

# Reference Service Design for Academic Library: A Case of Digital Learning Launchpad Development<sup>1</sup>

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## Abstract

Library reference services have been changed according to the users' needs and advances in information and communication technology (ICT). Consequently, Thai university libraries have also changed and developed their innovative reference services due to the influence of advanced ICT. For example, the use of artificial intelligence (AI) technology integrated with a Q&A service via Chatbot, the voice of customers (VoC) system to deal with users' complaints, clinic-like services to support information resource access and academic development, and information literacy instruction using video clips and online workshop sessions has been implemented. This paper presents the development of reference services by using service design and user experience concepts. The reference service design model for academic libraries was developed by adapting the Double Diamond model (Design Council, 2015) and the TCDC design process (TCDC, 2015) that included three phases, namely, exploration, ideation and creation, and reflection and implementation. Furthermore, a digital learning launchpad (DLL) was developed in the form of a Web application to facilitate graduate students to access and use library resources to support their study and research as they need. The researchers applied the reference service design model for the development of DLL for the university library. The DLL comprised five functions, namely, plagiarism checker, search starter, publication, citation, and copyright. It was found that DLL in the Web application format can effectively facilitate users to learn and get reference services anywhere, anytime. Additionally, they can review their knowledge as soon as they want. This tool enhances autonomous learning and life-long learning skills as well.

**Keywords:** reference services; digital learning launchpad; service design; user experiences; academic libraries

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### บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อบูรณาการแนวคิดการออกแบบบริการและประสบการณ์ของผู้ใช้เข้ากับกระบวนการออกแบบและพัฒนาบริการอ้างอิง โดยใช้แนวคิดการออกแบบบริการและประสบการณ์ของผู้ใช้ในการพัฒนารูปแบบแนวคิดสำหรับการออกแบบบริการอ้างอิงสำหรับห้องสมุดสถาบันอุดมศึกษาไทย ในการพัฒนาสื่อการเรียนรู้ดิจิทัล (Digital Learning Launchpad: DLL) ซึ่งเป็นเว็บแอปพลิเคชันที่มีการพัฒนาตามรูปแบบการออกแบบบริการอ้างอิง สำหรับอำนวยความสะดวกให้กับนักศึกษาระดับบัณฑิตศึกษาในการเข้าถึงและใช้ทรัพยากรและเครื่องมือห้องสมุดเพื่อสนับสนุนการศึกษาและการวิจัย ประกอบด้วยพังก์ชัน 5 ประการ ได้แก่ เครื่องมือช่วยตรวจสอบการคัดลอกผลงาน เครื่องมือสำหรับการสืบค้นข้อมูล การเลือกແທลตีพิมพ์ผลงาน การจัดการบรรณานุกรม และลิขสิทธิ์ การศึกษานี้ใช้วิธีการวิจัยแบบการวิจัยและพัฒนา ในการพัฒนาแนวทางการออกแบบบริการอ้างอิงสำหรับห้องสมุดสถาบันอุดมศึกษา โดยผสมผสาน Double Diamond Model (Design Council, 2015) และกระบวนการออกแบบ (TCDC, 2015) ที่ ประกอบด้วย 3 กระบวนการ ได้แก่ การสำรวจ การกำหนดแนวคิดและการพัฒนาบริการ และการสะท้อนผลและนำไปใช้ ผลการวิจัยพบว่า สื่อการเรียนรู้ดิจิทัลในรูปแบบเว็บแอปพลิเคชันสามารถอำนวยความสะดวกความสะดวกให้ผู้ใช้เรียนรู้และรับบริการอ้างอิงได้อย่างมีประสิทธิภาพทุกที่ทุกเวลา ส่งเสริมให้ผู้ใช้บริการสามารถทบทวนความรู้ได้ตามที่ต้องการ อีกทั้งช่วยส่งเสริมการเรียนรู้ด้วยตนเองและทักษะการเรียนรู้ตลอดชีวิต ได้อย่างมีประสิทธิภาพ

**คำสำคัญ:** บริการอ้างอิง; สื่อการเรียนรู้ดิจิทัล; การออกแบบบริการ; ประสบการณ์ผู้ใช้; ห้องสมุดสถาบันอุดมศึกษา

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## 1. Introduction

Reference services are significant services that connect users and academic resources to enable the retrieval of knowledge inside and outside the library. In other words, reference services aim to allow users to access and retrieve information from various information resources as they need (Katz, 2002). This means the heart of the reference services is the users. The circumstance of libraries has been changing rapidly due to fewer users coming to libraries, more academic resources available outside libraries, and faster information retrieval from the Internet. However, reference services still play an important role in libraries with the main purpose of supporting users in what they need. As a result, the form and role of services have also changed. According to Ferguson (2000), librarians must retain three core values of reference services, namely, equity of service, personal service, and service tailored to individual needs. Consequently, librarians must search for appropriate methods, tools, and services and provide them to users effectively and consistently in an actual situation.

