Title page

Understanding international users' library experience in the Digital Age—joining the behavioral and experiential aspects

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Abstract

Purpose—The purpose of this paper is to describe, analyze and understand international users' library experience in the Digital Age in order to inform library service design and ensure it provides an inclusive environment. In this study, the behavioral and experiential aspects of user library experience are merged to develop essential interconnections between information behavior (IB) and user experience (UX) in the context of the academic library with the goal of constructing a more holistic understanding of 'library experience'.

Design/methodology/approach—The study was built on the concept 'library experience' through analyzing its essential components of IB and UX. It was developed through findings from mixed methods research, consisting of the quantitative investigation from a library log analysis, and qualitative investigations via cognitive mapping exercises and semi-structured interviews, both targeted on the largest single group of international students in United Kingdom—international Chinese students.

Findings—The findings demonstrated the complexity and multi-layered characteristics of international Chinese students' library context and three unique contexts emerged from the data shaping their library experience. Building on the previous findings on the connections between IB and UX, the work attempted to redefine 'library experience' by joining both behavioral and experiential aspects. It is found that the key components of cultural library experience are the multi-layered context, cultural group's perception, needs, sense-making process and subjective evaluations.

Originality/value—This study joins the behavioral and experiential perspectives together to explore library experience in a more holistic way and proposes a systematic structure to understand and analyze library experience, especially that of international users in a cross-cultural context, which in turn will better serve their information needs and inform the design of a more equal and inclusive library system.

Keywords—library experience, library user study, the Digital Age, information behavior (IB), user experience (UX), international Chinese students

Paper type—Research paper

Introduction

The Digital Age, characterized by an exponential growth in information, an increasing amount of digital born materials, and evolving digital technologies, started in the late 20th century and continues through to today (Salganik, 2019; Smith & Crespo-Dubie, 2018). Within this context,

technology development has changed the way information is produced, stored, organized and accessed and this influences people's behavioral and experiential responses to information. There has been a fundamental shift in scholarly information production and access, with increasing electronic publications, diverse publication and access options, and more Web 2.0 tools that are designed to support scholarly communication etc (Cullen, & Chawner, 2011; Widén, 2010). Libraries, as a bridge between users and scholarly information, are working towards evolving user expectations against this digital transformation backdrop (Connolly et al., 2019). This shift prompts us to think about how 'the digital' has influenced and transformed users' relationship with and within academic libraries and how to holistically understand and analyze library experience to account for both behavioral and experiential aspects.

A further complexity is the notable globalization of library users in this digital backdrop. Since 2016, the British Council has recognized this remarkable shift happening in UK Higher Education (HE) institutions and has highlighted the need to learn more about neglected international student groups in this system (Ilieva et al., 2019). Among all the cultural groups, Chinese students were the largest single international group in the 2020-21 academic year, according to the Higher Education Statistics Agency (HESA). Despite a 5% drop in Chinese student enrollment in the UK due to the Covid-19 pandemic that began in 2019, this group remains the largest amongst all non-EU student groups (32%) (HESA, 2022). Their learning experience and academic achievement has a considerable influence on the appraisal and student satisfaction of the university and the assessment of educational quality (Barefoot et al., 2016). Student experience in the HE system has been discussed and studied extensively by educators; the discourse since the Digital Age has centred around the complex nature of their learning experience in the digitally-enabled society which is driven by multiple human and nonhuman factors when a sociomaterial perspective is applied to discover how students engage in learning practices (Fenwick et al., 2011; Gourlay & Oliver, 2016). Therefore, understanding and catering for international students' academic needs is crucial in supporting this large educational recipient group. However, the extent to which these international and cultural backgrounds are recognized and catered for has been limited, despite the increasing potential for new technologies to personalize library services, improve user satisfaction and explicitly recognize respect for diversity and inclusion (Jaeger, Sarin, & Peterson, 2015).

There is a complexity around the connection and duality of the physical and digital characteristics of library system and services; that is,, the physical and digital aspects of the library are sometimes treated as separate domains which lead to separate investigations of either experiential or behavioral part of usage. For example, qualitative approaches such as interviews, observations and ethnographic methods are commonly used in investigating user experiences in the physical library space (Lincoln, 2002; Paretta & Catalano, 2013; Bryant, 2009). In contrast, quantitative approaches such as large-scale surveys and system analysis are generally adopted to study usage patterns, preferences and other performance indicators that demonstrate behavioral characteristics of users (Steinerová & Šušol, 2005; Bollen & Luce, 2002). It is pointed out that the digital domain has tended to be treated as an isolated system that is "disembodied, decontextualized and free-floating", away from the impact of the physical side (Gourlay et al., 2015, p. 263). Studies that investigated either physical or digital usage of the library can only

reveal a fragmented picture of the interaction between users and the library, while the users' overall experience with the 'library' (symbolically) is overlooked to some extent. Focusing on different aspects of library user studies, information behavior (IB) and user experience (UX) research has been mostly investigated in terms of separate ways of looking into user's behavioral and experiential characteristics respectively. However, exploration over both concepts has identified some interconnections and suggested the value of probing the UX aspect in behavior research (O'Brien, 2011), which brings about new thinking on joining both aspects together in understanding 'library experience'.

The purpose of the paper is to navigate library experience in the Digital Age that considers both behavioral and experiential aspects of a less studied library user group. The research question is as follows:

> *RQ.* What are the behavioral and experiential aspects of international students' library experience in the Digital Age?

To address the research question, a three-year mixed methods research project involving both quantitative and qualitative techniques was conducted to investigate both the behavior and subjective experience of a targeted group of library users - international Chinese students studying in a UK university.

Literature review

International library users

Previous studies have found that international students have certain information behaviors in using and experiencing academic libraries abroad; for example, a high reliance on using digital devices to conduct information searches, the preference for search engines rather than university library resources, and barriers in dealing with local ICTs (Information and Communication Technologies) and languages (Chung & Yoon, 2015; Mehra & Bilal, 2007; Yoon & Chung, 2017). Cultural differences, language barriers, information literacy skills and different library systems design are generally considered to be the main barriers for international students' learning experience and library experience (Duan, 2016; Shaffer et al., 2010). As is pointed out by the PwC report on students today, "as a generation that is more digitally sophisticated than any previously, students expect to be taught and to learn methods that suit their personal preferences and at a pace that they have chosen, not one that is mandated to them" (McCusker & Babington, 2018, p. 4). Library systems and services are updating and diversifying, with students having new requirements under the rapidly developing Web 2.0 and even Web 3.0 tools, such as the evolving requirement for educational-targeted social media platforms (Sleeman, Lang & Dakich, 2020). Their behavior and experience in interacting with the library, need to be assessed constantly by the library, for the library to design a more useful and inclusive system and services for its international cohort.

