rather, the drone service has been more welcomed for the undergraduates.

4.1. Gender orientation

Through the statistical analysis for all the participants, a total of 115 students have visited the Makerspace in the past one year. Some have used the facilities in the Makerspace; some once tried to know about them by means of librarians' introduction in various activities the library conducted. Its gender distribution could be seen as follows. Based on Fig.1, although there were only 62 females participant in our investigation, the percentage of female students, who are interested in the drone service provided by the librarians except 3D printing, is higher than that of male students. In addition, as much as 64% of the female postgraduate students are more addicted to the drone service, it is indicated that the female postgraduate students feel less interested in 3D printing. As for the male students, it is revealed that they paid more attention to 3D printing than the drone.

Table 1. The gender distribution of the participants addicted to innovation service

	Undergraduate(N=209)		Postgraduate(N=164)	
	Female(N=37)	Male(N=172)	Female(N=25)	Male(N=139)
3Dprinting	13(35.14%)	31(18.02%)	2(8%)	43(30.94%)
Drone	11(29.73%)	9(5.23%)	16(64%)	21(15.11%)

4.2. Alternative preference

As the analysis is deeply and elaborately carried out, it is shown that 3D printing service is praised more highly than the drone service and that the participants focus more on the digital modeling by using 3D printer to produce its entertainment, practice and inspiration. Even though not all participants have visited the Makerspace, 373 participants clearly stated that they know these facilities and are ready to experience these high-tech services. In particular, the data shows that

postgraduates are more fascinated to 3D printing and yet undergraduates are fond of drones through investigating their preference to 3D printing, drone or both (see table 2 as follows).

Table 2. The different preferences of undergraduates and postgraduates

	Undergraduate(N=209)	Percent (%)	Postgraduate(N=164)	Percent (%)
3D printing	52	24.88%	57	34.76%
Drone	89	42.58%	32	19.51%
Both	68	32.54%	75	45.73%

4.3. Digital modeling

Among the main applications for 3D printing technology according to the questionnaire result, the digital modeling is finally more welcomed for the engineering students. 48.73% of the participants paid more attention to the digital modeling by using 3D printing, which is thought to be the largest colony applying the 3D printer. Moreover, it is shown that there are a variety of purposes of the digital modeling by utilizing 3D printing (see the figure as shown below). 31.11% of them consider 3D digital modeling as entertainment. However, it is encouraging that 23.69% of them regard it as practice and 21.83% think of it as inspiration. In addition, 7.49% expect to use it in order to attend the contest, which is inspiring for all the librarians who are working at the Makerspace as well.

Table 3. The Purposes

Purpose	Percent (%)
Entertainment	31.11%
Practice	23.69%
Inspiration	21.83%
Contest	7.49%
Others	15.88%

5. Discussion

Due to a minority of female students with engineering background in University of electronic of science and technology, it is inevitable that there are not too many female participants responding to the questionnaires. Nevertheless, they should not be neglected, which has been taken into consideration since the Makerspace was established in 2014. Even so, it is a big challenge to attract more female students to attend to the activities of the Makerspace. It is appreciating that some female students volunteer to enter the Makerspace to experience these facilities and that the drone service has indeed appealed to them in the past year.

As a main force, the male students take part in the innovative activities in the Library. They make full use of 3D printing facilities to do whatever they like and enjoy the driving force and passion it produces.

Postgraduates are mainly devoted to doing some scientific and technological research and undergraduates take knowledge learning into account due to the diverse core missions, which leads to the different orientations in utilizing the Makerspace. 3D printing service is praised more highly than the drone service for the postgraduates, and rather, the drone service has been more welcomed by the undergraduates.

Meanwhile, the digital modeling is more welcomed generally. The students make better use of the facilities in the library to put their idea and design into practice. Also, the digital modeling enriched

their campus life by means of entertainment and inspiration, which indeed promotes their ability and adheres to our original intention. Their designs have been rewarded at home and abroad these two years, which compel more excellent students to take part in the digital modeling.

6. Conclusion

As libraries are being changed from the traditional to a more modern paradigm, there has been the need to alter their concepts and patterns. It is unarguable that the University of Electronic Science and technology library has proceeded to innovate. Libraries and librarians are seeking to get through the existing obstacles and lead to the expectation they are thinking of. Today, users could access 3D and drone services, and libraries have to continuously look at new ways to meet these needs. There are challenges facing the school's library. We are trying to provide more services like artistic designing and experience. In the micro-service innovation, we are attempting to explore more ways to broaden patrons' eye and the enjoyment produced by the high technology.

This study applies questionnaire to investigate the service condition of the Makerspace, and through this study, it is found that the different participants gave feedback to the innovative service provided by the Makerspace. In addition, their preference provides valuable information for librarians on how we could promote service quality and make our future plan. Furthermore, the diverse purposes also indicate the multifunctional practicality.

However, further studies should be raised. For one thing, the Makerspace was merely opened to the public last year, which reveals that more statistics should be collected in a longer time. For another, the research methodology should be varied through more methods like interviewing and surveying individuals. Finally, it is necessary to research on the service condition the Makerspace provides if it is open to the public.

Acknowledgements

The authors would like to express their profound gratitude to all who made it possible for the conduct of the study and publication of this article. First of all, we wish to acknowledge efforts of the library staff and the students of University of Electronic Science and Technology of China, for assisting in the collection of data for the study. We would like to acknowledge the support and relevance of all the information and sources of reference cited in the work. Finally, this research is funded by the project of the Library of University of Electronic Science and Technology of China (No.LS2015Z004). Thanks to everyone.

References

Balk et al. (2014). What makes innovation work? Innovation practice in the National Library of the Netherlands. *The IFLA Journal*, *40* (3), 159-160.

Bradley, K. (2014). Build on sound principles: Audio management and delivery at the National Library of Australia. *The IFLA Journal*, *40* (3), 186-187.

Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston: Harvard Business School Press.

Enkel, E., Bell, J. & Hogen kamp, H. (2011). Open innovation maturity framework. *International Journal of Innovation Management*, *15* (06), 1161-11.

IML Craddock (2015). Makers on the move: A mobile makerspace at a comprehensive public high school. *Library Hi Tech*, *33*(4), 487-504

Schumpeter, J. A. (1974). The creative response in economic history. *The Journal of Economic History*, *7* (2), 149-159.

Tara, B., Camile, S., Ayah, N., Walter, R. & Mega, S. (2014). MakeAbility: Creating accessible makerspace events in a public library. *Public Library Quarterly, 33*(4), 330-347.