According to the related studies, many libraries had developed and improved reference services to respond to the user's needs in the digital era by applying technology and concepts into the services. The reference service consists of 4 functions that are Answering, Information Service, Guidance and Counseling Service, and Information Literacy Instruction as follows: **Answering** is the service that direct interaction with the user is made including assisting the users in what they need. Today, the reference desk has transformed into an online environment. Users can access it from everywhere and every time. Many libraries use technology to embed reference services. Libraries can benefit from technology development for reference service innovation area includes virtual reference services such as E-mail, Web-based contract center software, Mobile application, and Robots (Burke, 2008; Yao et al, 2015). **Information Service** provides the access to full text anywhere any time. Consequently, it saves cost, and it is worth investment especially when some are free. Moreover, it provides various channels to get access to various formats of information (Wolfe, Naylor & Drucke, 2010). Nowadays, information is in electronic and other various formats such as electronic books, audiobooks, pictures, videos, games, blocs, applications, and social networks, etc. (Dey, 2012). This phenomenon results in the easier creation and spreading of electronic information. **Guidance and Counseling Service** is the service to provide the suggestion for searching, getting access, and the use of the information such as term paper counseling, aiding the user in the selection of good works, and research support service and in-depth research requests by specialists who are expert in the specific field. Now, there are many available channels for Guidance and Counseling Services such as Artificial Intelligence, social media, Hotline, Live chat, Mobile application and Robots (Ayeni, 2015; Burke, 2008). **Information Literacy Instruction**, previously, focused on instructing learner skills on information literacy, holding library visits, holding training for small group or subject-focused groups such as how to use the library and how to search for information in the international database. Nowadays, the Information Literacy Instruction service has been improved to add research methodology instruction together with information literacy instruction. This concept is based on the embedded librarianship that is about collaboration. Specialized services have existed in academic branch libraries since

their inception (Drewes & Hoffman, 2010). There are examples of embedding processes including Web 2.0 communication applications such as Facebook, Twitter, and blogs, and the embed librarians and collaborators to online classrooms (Ramsay & Kinnie, 2006).

Nowadays, reference services have changed following users' needs and the advancement of information and communication technology (ICT). Consequently, information management and retrieval have also changed dramatically (Bopp & Smith, 2001). Librarians and reference services now need various tools and technologies to support and communicate with users, such as emails, Web forms, chat, video conferences, and Multi-User Domains (MUD) / MUD Object Oriented (MOO)- which allows users to construct, manipulate and chat or interact with other users and objects, for virtual environments (James, 2002). The role of reference services also includes services such as question and answer, reference book searching, and library introduction and instruction. These additional tasks are specialized real-time support that can be integrated with marketing concepts, namely, customer relationship activities, events, and promotion (Siriprasoetsin, Tuamsuk, & Vongprasert, 2011).

Thai university libraries have changed and developed their services due to the influence of advanced ICT. Sutthiprapa and Tuamsuk (2019) studied the reference services of Thai university libraries and found that they have innovatively developed them by integrating information technology and digital technology into their services. For instance, this has been done through the use of artificial intelligence (AI) technology integrated with Q&A services via Chatbot, the voice of customers (VoC) system to deal with users' complaints, clinic-like services to support information resource access and academic development, information literacy instruction using video clip and online workshop sessions. Khon Kaen University Library (KKUL) [<https://library.kku.ac.th/>] has also developed reference services, including those integrating with ICT such as live chat research support, Librarian Embedded, human books, and a library application to increase online channels and facilitate users. This shows a huge development to reform the library services according to the capacity and readiness of the university library to respond to users' needs.

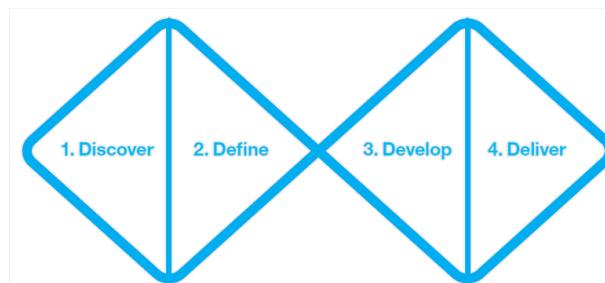
Previous studies proposed library service models integrated with marketing models and user experience concepts. Broady-Preston and Felice (2006) designed a university library model integrated with customer relationship management to develop user-profiles and improve information preparation to respond to users' needs based on user experience. Sadeh (2008) studied the use of the Internet in the daily lives of library users and designed a retrieval system to get easy, fast, and effective access. Further, Gross & Sheridan (2011) studied a library search tool named "Summon" to verify the accessibility, ease, and quality aspects of the use of the tool among participants. The results showed that the interface of the home page that was designed as a single search box can improve the effectiveness of the retrieval system. Moreover, the participants mentioned that a single search was easy to use and increased their satisfaction in receiving further services from the library. Ahenkorah-Marfo & Akussah (2016) found that social media had a great influence on reference service management because it participated as the facilitator in Q&A services and was used as a tool to communicate with users. Curtis & Greene (2004) developed a reference service using the "chat with us" option that was linked to the "ask a librarian" function on a university library website. The results