While there is much written about international library users as a whole and international Chinese students in the context of Higher Education in general, there is a dearth of research that focuses on Chinese students' library experience in particular. There was study investigated

Chinese students' information seeking behavior in a Canada university and found a difference in their behavior compared to that of students from other countries in terms of English proficiency, culture adaptability, educational level, etc. (Liu & Winn, 2009). There had also been quantitative research using large-scale surveys to learn about this group's library experience in an America university, finding a general positive feeling from Chinese students about the library, but a unawareness of some library services, such as reference librarian, and a requirement for multicultural services (Shao et al., 2013). Previous research had identified these students' unique library experience, which demonstrated a need to learn more about this group. Chinese students constitute the largest single group among all the international student groups in UK (HESA, 2022), thus, their library experience, as a response to library systems and services, should be continually investigated using up-to-date research methods, in order to improve their student satisfaction and boost their academic achievement.

Probing into 'library experience'

Library user studies, which aim to understand library users and their relationships with and within the library, have utilized a wide range of approaches focusing on measuring different aspects of such relationships, such as statistical analysis of library system use (Fry & Rich, 2011; Villén-Rueda et al., 2007), observational studies in the physical library space (Mandel, 2010; Suarez, 2007) and user surveys for evaluating library services (Cook et al., 2000; Scoulas et al., 2021). User studies investigate both behavioral and experiential aspects of users in interacting with the library, and it is claimed to be a compound of usability, cognitive, behavioral, and affective aspects (Scoulas et al., 2021). Nevertheless, there is no agreement on the standard way of measuring library experience.

Library experience is generally understood as User Experience (UX) in the library context, where UX is generally a sub-field in the Human Computer Interaction (HCI) domain (e.g, Heath, 2016). Experience is the totality of human interactions and responses to everything encountered, while UX refers specifically to users' interactions and responses to products, systems, services, and objects that are contacted through the user interface (Law et al., 2009). The advent of the concept of UX in the HCI field first raised the interest of academic libraries in the 2000s when usability testing on other web-based systems gained popularity in related fields (Battleson et al., 2001). Academic libraries also started exploring UX on their online services, such as digital library services and websites, by making use of usability testing (Fry & Rich, 2011). UX in libraries at that stage focused on improving the effectiveness of the library website interface and task design to meet users' search goals to perform tasks fluently on library websites (Bell, 2014). In 2007, the library of the University of Rochester in New York published library design and UX ethnographic research, which presented a new way of investigating UX in the library context (Foster & Gibbons, 2007). Many early works on the use of ethnographic techniques in learning about UX in the library context were from libraries in the USA and Canada, and their pioneering studies led to more user-centered research in libraries that looked beyond systems (McKechnie et al., 2006; Duke & Asher, 2012; Forlizzi & Battarbee, 2004; Suarez, 2007). In this methodological shift, UX research in the library has expanded from using mostly quantitative methods (such as surveys and usability tests) (Fry & Rich,2011; Zimmerman & Paschal, 2009) to qualitative methods (such as interviews and ethnographic methods) (Bell, 2014). The subject of UX research in libraries has also showed

noticeable changes, from the focus on mostly library web-based services to physical library space design and user interactions in the space.

Notably, in a library context, the behavioral aspect is often studied in IB research, focusing on information needs, seeking, searching, and other ways users interact with information (which is in abstract form); whilst the experiential aspect often studied in UX research tends to focus on the design process and subjective responses from targeted user groups. It is about investigating the pragmatic function of a product in respect of its design. To understand 'library experience' in a more holistic way, it is necessary to review the distinctions and connections between the concepts of IB and UX, and behavior and experience, in order to demonstrate why these two areas of research are important and interconnected in terms of understanding library experience in the Digital Age.

Information behavior and user experience in the Digital Age

IB is concerned with all forms of human interaction with information (Wilson, 2000) and the focus is primarily on information needs, influential factors, stages and tactics during the process of interacting with information; whilst UX is concerned with human interaction with products or technologies, in other words, the medium that conveys information (Law et al., 2009). The Digital Age brings about a conflation of information and technology or, to put it in another way, a mixture of content and medium. This is frequently applied to academic libraries, where information and services are provided in diverse forms with the support of digital technologies. Therefore, understanding user library experience in this digital backdrop should consider concepts and methodologies from both IB and UX research. Ultimately, both work towards user satisfaction and this brings about the interconnections between the two.

From the perspective of the object of research, it is straightforward to see the distinction between the two concepts. IB studies are concerned with people's pursuit of information to satisfy their needs and preferences regardless of the medium between people and information (Gershon, 1995; Wilson, 2000), suggesting the indifferent role of the tool, technology or any other medium used during this process. In contrast, UX studies are interested in how human-product interaction changes over time with services and products leveraged by evolving technologies or tools being integrated into users' everyday life. LIS researchers are interested in serving users (whether their service is doing its job in terms of meeting user's need), while UX is concerned with engineering products (whether the product is built in regard to requirement).

From the perspective of research origin and area of research, UX emerged and has mostly developed in the HCI field because product design is a primary goal for HCI developers, and UX is integral to users' experience of the product. Compared to that, IB is mostly studied in libraries where user behavior with library information is used as a direct indicator of library usage. It is the concept which is closely connected to, for example, information needs and information literacy which are essential elements required to understand users.

From the perspective of research focus or modelling concept, IB research is focused on the stages of individual's performance of seeking, searching and using information where the modelling

generally portrays those stages within a complete process. UX research, however, focuses on users' overall appraisal of a product rather than looking into separate actions during the process. LIS professionals support their users through a process of looking for information; while UX is generally used to support users through building a pragmatic product that serves them well in a designed environment. Ultimately, however, both IB and UX are concerned with user satisfaction and this is why the emotional and affective factors are included in both concepts.

Compared to those distinctions, it is the connections between the two concepts that support the argument of this current paper. The first easily noticeable connection is suggested from models or frameworks of both concepts. Kuhlthau's information search process model in 2004 integrated affective, cognitive and physical factors in learning about the responses of people in interacting with information (Kuhlthau, 2004). Wilson's 1999 model revealed contextual factors that have an impact on information seeking behaviors, including personal (psychological, affective and cognitive states), social and external factors (Wilson, 1999). In UX frameworks, such 'non-instrumental' factors were also found to be important components in user perceptions. Hassenzahl and Tractinsky᾽s facets of UX listed emotion, affect and other non-instrumental factors as essential components in revealing UX (Hassenzahl & Tractinsky, 2006). Beauregard and Corriveau's conceptual framework described perception, emotion, thoughts, attitudes and intention that emerge and continually develop through the UX process (Beauregard & Corriveau, 2007). The emotional aspect is viewed as an important component in both IB and UX studies, for they both are rooted in how people understand, perceive, interact, go about and feel about the world (O'Brien, 2011). In both regions of research, emotional, cognitive, and affective factors play a considerable part in influencing and evaluating the process because the human whose behavior and experience is directed by subjective judgement is put in the centre of the investigation.

From the methodological view, both concepts emerged with an emphasis on a quantitative approach, but gradually shifted to qualitative investigations: IB research started with log analysis and surveys to identify patterns and trends in behavioral data and has moved towards a use of qualitative techniques, for example, interviews and ethnographic methods, to learn about individual's behaviour and inner reasons. UX emerged from usability studies where the performance indicator is key to evaluation but shifted to the use of qualitative techniques to learn about subjective responses and perspectives. There has been a general shift on all sides towards a taking more human-centered view with the goal to explore the inner reasons behind users' behavior and experience.

Researchers in the information studies field have noticed interconnections between human-information interaction (HII) and UX. HII, as a broader concept that includes IB, explores how people interact with information regardless of the medium joining the two (Fidel, 2012). Researchers have agreed to view information as experiencesince Laurel suggested understanding information interaction as moving from "looking for something" to "examining or experiencing it" (Laurel, 1993, p. 140). Interaction with information is not merely a single action to find or solve, it is where an individual's expectations and motivations are shaped and when the path of experience is formed and altered. O'Brien suggested using a UX lens to learn about HII, borrowing UX frameworks to "explore information seeking and use as processes within as well as outcomes

and predictors of human experiences"(O'Brien, 2011, p. 70). Albeit generalizing all forms of interaction between human and information to HII, it explicitly points out the link between the two; IB, as one manifestation of HII, is connected with UX and worthy of further exploration. In O'Brien's work, three parallel streams were found between HII and UX, which are context, needs, and sense making (O'Brien, 2011). It is argued that context is paramount to both HII and UX in evaluating and understanding the matter and they all underscore the social aspect of context where behavior and experience is emerged, guided and influenced (Courtright, 2007). Needs in IB research are viewed an important element of the information seeking process, driving the individual to fill a knowledge gap, make sense of a situation or reduce uncertainty (Dervin, 1998; Kuhlthau, 2004; Wilson, 2000). However, needs in UX research are generally viewed as "the value inherent in a product, with users' motivation for choosing or using a technology, or with how people evaluate a system" (O'Brien, 2011, p. 80), which is broader than the needs for information. This broader understanding of needs in UX research may be borrowed to consider information seeking and using processes more thoroughly. The last commonality found is the role of sense-making approach from Dervin in probing HII and UX problems; 'gap bridging' is regarded as the motive and driver in information seeking and the sense-making process during which leads the way people respond to and deal with the gap (Case, 2012). UX researchers also leverage sense-making approach to understand what is happening during the experience (McCarthy & Wright, 2004). O'Brien's work on proposing to borrow UX as a new direction to learn about IB is crucial in terms of taking the expanding view from UX which looks beyond the stages of IB and seeing information experience as more integrally embedded in human experience (O'Brien, 2011).

Arguably, information interaction/behavior as a component has been noticed and expanded as a part of UX research and many UX frameworks depict this. The CUE-model (components of user experience) by Thüring & Mahlke indicates emotional reactions as indispensable components of UX and they view the interaction process, usage behavior, user experience and the appraisal of the system as interrelated parts, providing a relatively comprehensive view on human-technology interaction (Thüring & Mahlke, 2007). Expanded ideas in UX research see behavior as a playing role in understanding and evaluating experience and so requiring investigation. Expanding UX to include behaviour benefits understanding of how experience is formed and evolved through interaction, and how behavior and experience are altered by external changes of context and technology.

In the library context, UX research has similarly expanded from narrow usability studies of web-based interfaces to more comprehensive investigations of how people are experiencing libraries using ethnographic methods. Given the distinctions and connections between IB and UX in what has been discussed here, the way UX is used to understand human behavior can be borrowed to learn about IB in a more holistic way; as it is asserted that "UX invites us to see information interactions as rich and varied narratives, thus enabling us to explore information seeking and use processes and outcomes simultaneously and more deeply as we attempt to keep pace with the changing information condition" (O'Brien, 2011, p. 87). This paper takes both concepts of IB and UX into consideration in analyzing and understanding international users' experience in the library context.

Research methodology

This paper is based on findings from a three-years mixed methods research project based at University College London (UCL) with a largely qualitative stance to uncover the complexity of international users' library experience and to investigate library service delivery to enhance the future library user experience design. Within an interpretive paradigm, it focused on understanding human interactions with the world and how they react within the social and historical contexts (Creswell, 2009).

The research is reported in two parts, the first part outlines the preliminary quantitative investigation through a library log analysis covering the library usage data from September 2017 to August 2018 (Fu, Lomas & Inskip, 2021). In this paper, the second part presents findings from a qualitative exploration by cognitive mapping exercises and semi-structured interviews conducted between September 2018 to August 2019 with 15 international Chinese students studying Master's level programmes at UCL.

Data collection

The first part of data was collected from a library log analysis, a quantitative investigation into all the users' behavioral statistics in the digital library system, revealing usage information such as user demographics, clicks, actions, searches, devices usage, etc. It indicated an overall view on the library usage status and helped to identify a large number of international Chinese users (clues including system language settings, and demographic settings). The findings from the log analysis suggested that Chinese library users had a relatively low bounce rate[1], longer session duration and viewed more pages in each session compared to other users, suggesting their unique library experience from the behavioral aspect. This also informed interview question design around such topics as their habits of using the library system, functions and pages they normally spend time on, any difficulties they encounter, any differences between the library system they used in China and in UK, etc (see *Appendix A* for the Research script about the procedure of the session and interview questions). This preliminary investigation reveals 'what they do' on the library system, whereas the reasons and their self-interpretations about that behavior should be explored by qualitative approaches.

As a sense-making tool and a narrative-elicitation tool respectively, cognitive mapping and semi-structured interviews were then conducted to draw out the subjective reflections and perspectives about their behaviors and experiences in the library (Kjaergaard & Jensen, 2008; Simons, 2009). Purposive sampling was used to recruit participants with a focus on international Chinese students[2] studying in one-year PGT programs in UCL in the qualitative data collection. All the participants had their UG education in Chinese universities and, at the time of this data

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[1] Bounce rate is an important indicator demonstrating the effectiveness and relevance of the web content in terms of the landing page.

[2] For the purpose of this study, it refers to students from mainland China and does not include students from HongKong, Taiwan, Macau and the disputed islands as the Chinese students from the mainland constitute the majority and the educational system in mainland China is distinguished from those other areas where the education might have a Western (colonial) influence.

collection, were studying in one-year PGT programs at UCL so have experienced the academic library systems in both countries. The sample studied for this research was 15 Chinese students from nine different academic areas in UCL: literature, humanities, social science, engineering, education, medicine, economics, architecture and computer science. There were 12 women and 3 men, all aged between 22 to 30. It should be noted that the Chinese student community at UCL is massive[3], and the participants came from different cities in China and were studying different subjects. The 15 students in this research only represents an example of UCL PGT Chinese students whose library experience is also an example of that for the wider Chinese student community. They were recruited by invitation emails sent via the departmental email lists and recruiting posts to UCL Chinese students group on the Chinese social media platform (WeChat) in early April 2019 with a £10 Amazon voucher given to each one as an incentive.