showed that users can access services via mobile phones to receive real-time consultations and get help from the library. These studies have shown that reference services have been designed and developed in several libraries with the aim to create more tools and channels for their users. Most previous studies focused on service design. However, a study that integrates both the service design concept and user experience to develop an innovative reference service has not yet been conducted. Therefore, this study has been conducted with the objectives to study innovative reference service designs for university libraries, propose a service design concept, and develop a digital learning launchpad as a model for innovative reference service. Researchers had used the innovative reference service model at the KKUL and evaluated it previously. The findings of the study have benefited reference service librarians, as they can use the model as guidance to systematically develop reference services and apply new models to design further innovations for reference service development.

## 2. Service Design Concept

Service design is a holistic and interdisciplinary tool for developing management. It is considered a service science that can be classified under business administration (De Jong, 2014). Service design can add value to a service based on users' or customers' experiences to respond to their needs and provide them with ease to access and receive services. Service design was not only applied in the business model design (Mager, 2010; Moritz, 2005; Stickdorn *et al.*, 2011) but also in library services design, as libraries provide services to various kinds of users similar to a kind of business. Therefore, it is important that library resources are fully utilized and library services are able to respond to users' needs and experiences to enhance the effectiveness of the services (TCDC, 2014).

The British Design Council developed the Double Diamond model that was adapted to be used in numerous business sectors and other organizations. The Double Diamond model consists of four main phases, namely, discover, define, develop, and deliver (Fig. 1) (Design Council, 2015)



**Figure 1** Double Diamond Model (Design Council, 2015)

In Thailand, TCDC (2014) proposed a design process and divided it into three phases. Phase 1, the exploration phase, concerned data collection, investigation, researching, and in-depth data analysis and synthesis to determine the scope and objectives of the research. Phase

2, ideation and creation was related to service creation based on the results from Phase 1 to develop the service image and enhance user experience at the touchpoint. This phase would likely create an option for the users, and the developer would consider the appropriate design in Phase 3. Phase 3, reflection and implementation, concerned the implementation of the most appropriate and valuable service to create a prototype model, evaluate the effectiveness of the model, and fix any flaws before officially using the service model. In 2015, TCDC integrated the Double Diamond model into the design development framework, as shown in Table 1.

**Table 1** Adapted Double Diamond Model (TCDC, 2015)

Phase	Process	Objectives	Tools
<b>Discover</b>	Discover and collect data for model design		<ul style="list-style-type: none"> <li>- User journey map</li> <li>- User diaries</li> <li>- Contextual interview</li> <li>- Mobile ethnography</li> <li>- Remote research</li> </ul>
<b>Define</b>	Analyze data, identify opportunities, and conclude problematic issues from data collection	<ul style="list-style-type: none"> <li>- to analyze results from the Discover phase</li> <li>- to synthesize possible opportunities</li> <li>- to identify the conclusion and confirmation from stakeholders to build relationships among them and get the conclusion following users' needs and service design direction</li> </ul>	<ul style="list-style-type: none"> <li>- Observation of insights</li> <li>- Stakeholder map</li> <li>- Persona</li> <li>- User journey map</li> <li>- Design principle generation</li> <li>- Brainstorming</li> <li>- Design brief</li> </ul>
<b>Develop</b>	Test the prototype based on the results from the Define phase with the wider points of view to create more options that can respond to the target's needs	<ul style="list-style-type: none"> <li>- to develop initial service and design the components of the service in detail as a holistic experience</li> <li>- to test the developed model and receive feedback and suggestions from the users to improve the service</li> </ul>	<ul style="list-style-type: none"> <li>- Service blueprint</li> <li>- Experience prototyping</li> <li>- Business model canvas</li> <li>- Co-creation</li> <li>- Morphological chart</li> <li>- Concept generation matrix</li> <li>- Solution diagramming</li> <li>- Scenario and storytelling</li> </ul>
<b>Deliver</b>	Summarize and synthesize concepts to create the most appropriate service and launch it in the market	<ul style="list-style-type: none"> <li>- to launch the product or service and make sure that the user feedback system works effectively</li> <li>- to share the knowledge from the development process within the organization</li> </ul>	<ul style="list-style-type: none"> <li>- Service blueprint</li> <li>- Business model canvas</li> <li>- Scenarios</li> </ul>