They were invited to participate individually in a one-hour session, which consisted of a cognitive mapping exercise and a follow-up semi-structured interview. Upon their arrival, the purpose and procedure of the session was explained; in the cognitive mapping exercise, they were invited to draw a cognitive map of their perceptions and experience of the library in six minutes; after that, they were asked to explain their drawing and interview questions about their library information behavior and library UX were asked (see *Appendix A* for the Research script about the procedure of the session and interview questions). All the participants engaged in the study individually with the researcher from May to June 2019 in a quiet study room in UCL.

The qualitative data collection was approved by the Research Ethics Committee at UCL; and was qualified as low risk. Personal information (such as participants' names, addresses, student numbers, etc) was not collected. And as the size of the Chinese community in UCL is considerable, with many similar names, this minimized the risk of identifying individuals.

Data analysis

Data obtained by the cognitive mapping practice and semi-structured interviews was analyzed by qualitative content analysis (QCA) as it is useful in analyzing large amount of verbal data collection through narrative techniques and also providing possibilities in quantifying categories (Schreier, 2012); in other words, it helps meanings to emerge where there is less existing research about a phenomenon. A more complete and detailed illustration of how cognitive maps were analyzed has been published as a separate method-oriented work (Fu, Lomas & Inskip, 2022). During the data analysis process, qualitative analysis software, NVivo, was used to organize data (cognitive maps and interview transcriptions), support the coding process and the identification of themes. The codes were created and checked twice by the researcher to make sure the codes were applied consistently and completely.

Meanings which emerged from the codes were explored and interpreted by the researcher with the goal of navigating both behavioral and experiential aspects of international users' library experience (see *Appendix B* for themes and sample codes); although there is some doubt that meanings 'emerge' as they are constructed by the researcher's experience and by the coding and

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[3] More than 11,000 (https://www.ucl.ac.uk/prospective-students/international/china)

research objectives, the codes that arose from the data do help with the exploration and understanding of a phenomenon that has been less studied. Building on the previous findings where context is seen as a crucial concept in both IB and UX research, combinations of behavioral and experiential elements found in the current study with Chinese students are organized by three contexts:

Context #1: Academic library experience as a part of a learning experience within a specific educational system;

Context #2: Academic library experience within the digital world;

Context #3: Academic library experience within the physical world.

In this study, the context is treated as a container where the researched phenomenon resides (Dervin, 1996). The three contexts are also the three themes that emerged from international Chinese students' library experience, which contains a variety of unique, but not necessarily independent behavioral and experiential elements.

Findings

The three contexts/themes found in this study are containers that define the conditions about the researched group of people and phenomenon. The first context, library experience as a part of a learning experience within a specific educational system, contains codes that represent Chinese students' overall learning experience in the UK higher education environment and their educational cultural experience that they regarded relevant to the library system and services. The second context, academic library experience within the digital world, embraces codes that demonstrate the bigger virtual environment where digital library system and services takes a small part, and their experience is expanded based on their behaviors in the virtual world. The third context, academic library experience within the physical world, contains codes that show the bigger physical space where the library building is situated, and so their experience is formed on the basis of their behavior in the physical world. The representative codes, examples of cognitive map elements and interview quotes under each theme (context) can be found in Table 1. Notably, the three contexts are not necessarily experienced as separate—they are to some extent, experienced simultaneously. In order to describe, analyze and understand international Chinese students' library experience in an organized way, it is helpful to decompose them and to report the composite of findings within distinct containers.

Table 1 Three contexts, and related codes

Category	Code name	Code description
Context 1: academic library experienced as a part of the learning experience within an educational system	Identity	Awareness of their identity as an international learner in a unfamiliar educational system
	Language	Language issues (including concerns, self-evaluations, and awareness) encountered in interacting with the library
	Meaning construction	The process they go through in building connections between two languages (Chinese and English) in order to construct meanings in the new system
Context 2: academic library experienced within the digital world	Digital devices	The behaviors, experiences about the usage of digital devices (including desktop, laptop, and mobile devices) in interacting with the library and the digital world
	Digital literacy skills	The reflections on their own digital literacy skills in using the library system
	Digital library interface	The perspectives, behaviors and evaluations on the digital library interface
Context 3: academic library experienced within the physical world	Affordance of library equipment	The way they use and feel about the characteristics and features (affordance) of the tool, equipment, facilities and services that provided by the library
	Library navigation	The way they perform and feel about the navigation in the library
	Feeling of "library environment"	The "library environment" is described as an environment that is conducive to study; this code represents how they describe, make use of, and duplicate this feeling in their learning activities

Context 1: academic library experienced as a part of a learning experience within a specific educational system

In this context, the sense-making process, for some individuals, first starts at the pre-arrival stage when they plan for the study abroad. At this time the focus of sense-making is to be equipped with a general understanding of the academic structure and requirements of the new academic system and to be aware of the different tools and resources used in the new system. Information they receive directly from the system (e.g. university, department or library), such as program reading list and pre-arrival guide, is designed for this purpose, to supply prospective students with useful information about the university and the program; however, Chinese students in this study indicated an overwhelming and unpleasant feeling when talking about their preparation for the new academic system primarily due to the language barrier they encounter:

> *[…] if possible, the faculty and staff should sort out some essential things [...] instead of directly giving us a bunch of readings that we would be declined to read further, or we may feel hard to understand. (Participant 11)*

At this stage, they are struggling in the transition from the system they are familiar and comfortable with to the one that seems intimidating (Jindal-Snape & Rienties, 2016); and once they feel overwhelmed, they show reluctance and anxiety to change their learning method and cognitive style (by using their mother language), which is also described by Chatman and Wilson as avoiding 'emotional risk'—a way to cope with information needs and a fear of uncertainty when they feel the knowledge gap is too big to handle (Chatman, 2000; Wilson, 1997). The

academic library, although not taking part in providing information directly at this stage, is expected by them to provide help around sorting and sifting the essential resources to a sensible length to give international students extra help from librarians' expert view.

Compared to information they received from the system itself, Chinese students engaged in the study valued information from knowledgeable others more (for example: senior Chinese students who had learning experience in UK before) to make sense of the new system and the academic tools within it to get mentally prepared:

> *there are former senior Chinese students [...] they recommended some helpful books[…] they have a full and comprehensive understanding of this course[…]to help me get prepared, which makes me aware of what I am going to have (in the course) and I don't feel confused at all. (Participant 12)*

They demonstrated a strong reliance on the Chinese student community in order to prepare them for a different educational system and to help them construct a general understanding through sharing personal experiences. This finding is in line with the previous work which shows that stories from prior students, especially from the ones who have experienced the same situation, are vital in helping international students adapt to the new environment (Ishimura & Bartlett, 2013). Previous students also resonate with those prospective students' feeling of anxiety, uncertainty and worry as they experienced the same situation before and through sharing their stories; they give mental comfort and confidence to them (Lindh, 2015, pp. 130–135).

Making sense of the academic tools in the new system is another notable action Chinese students take in this context. They were found to spend time making sense of the mechanism of the library system, especially comparing the system with the one they used before:

> *Actually, I feel very confused when I first use our UCL library system [...] because when I was in China, our library system was only for retrieving physical books, it's like a book catalogue [...] for articles, there is a link to CNKI, Wanfang Data[…] at first, I was thinking what the system is for and how to use it. (Participant 4)*

Some spent time exploring the system by themselves and some received training from the library; in both ways, they demonstrated a pathway to form their perception of what the academic library system looks like in the new educational system and what they expect to obtain from it.

In most of the cases, it was the grasp of language that influences their interaction with the library system and, in the end, forms their library user experience and learning experience within the new educational system. The academic library, in this context, was perceived as the study support that helps with their transition across educational systems and languages. Targeted academic support, such as providing the right terms or expressions of academic concepts, is indispensable in helping them make up any inadequacy of language and helping them build connections between concepts in two languages. Yet, this kind of support was claimed to be absent, and they expressed strong expectations to obtain it within the system and from academic library which they regard more trustworthy:

I think it [academic concepts] should be somehow connected by using a semantic web[…]it should assist your search by giving you similar concepts and associated terminology[...]I think it would be nice to have a small plugin [on library website] that helps with the language. (Participant 4)

It has been asserted that multilingual information access facilitated with language tools is crucial in improving library user experience and promoting user-centred design (Nzomo et al., 2016). Demanding connections of concepts linking with each other semantically, they were, in effect, hoping to build connections between the two academic systems. Whether the academic library is taking an active part in this process is shaping how they experience library and learning within a different educational system. Instead of focusing on the scale of information they can get during this sense-making process, working out the way to find proper information via academic tools is emphasized when they interact with the library in this context.

When students experience the academic library as a part of a learning experience, the academic library constitutes an important part of the educational system in which they are situated (the UK HE system in this case) and serves students by supporting their learning and boosting academic achievements (Brown & Malenfant, 2017). Situating in this context, Chinese students in this study are found to see themselves as learners in the role of PGT students studying in a foreign country and having learning tasks to complete. The academic library, which is situated at the heart of this system, is regarded as trustworthy, reliable, and authoritative, and is assumed to have the resources that help them complete the current course and get the degree; in other words, it is seen as 'learning support' during the time when they are abroad. As they are experiencing academic library in this way, their primary need is to complete learning tasks (coursework, group works, essays, seminars, etc.) and to achieve their degree which has specific requirements for them in this educational system. Hence, the academic library is regarded as facilitating this process through providing high quality scholarly resources. Rather than focusing on the scale of collections, the evaluation towards academic library in this context focuses on the resource quality and whether the learning material and related knowledge is explained clearly and explicitly to help them complete the learning tasks.

Learning within the UK HE system, which is different from the one they have been familiar with in their home country (the Chinese HE system), Chinese students are confronted with different academic structures, requirements and expectations, and most importantly, with all the related activities conducted in a different language (Byrne et al., 2019). The appraisal of library and the related experience in this context is found to be based on the comparison between the past library system they used to be situated in and the current system that takes time for them to get familiar with; and it involves a transition of identity from a native student in the educational system they are associated with to an international student in a new system. If taking the academic library as a gateway to knowledge, less in terms of access to resources but more about exploring meanings and connecting concepts, it becomes an issue as they, as international learners, encounter hurdles to building connections and using appropriate expressions to seek for the 'right' information and ensure they obtain what they truly need from the library system. Therefore, building connections and promoting understanding in the new educational system is regarded as more vital than the actual seeking and using of information in the way that it

determines how they make sense of their needs (for example, the information strategy they use to handle learning tasks and the information sources they look for). As a continuing process throughout the time abroad, it involves building a general understanding of the academic structure and requirements (e.g. PGT program curriculum, rules and procedures, and assessment and examination) (Hyldegård & Hertzum, 2013), familiarization with academic tools (e.g. library system, referencing style), and more vitally, thinking and learning in a different language. They construct knowledge and come up with their own understanding of the new academic system through seeking information on their own or from others, and they refine this construction and understanding throughout the time with ongoing tasks and experiences; this is what Waterman (1990, p. 41) refers to as 'structuring the unknown' to make the environment intelligible through building a 'repertoire' of understanding, or it can be understood as a sense-making process when being confronted with a changing environment (Ancona, 2012).

Context 2: academic library experienced within the digital world
When they perform information searching digitally, the Chinese students in the study presented two major methods of information searching facing different situations: firstly, in the situation when they know the specific name, keyword, or title of resources, they go to the university library system and copy in the known keyword to get free access to information; secondly, when they only have a vague concept or topic to explore, they were inclined to search in both Google Scholar and the university library system to compare the search result, adjust search keywords and formulate a search focus:

> *I search directly by the title which is from the reading list given by the teacher[... if not, I may first search in Google Scholar, and after I find what I want, I copy and paste the title of it and search in the library system. (Participant 11)*

> *[...] I normally go to Google Scholar, find something that cannot be found in our library system, and then put the article name in the Explore search to download that specific article. (Participant 7)*

Compared to worrying about the quality and authority of resources when they perceive academic library in the first context within the UK HE system, in this context they are more concerned about the scale of information they can get when they view the academic library system as part of the digital world. Therefore, the information they get from the library system is evaluated with other similar academic sources, for example, Google Scholar and academic databases in China. They also care about the readability and convenience of searching, so authority becomes a less important thing and thus, they would go outside of the academic system to seek for information, for example, from Google, YouTube or social media platforms, which would also be compared with information from the academic library system.

In effect, they perceive the academic library in this case as a digital resource provider rather than a knowledge discovery tool. They also distinguish the two resource providers in this situation based on the applicability to their information needs and the mechanism to present the search results. This shows their information coping strategy in estimating self-efficacy, that "an individual may be aware that use of an information source may produce useful information, but doubt his or her capacity properly to access the source, or properly to carry out a search" (Wilson,

1997, p. 563). Being satisfied with information found via a familiar information source, they make assumptions before the actual search and they have doubts about whether similar results can be found on the new system; therefore, they save time and just go for the familiar source.