The results of the previous studies that applied service design processes revealed that this process was applied to various organizations, both profit and nonprofit. The objectives of the service design process were to design products and services, understand user experience, and respond to users' needs appropriately and effectively. The service design process lets the organization use the concept model to test and operate the service in the service system and receive feedback for further development to obtain a more effective service model (Design Council, 2015). Moreover, dealing with user experience can guarantee that the user experience and developed service are consistent so that the service can satisfy users, add value to the service and organization, and reach the service standard as an outcome (Mendonca & van Zyl, 2014; Pipatphokakul, 2014; TCDC, 2014; Holmlid, 2008).

### 3. Methodology

The development of reference services by using service design and user experience concepts can be conducted for studying the user experiences and current state of reference services in academic libraries based on the marketing mix 7Ps concept.

The development of the DLL for reference services can be divided into benefits for users, service providers (librarian or library staff), and other involved organizations including faculty libraries, the research administration division, and the graduate school.

This study adapted the Double Diamond model (Design Council, 2015) and TCDC design process (TCDC, 2015) integrated with the user experience concept to create an appropriate reference service design model for an academic library in Thailand (Figure 2). Details of the reference service design model have been provided in the following section.

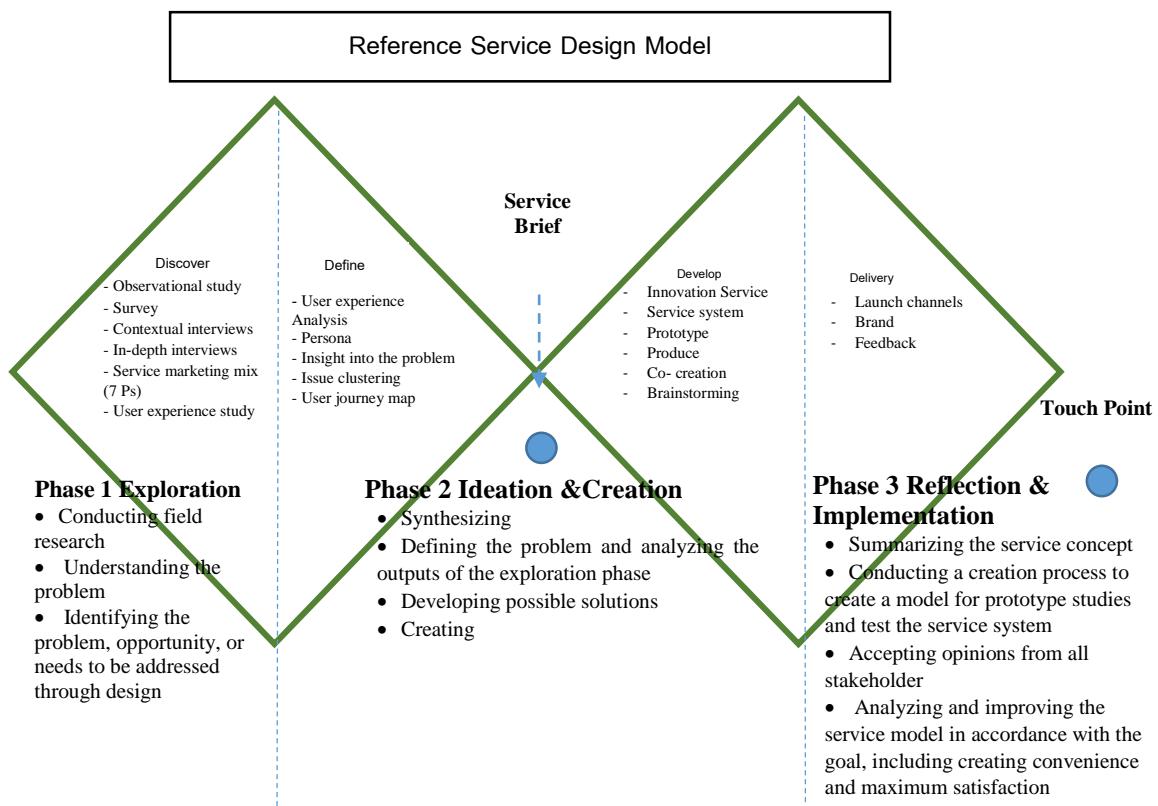
**Phase 1, the exploration phase,** is the process to discover data to understand users' needs, identify the problems, and seek opportunities for them to be addressed through the design. It is a process that deals with problems by using research methodology, which includes investigating the environment and context of the users and conducting interviews and observations. User experience is also a key tool to study users' attitudes, behavior, and motivation in making decisions to receive the service in depth. This process must be systematically planned with clear objectives, expectations, and target groups (Rohrer, 2014; Stern, 2014).

**Phase 2, the ideation and creation phase,** is the process of creating a service model based on the results from Phase 1 and focusing on involvers, stakeholders, and users as co-creators. This phase consists of the following two steps:

**1. Define:** In this step, the problem is identified and analyzed from the results of the exploration phase to conclude the problematic issues and identify the objectives of the service design, further setting the BRIEF based on users' needs and service design direction. The brief must be straightforward and easy to understand by all stakeholders to get ready for the service creation, according to the target conceptual framework.

**2. Develop:** In this step, the most possible design concept is identified by integrating the 7Ps of marketing strategy, innovative service designs, service systems, and prototype produced with co-creation to enhance the effectiveness of the service from various stakeholders' viewpoints.

**Phase 3** is the **reflection and implementation phase** where the conclusion of the ideation and creation phase is applied to create a model and deliver it to the delivery. This phase screens the appropriate conceptual framework to test and study the possible prototype by launching the service into the service system to receive feedback and suggestions. The feedback is then evaluated and used for further improvement to make the service consistent with the target users' needs, facilitate and satisfy users, and effectively enhance user experience at the touchpoint.



**Figure 2** Reference Service Design Model (Adapted from Design Council, 2015; TCDC, 2014; Kotler & Armstrong, 2008)

#### 4. DLL: A Case Study of the Reference Service Design

A digital learning launchpad (DLL) was designed and developed by the researchers to support the reference service of the KKUL. The digital learning media was in the form of a

Web application that could facilitate graduate students to access and use library resources to support their study and research as they needed. The researchers applied the reference service design model to develop DLL for the university library. This was carried out in several phases.

### ***Phase 1: Exploration Phase***

#### ***1. User Experience Exploration***

The user experience exploration was conducted by collecting data from 30 graduate students who received reference services at KKUL. Data were collected by using observation and interview methods. The results showed that most of the graduate students did not have time to receive research reference services and were unable to attend the training program scheduled by the library (55%). Additionally, they needed research support (80%); for example, they needed the aid of Turnitin plagiarism check (55%) and referencing management (40%). Some used the Q&A service at the reference service counter when they encountered any problems in using the library or specialized programs provided by the library. However, there was difficulty in receiving services at the reference service counter due to the inadequate number of librarians at the counter, especially when the users would come to ask for specialized program instruction support for which the librarian had to take time giving instruction. In addition, the librarians at the reference service counter were rotated and some did not specialize in the issues asked by the users and thus were unable to help the users in time. These problems led to a lower standard of instruction and made the direction of the reference service confusing.

#### ***2. User Need Exploration***

The user needs exploration was also conducted with 30 graduate students using the observation and interview methods. The results of the user need exploration showed that users needed the following services from the library:

- (1) Learning multimedia for self-study that was clear, concise, correct, easy to understand, and could be accessed 24/7,
- (2) Online instruction via social media such as “live” sessions that users could access to learn and ask their questions online,
- (3) Online workshops such as MOOC and workshop sessions conducted by librarians at the library so that the users could receive certificates of participation in the workshop,
- (4) In-class workshops conducted by librarians so that the users could receive certificates of participation in the workshop.

### ***Phase 2: Ideation and Creation Phase***

#### ***1. Ideation***

The results from the exploration phase concerning users' opinions about the reference services of KKUL were analyzed and used for developing the DLL. The results showed that users employed the Q&A service to ask about instruction services such as how to search for research articles from information tools and use library and information learning support systems and specialized programs (e.g., Turnitin, Zotero, EndNote). Additionally, users needed the library to provide reference services in and out of working hours, especially for workshops or instruction facilities. Five services were proposed, as follows: a) plagiarism check, b) search problems, c) publishing papers in good ranking journals, d) reference writing and citation, and

e) copyright issues. Moreover, it was indicated that reference services should provide online consultations via social media, including giving instructions, training, and learning materials. Further, these services should be provided regularly, should be up to date easily accessible, and should have the ability to be used by graduate students to learn and conduct research.