The issue of language barrier is intensified when they seek for information in this virtual environment where they need to select the 'right' input keyword to search for information and a straightforward result list is presented to show the outcome, which produces a direct impact on subjective feelings about the library system performance, for example:

> *[…as] I am not a native speaker, if I don't know how to express the keywords, I can't find the most relevant documents [...] so I normally go to Google to search for the proper expressions and then search after browsing some authentic expressions[...]Or I may send an email to the teacher to ask if there were any keywords that he recommends for writing the paper. (participant 5)*

Googling and asking knowledgeable others for keywords are the strategies found with Chinese students in bridging the gap; improved result relevance after those strategies shows that it is the language issue that hinders their information searching activities and library experience. It has been found that non-native speaking students exhibit problems in manipulating vocabularies, terminologies and expanding concepts during their information seeking (DiMartino et al., 1995; Mehra & Bilal, 2007). International Chinese students are found to be fully aware of this issue and they expect to get relevant support from the library, which is currently not offered. As a result of that, understanding the terminologies before conducting their information searching in this context is regarded as essential in all the intellectual activities and is believed to be helpful in terms of improving information seeking efficiency.

It is found that when the academic library is experienced as a part of the digital world, it escapes the academic system in terms of its physical location and is perceived as a digital entrance to the mass of online information. The digital library interface is seen as a gateway to knowledge (via the search box on the library interface) and as a tool to organize, categorize and make sense (via filtering or advanced search functions). In this context, Chinese students are found to perceive themselves as seekers of knowledge whose task is to find the 'right' information to satisfy certain information needs in a convenient way. Their library experience under this context mostly reflects their information seeking behavior in the library where concrete strategies, information retrieval tasks, and digital literacy skills are taken to fulfill information needs. The library is seen as one of the online sources or gateways where they look for information. In this case, the academic library system is perceived and evaluated with the same set of criteria as for other online sources. Instead of focusing on making sense of how the new system works and building connections between the two languages as in Context 1, they are more concerned about the usage experience of virtual interfaces. They also require the library system to be a digital assistant that helps them to find the 'right' resources in an effective way and to make this searching process go smoothly.

Context 3: academic library experienced within the physical world

In this context, when the academic library is experienced within the physical world, international Chinese students view the library building as a place or environment that is conducive for study where they can concentrate and immerse themselves in learning activities, as it is indicated by a participant:

> When I study in the library and everyone stays in the library till very late, […] such concentration on learning forms a good atmosphere. (Participant 13)

Students' perception of learning atmosphere is found to be a multi-sensory experience which is activated by bodily response in the space and is constructed by themselves (Cox, 2018). They perceive themselves to be someone that is moving around and living in the world who requires a stable physical space to feel safe in. In this sense, their bodily experience generates subjective feelings and sensations through moving around and physically being in the space (Evans & Baker, 2009; Hopwood & Paulson, 2012). Perceiving the library in this context, the physical sensation they get from the physical library, for example, walking among bookshelves, reading physical books, etc, remarkably influences students' library experience. The physical elements within the library form the special library sensation that boosts their behaviors and activities in the library; subconsciously, they get the idea that "this is a place to study and work" when they enter the physical library and see the related elements.

Chinese students are found to view the physical library more as a study and social space rather than a place where physical collections are preserved. Being aware that the physical world is more constraining than the virtual one in terms of requiring more time and effort to acquire similar resources, digital technology is an important player in this context to facilitate and make up for the constraints, helping to build the desired environment for study. They see the library as a physical space that is conducive to study and has co-located facilities and resources that are beneficial to study, such as desktops, loanable laptops, printers, etc:

> I am more willing to go to the library to study, because the library in UK has a comfortable learning environment and better facilities. Also, there are lots of services, for example, you can loan laptops from library, or you can use the library desktop, etc. (Participant 3)

Chinese students in this study are found to view it as a place to work rather than for searching for information. This perspective has also been found in previous research (Sadler & Given, 2016). Perceiving the library in this way, they hope to find their own place and create an environment with everything they need to perform their academic tasks, whether it is with the support of the library facilities or its digital technologies. They perceive it as "a hybrid of information resources and collaborative and independent workspace" (Bryant et al., 2009, p. 8).

When they are in this context, the activities they perform are mostly in the digital form. The desktops in the library were preferred by most of the Chinese participants, but they stated that their personal laptop are also used along with the desktop to search for documents, forming a personalized workplace all together with different devices. Digital devices serve as the 'space' for most of their intelligence work, where they seek for information to understand and interpret, and produce outputs by writing. Technologies are also seen as tools that bridge the physical and digital worlds, which is expected to support their intelligence work anytime anywhere, creating a digital world with all the information available.

If looking at the library as a physical place, which makes its context the real world, there appears to be a tension as students also want it to be a social space where they can connect with other physical entities. This is also found in other students' perceptions that the library is seen more as a "place of collaborative learning and community interaction" (Montgomery & Miller, 2011, p. 229) or a "third place" as proposed by sociologist Ray Oldenburg where they can freely relax, interact, and engage with their community (Oldenburg, 1989), rather than a place that merely holds physical collections. They have the need to connect with the community, boost knowledge, and learning collaboratively with their peers. This has also been strengthened as when the library is perceived as a learning space, it is serving the role of "facilitating social exchanges through which information is transformed into the knowledge of one person or group of persons" (Bennett, 2003, p. 4).

However, being social and being quiet when studying is conflicted in this case, technology is helping with the issue in terms of creating a digital space for users to communicate and interact with peers, as one participant said:

> […] a communication platform? Like some forums, where you can communicate with other users […] where users can discuss in this system or rate a book in this library system […] I think it can be combined with the topic groups, like Douban[4], where there are ratings and comments for books. (Participant 10)

Instead of communicating with other library users face to face, Chinese students hoped for socializing with others through a library 'virtual forum', similar to the concept of academic social-networking sites. By discussing the books and resources under certain topics with other users who have similar academic interests, they wished to gain knowledge from their peers and satisfy social needs in the academic activities in a convenient format. This finding is in line with previous research on academic social-networking sites that there is a trend in academia that users communicate with each other online with the motivation to get professional knowledge, get self-promotion and to interact with their peers (Meishar-Tal & Pieterse, 2017).

Discussion

Through decoding and analyzing international Chinese students' library experience in this study, their behavioral and experiential aspects of experience are organized and reported via the three contexts. The context in this study is viewed as "a composite of things, comprised of unique, but not necessarily independent, elements or aspects" (Kelly, 2006, p.1731). Noting that the three contexts are in fact overlapping with each other and those behavioral and experiential responses are happening simultaneously during their library experience, while separating context into multiple distinct layers is helpful in the way that it acts as a container that holds a variety of combinations of elements related to information behavior and user experience.

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[4] Douban: a Chinese social networking service website that allows registered users to record information and create content related to film, books, music, recent events, and activities in Chinese cities.