## **2. The Development of DLL**

The following elements are involved in the process of development of DLL:

(1) Data analysis. Information about supportive tools for learning, teaching, and conducting research as well as the problems found by users using the library were summarized and collected based on user experience and user need exploration. Frequently asked questions (FAQ) by users about the Turnitin program were selected to be applied to the service design. Software and information resources to support users' learning were collected and created, as the DLL is based on five FAQ topics, namely, plagiarism checking, citation, searching smart, publication, and copyright.

(2) Several tools were selected to create content in the DLL. A Web application was selected to create learning materials for the DLL of KKUL to respond to users' needs. The tools and languages that were used to create content did not violate the Copyright Act B.E. 2537 (1994) and Computer-related Crime Act (No. 2) B.E. 2560 (2017). The DLL was designed to present multimedia for research support via a Web application. The target users were graduate students in KKU. The Web application was designed to be simple, uncomplicated, clean and clear, and systematic so that the users could retrieve the information they wanted in less than three clicks. In addition, graphics were added along with the content to ensure users understand the website more easily. Furthermore, the form and style of the Web application were designed to be harmonious with the official website of KKUL.

## **Phase 3: Reflection and Implementation Phase**

### **1. DLL delivery**

Users can access DLL via <https://library.kku.ac.th/launchpad.php> or the official website of KKUL (Fig. 3), as well as other public relations channels of KKUL such as Facebook, Twitter, Line official, and Live Chat.



**Figure 3.** DLL via <https://library.kku.ac.th/launchpad.php>

The DLL in Web application format effectively facilitated users to learn and access the reference service anywhere and at any time so they could review their knowledge as soon as they wanted. This tool also enhanced autonomous learning and life-long learning skills. There were five functions on the DLL, as shown in Figure 4.



**Figure 4.** Functions of DLL

**1.1 Plagiarism Checking.** This function supports students and faculties in learning how to check for plagiarism using the Turnitin program. It comprises five sub-functions with three- to five-minute-long video clips in each category: a) Turnitin: Introduction, b) Turnitin: I am a student, and c) Turnitin: For instructor (Fig. 5).



**Figure 5.** Plagiarism Checking

**1.2 Search Smarter.** This function contains infographics that suggest searching techniques, strategies, and solutions for the problems related to information search, such as a) too many results, b) a few results, and c) no relate result (Fig. 6).



Figure 6. Search Smarter

**1.3 Publication.** This function recommends journal selection for publication and how to check journal quality by presenting one-minute VDO clips and short descriptions with animations (GIFs) on two topics, that is, a) enhancing your impact and b) journals finder (Fig. 7).



Figure 7. Publication

**1.4 Citation.** This function shows the referencing manual of how to use Zotero and recommends techniques for making references by presenting one-minute VDO clips (Fig. 8).

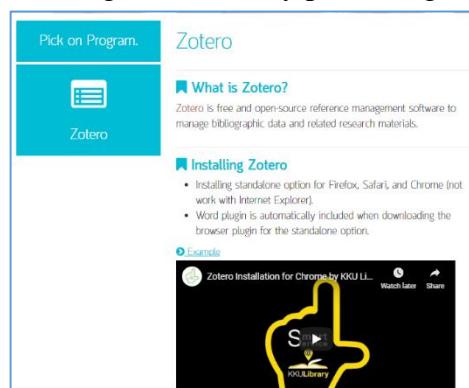


Figure 8. Citation

**1.5 Copyright.** This function suggests how to select legal copyright materials for learning and teaching by presenting infographics as well as providing a link to the original resources so that users can retrieve correct and complete information, as required legally (Fig. 9).



**Figure 9.** Copyright

## 2. Satisfaction Feedback

Feedback was collected online between November 1 and December 31, 2019, from 248 DLL users who were graduate students. The satisfaction feedback was used for further service design development and multimedia improvement. The results of the satisfaction feedback were as follows (Tables 2 and 3):

**Table 2** The number of users that accessed DLL according to topics

Digital Learning Launchpad Topics	N	percentage
Plagiarism Checking	248	100.00
Citation	98	39.52
Searching Smart	71	28.60
Publication	106	42.90
Copyright	85	34.27

Table 2 shows that users accessed DLL mostly to retrieve information about plagiarism checking (100%) and publication (42.9).

**Table 3** DLL users' satisfaction

DLL Aspects	Means	S.D.	Meaning
<b>1. Content</b>	4.48	0.60	Satisfied
1.1 Brief and easy to understand.	4.29	0.76	Satisfied
1.2 Comfortable to use DLL.	4.43	0.79	Satisfied
1.3 Knowledge from DLL benefits learning and conducting research.	4.71	0.49	Strongly Satisfied

<b>2. Style and format</b>	4.32	0.87	Satisfied
2.1 The format on the website is easy to read and use.	4.14	0.90	Satisfied
2.2 Font style, size, and color are easy to read, beautiful, and appropriate.	4.29	0.76	Satisfied
2.3 Multimedia is consistent and comprehensible.	4.29	1.11	Satisfied
2.4 The links to other resources were correct.	4.43	0.79	Satisfied
<b>3. Utilization</b>	4.76	0.32	Strongly Satisfied
3.1 The website is able to be a learning resource.	4.71	0.49	Strongly Satisfied
3.2 The contents are useful and can be applied to use.	4.71	0.49	Strongly Satisfied
3.3 The website benefits learning, teaching, and conducting research.	4.86	0.38	Strongly Satisfied
<b>Total</b>	4.43	0.54	Satisfied

Table 3 represents the users' satisfaction with the DLL based on the range of mean scores (i.e. 4.51- 5.00 = Strongly Satisfied, 3.51- 4.50 = Satisfied, 2.51- 3.50 = Moderately Satisfied, 1.51- 2.50 Unsatisfied, and 1.00 - 1.50 Strongly Unsatisfied). The results showed that the overall users' satisfaction was in the "satisfied" level ( $\bar{x} = 4.43$ ). The users reported they were "satisfied" with the overall content aspect ( $\bar{x} = 4.48$ ). In terms of content, they graded "the knowledge from DLL benefits learning and doing research" the most in the "strongly satisfied" level ( $\bar{x} = 4.71$ ). The users were "satisfied" with the overall style and format aspect ( $\bar{x} = 4.43$ ), and "satisfied" most with the category "the links to other resources were correct" ( $\bar{x} = 4.43$ ). Finally, users were "strongly satisfied" with the overall utilization aspect ( $\bar{x} = 4.76$ ) and "strongly satisfied" most with the fact that "the website benefits learning, teaching, and doing research" ( $\bar{x} = 4.86$ ).

## 5. Conclusion

The development of the reference services design adapted with the Double Diamond model (Design Council, 2015) and TCDC design process (2015) can support learning, teaching, and researching to be more effective and can highly facilitate users. They are easy to access and be able to learn freely in the digital environment, with ease, speed, and save more time. Users can review the knowledge and techniques easily. In addition, Librarians have the time to develop their abilities and capabilities to provide services. The satisfaction feedback is important to help the library to create and develop efficient new services and enhance role interaction which focuses on user experience.

The development of the DLL for reference services can, indeed, facilitate users to learn anywhere, at any time, and review their knowledge as they want. Users can learn by themselves and enhance their life-long learning skills. From the point of the service provider, this service can reduce librarians' duties for Q&A tasks and increase opportunities to create new innovations and improve their research skills. The benefits of the DLL can be divided into benefits for users, librarians or service providers, and other involved organizations.

### 1) *The benefits for the users*

This innovation has reduced the limitation of time that many users faced, being unable to attend the training session scheduled by the library. Moreover, it has reduced the number of FAQs at the reference service counter, as users can now find the answers on their own via the DLL anywhere, at any time. Consequently, users can enhance their autonomous learning skills in the digital environment using the DLL that can respond to their needs and experiences.

### 2) *The benefits for librarians or service providers*

The DLL has reduced problems in conducting workshops, especially in the cases when users' timing and librarians' schedules do not match. Moreover, all librarians at the reference service counter can use the DLL as the main material to follow in the same direction that further reducing confusion. This innovation has also reduced librarians' duties in terms of providing answers about referencing and has given them more time and opportunities to create innovation and develop their skills and abilities to provide more effective service.

### 3) *The benefits for other involved organizations*

The DLL can not only be used by the central library but also by faculty libraries, the research administration division, and the graduate school to increase the quality of university research. Furthermore, other university libraries can apply this model for reference service management to support learning, teaching, and research in universities in Thailand.

## References

Ahenkorah-Marfo, M. & Akussah, H. (2016). Changing the face of reference and user services: Adoption of social media in top Ghanaian. *Reference Services Review*, 44(3), 219–236.

Ayeni, P.O. (2015). The relevance of reference librarian in 21<sup>st</sup> century: a critical look. *Information and knowledge Management*, 5(7), 113-117.

Bopp, R.E. & Smith, L.C. (2001). *Reference and information services: An introduction*. (3rd ed). Libraries Unlimited: Englewood, CO.

Broady-Preston, J. & Felice, J. (2006). Customers, relationships and libraries: University of Malta – A case study. *Aslib Proceedings*, 58(6), 525–536.

Burke, L (2008) Models of reference services in Australian academic libraries. *Journal of Librarianship and Information Science*, 40(4), 269–286.

Curtis, D. & Greene, A. (2004). A university-wide, library-based chat service. *Reference Services Review*, 32(3), 220–233.