To visualize the three contexts, a diagram (see Figure 1) was created based on the findings. The three circles in different colors are the three contexts that were reflected in international Chinese students' library experience; they are separated by their unique characteristics, which are summarized in each square.
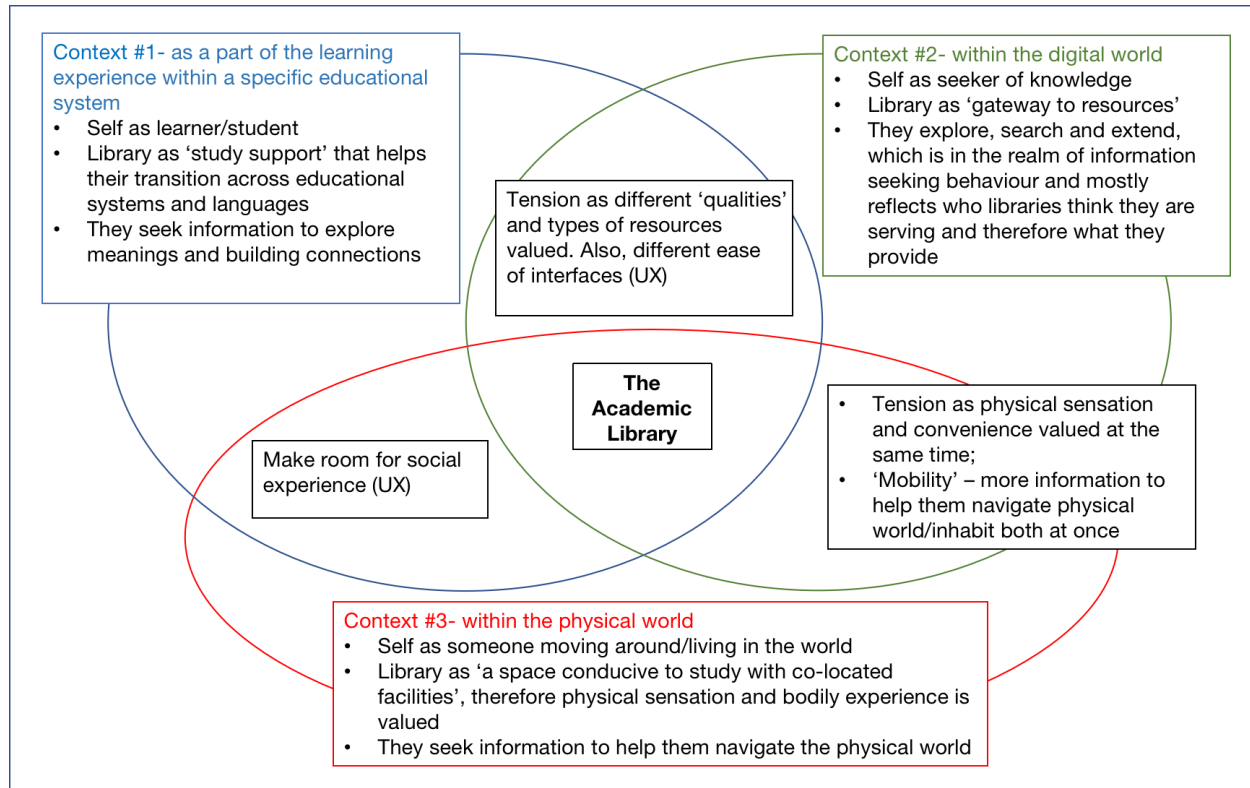

Figure 1 Diagram of international Chinese students' library experience

In the first context when seeing the library as a part of their learning experience within a specific educational system, Chinese students perceive the library less as a concrete reality but more as an abstract concept. This concept positions the library as more than a provider of academic resources or a knowledge center, instead, it takes the role of a learning facilitator or a trustworthy academic assistant that supports their sense-making process during their learning abroad and helps with their learning transition into a new academic system. They assume and expect it to provide the information necessary for international learners, especially in helping them make sense of the educational system and the rules attached to it, easing and speeding up their transition into a different academic system.

When they perceive the academic library within the physical world, they view it more as a space conducive to study (individually or collaboratively) with essential co-located facilities, at the same time they perform most of their learning activities digitally. Focusing less on its function of storing hardcopy materials, Chinese students perceive the physical library more as a professional workplace where they can think and study without interruption in a quiet atmosphere, which is in line with the previous findings on 'library as a learning place' or 'a learning environment' (Freeman et al., 2005; Juceviciene & Tautkeviciene, 2003). It was also found that Chinese students

perceive it as a place where academic services are provided related to their learning, which is in line with the idea of the library's role of a 'service provider' (Pinfield et al., 2017). At the same time, they hope it to be a space where they can socially engage and learn with their peers and find a sense of belonging, in order to gain motivation, and reduce the feeling of isolation, which is in line with the concept of library as a 'third place' which emphasizes on the functionality of collaborative learning (Montgomery & Miller, 2011) or library as a 'home' which stresses on the emotional feeling of belonging (Mehta & Cox, 2019).

The three contexts are containers of compositions of elements and they overlap with each other as they are experienced simultaneously. However, because Chinese students pay attention to different aspects in the three contexts, conflicts and tensions may emerge where they need to make choices. If perceiving the library in both context 1 and 2, they need to balance the resource quality and information seeking efficiency using different interfaces (academic library interface versus other interfaces). When experiencing the library in both context 2 and 3, they should assess the way they interact with the information as the physical sensation of using information is challenged by the convenience of digital use. While the crossover of context 1 and 3 emphasizes social experience in the new educational system, and thus, endeavors should be made to satisfy this aspect in both contexts.

Making sense of Chinese students' library experience through context, which is the crucial concept in both IB and UX fields as presented in the literature review, this study organizes the codes/meanings from the data by the three contexts where international Chinese students find themselves when interacting with the library. In further analyzing their library experience, the three aspects - contexts, needs and sense-making, which are found to be the three connections between IB and UX, are projected onto the findings. The goal of doing that is to identify which aspects are found in describing Chinese students' library experience and which are missing. Table 2 is a summary of how the three aspects (Aspect 1-3 in the table) found as commonalities between IB and UX are represented in the three contexts in the current study. Apart from the three aspects that are found in previous research, two missing aspects are identified, which are 'how people perceive themselves to be' and their 'assumptions', listing as Aspect 4 and 5.

Table 2:The summary table of the five aspects determined by context

Context/aspects	Context#1: experience as part of the learning experience within a specific educational system	Context#2: experience within the digital world	Context#3: experience within the physical world

Aspect 1: Sense-making: information seeking strategies	Make sense of the academic requirements and tools and prepare for language to build connections	Seek and browse in an efficient way with two languages	Seek for information to help the use of physical library facilities
Aspect 2: Sense-making: Appraisal of the system	Assess the value in helping with their learning transition to a new educational system; evaluate the quality and trustworthiness of resources	Evaluate the efficiency to get sufficient academic resources; assess algorithm accuracy in being intelligent to know what they need	Appraise the design of library space and facilities in terms of supporting their learning
Aspect 3: Needs	Support their learning transition in terms of helping with meaning exploration and language assist	Provide massive academic resource in a speedy and smart way	Design handy library space that is conducive to learning
Aspect 4: How people perceive themselves	As an international student/learner	An information seeker	As a moving body with sensations
Aspect 5: Assumptions	Get language or other targeted supports that may help them adjust to a new educational system	Get any easily accessible online information or digital resources that relate to their information needs	Assume it to be a location with adequate and handy facilities that is conducive to study

These five aspects are interrelated, constituting people's perceptions, behaviors, subjective evaluations and needs in their library experience. To categorize those aspects, they firstly demonstrate their behaviors (aspect 1); secondly, the subjective evaluations, in other words, how they evaluate things and activities in the library (aspect 2); thirdly, the needs and requirements for the library (aspect 3); and lastly, the perceptions of their identity and role, in other words, who they are in that context (aspect 4), and the perceptions of the academic library, in other words, what system they are in and what they expect it 'to be' (aspect 5).