De Jong, M. (2014). Service design for libraries: An introduction. In Woodsworth, A. & Penniman, W.D., (Eds.), *Advances in Librarianship*. (pp. 137–151). Emerald Group Publishing: Bingley, UK.

Design Council. (2015). *An introduction to service design and a selection of service design tools*. Retrieved from <https://www.designcouncil.org.uk/sites/default/files/asset/document/Design%20methods%20for%20developing%20services.pdf>

Dey, T. (2012). Cybrarian: the librarian of future digital library. *International Journal of Information Dissemination and Technology*, 2(3), 209-211

Drewes, K. & Hoffman, N. (2010). Academic Embedded Librarianship: An Introduction Academic Embedded Librarianship: An Introduction. *Public Services Quarterly*, 2(3). 75-82

Ferguson, C. (2000). Shaking the conceptual foundations too: Integrating research and technology support for the next generation of information service. *College & Research Libraries*, 61(4), 300–311.

Gross, J. & Sheridan, L. (2011). Web-scale discovery: The user experience. *New Library World*, 112(5/6), 236–247.

Holmlid, S. (2008). Interaction design and service design: Expanding a comparison of design disciplines. *The International DMI Education Conference: Design Thinking: New Challenges for Designers, Managers and Organizations*, 14–15 April 2008, ESSEC Business School, Cergy-Pointoise, France.

James, J. (2002). Digital reference: Reference librarians' experiences and attitudes. *Journal of the American Society for Information Science and Technology*, 53(7), 549–566.

Katz, W.A. (2002). *Introduction to reference work, Vol. 1.: Basic information services*. (8<sup>th</sup> ed). McGraw Hill: Boston, MA.

Khon Kaen University Library. (2020). *Library service*. Retrieved from <https://library.kku.ac.th/>

Kotler, P. & Armstrong, G. (2008). *Principles of marketing*. (12<sup>th</sup> ed) Pearson/Prentice-Hall: Harlow.

Luo, L. (2014). Text a librarian: A look from the user perspective. *Reference Services Review*, 42(1), 34–51.

Mager, B. (2010). *Service design-an emerging field*. Retrieved from [https://www.academia.edu/20566424/Service\\_Design\\_An\\_Emerging\\_Field](https://www.academia.edu/20566424/Service_Design_An_Emerging_Field)

Mendonca, H. & van Zyl, I. (2014). Youth empowerment: The role of service design and mobile technology in accessing reproductive health information. In *Proceedings of the 13th Participatory Design Conference* (pp. 103–106), ACM Press, Windhoek.

Moritz, F. (2005). *Service design: Practical access to an evolving field*. Retrieved from <https://www.scribd.com/document/388256404/MORITZ-Service-design-practical-access-to-an-evolving-field-pdf>

Pipatphokakul, P. (2014). *Service quality*. Retrieved from <https://goo.gl/Dt05Hv>

Ramsay, M. & Kinnie, J. (2006). The Embedded Librarian. *Library Journal*, 131(6), 34–35.

Rohrer, C. (2014). *When to use which user-experience research methods*. Retrieved from <https://www.nngroup.com/articles/which-ux-research-methods/>

Sadeh, T. (2008). User experience in the library: A case study. *New Library World*, 109(1/2), 7–24.

Siriprasoetsin, P., Tuamsuk, K., & Vongprasert, C. (2011). Factor affecting customer relationship management practices in Thai academic libraries. *International Information & Library Review*, 43(4), 221–229.

Stern, C. (2014). *CUBI: A user experience model for project success*. Retrieved from <https://goo.gl/NGFWk1>

Stickdorn, M., Schneider, J., Andrews, K. & Lawrence, A. (2011) *This is service design thinking: Basics, tools, cases*. Wiley: Hoboken.

Suthiprapa, K. & Tuamsuk, K. (2019). Reference services management and innovation in Thai academic libraries: A study based on the market mix 7PS concept. *Proceedings of the 2019 International Conference on Library and Information Science (ICLIS)*, (pp. 523–536). 11–13 July 2019, Taiwan National Normal University, Taipei.

TCDC. (2014). *Service design*. Thailand Creative & Design Center: Bangkok.

TCDC. (2015). *Service design process*. Retrieved from <http://tdc.groov.asia/method/assets/PDF/ServiceDesignBook.pdf>

Wolfe, J.A., Naylor, T. & Drucke, J. (2010). The Role of the Academic Reference Librarian in the Learning Commons. *Reference & User Services Quarterly*, 50(2), 108-113

Yao, F., Zhang, Ch. and Chen, W. (2015). Smart talking robot Xiaotu: participatory library service based on artificial intelligence. *Library Hi Tech*, 33(2), 245-260