Building on the existing recognition of the important role of context in both IB and UX research (O'Brien, 2011), the findings presented in this paper confirm that context plays a vital role in shaping the library experience and brings about perceptions, behaviors, and subjective evaluations towards needs that can correspond or conflict. It should be noted that context is a complex thing to define and understand; philosophically, "the attempt to be thorough in understanding context leads to a total contextualization, in which everything becomes the context of everything else. Such a contextualization is equivalent to total relativity" (Scharfstein, 1989, pp. xii-xiii). Agarwal summarized in his work that context has many facets and is perceived differently (Agarwal, 2017) and Dervin highlighted that context is not a permanent thing but changes over time (Dervin, 1997). This makes it a challenge for researchers to distinguish one context from another. Even with the current research setting which is within the academic library,

its compound role, and diverse ways to engage with the users expose it to multi-layered contexts. More importantly, students within the academic library are being put into a complex context, which consequently brings with it different ways of perceiving and interacting; their behavior and experience in one context is at the same time influencing the others. In essence, the "complexity of the social world and associated human behavior and the complex nature of the human psyche" (Wilson, 2016, p. 1) is what this paper has been exploring and uncovering; this way of analysis, separating the three contexts by grouping combinations of elements, demonstrates students' different priorities of behavioral and experiential responses. Technically, context is the starting point of the library experience and determines how students understand their roles and relationships with the library and how they cope with the needs in that context. It shapes both their behavioral and experiential responses. Other international users may have different contextual dimensions that trigger and shape the library experience, but the three contexts found in this paper are the specific ones that are clearly mapped by Chinese students participated in the study.

Apart from the three commonalities between IB and UX found in previous literature, in joining the behavioral and experiential dimensions, this paper found another key element, which is that of perception. Although being recognized as an important component in UX research (for example, as depicted in the CUE model (Thüring & Mahlke (2007)), it is generally overlooked in IB research. This paper demonstrated that students' perceptions of their role and their relationships with the library set up their interaction with it and continually influence the way they behave; their perceptions also change throughout their experience within the library. This new finding challenges the existing UX understanding of perception which is claimed to emerge after the user's interaction and is understood in a narrow sense that it is built from temporal interaction (Thüring & Mahlke, 2007), and can be summarized as 'perception of interaction' when using a certain system. In the library context though, library experience is much broader than that in the typical UX sense and involves more elements that break the temporality. Nonetheless, it still should be distinguished from the concept of 'experience' which is the totality of human interactions with everything encountered (Law et al., 2009). This paper proposes a new understanding of 'perception' in understanding library experience in both behavioral and experiential ways, and names it as 'perception of experience', which extends the typical definition of 'perception' in UX research which is the "process of acquiring and interpreting sensory information" (Beauregard & Corriveau, 2007, p. 328). This new idea of 'perception of experience' is how people see themselves as having and employing agency in the library context.

During the sense-making within the academic library, an individual's perception, as the way they view themselves in relation to the library, regulates and alters their attention, assumptions and goals in experiencing the library. They may go back and forth iteratively to make sense of who they are, what they are expected to have and what to do in this system depending on the context change. This finding on the vital role of perception extends Dervin's sense-making approach (Dervin, 2008) regarding what is carried with the individual, that apart from the personal context, their perception goes with them during the whole sense-making process. It also provides insights into IB research by revealing perception's role in shaping and regulating an individual's information behavior, and ultimately shaping their library experience.

The context, needs, perception, and sense-making process (information seeking and appraisal of the system) constitute the Chinese students' library experience; this experience should not be simply classified into IB nor UX, instead, should be viewed as how library users make sense of themselves and the library, their needs and situation continually, and bridge the gaps through the library with an evaluation of the outcomes. For Chinese students, their library experience is made up of continuous internal and external sense-making processes; context triggers and shapes those sense-making processes, and perception alters and influences those processes.

Conclusion

This paper has explored the connections between behavioral and experiential perspectives of human experience in the academic library context with the specific library user group - international students, aiming to fill the gaps in learning about international library user experience through a case study on international Chinese students learning in a UK university.

The perspective of Chinese students in exploring library experience offers new insights into the diversity of library users and the context which sits around them. The findings reveal how the academic library plays its role in helping Chinese students' learning transition to a new educational system by supporting their sense-making process. As a large student population whose learning experience is crucial to universities in the UK, the exploration of Chinese students' library experience contributes to the field in terms of uncovering their unique information needs, ways of perceiving, interacting, and experiencing and more vitally, reveals the cultural impact influencing their context of experience, and their perceptions, which further regulate the library experience. This can inform the design of more inclusive systems and services in academic libraries to serve international users. More significantly, it adds understanding to the cultural dimension of the Chinese community in the UK HE context, providing insights into future research about cultural issues in HE.

By identifying the key behavioral and experiential components of the library experience of this ethnic group, namely multi-layered context, perception, needs, sense-making process (information seeking and appraisal of the system), the study provides an improved understanding of the library experience of a set of culturally diverse library users in the globally connected digital environment and the contexts which sit around them. It confirms the need to link and explore both physical and digital contexts in conjunction. In addition, it evidences particular needs for Chinese students and the possibilities of better understanding and supporting all international students taking into account their support needs when transitioning into non-native library environments.

Declaration of interest

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Appendix

Appendix A: Research script for qualitative data collection

- Before the session:
    - Email invitations shall be sent out to confirm time and venue of the session, with information

sheet about the research information and research process attached in the email for participants' information
- ◼ The researcher shall prepare A4 paper, color pens, printed information sheets, printed consent forms, Amazon vouchers, sign-up sheet, recorder, laptop, mobile phone
- ● On the arrival:
  - ◼ The researcher shall go through the information sheet with the participant and answer any questions they may have. Upon their confirmation, the participant shall then sign the ethical consent form. The research shall record participant's information (programme, age range, gender, undergraduate university)
  - ◼ The research shall explain the research method, cognitive mapping, to the participant and answer any questions they have about the research method

Cognitive mapping (around 10 mins)

You will be asked to draw a cognitive map of your perceptions of the library (digital, physical, mobile or other forms that you consider as a library) using three different colored pens. You need to change the pen color in every two minutes and I will give you notice when the time is up. This color-changing is aimed at presenting the drawing sequence and relative importance of the things you come up with[5].

You can draw your perspectives, thinking, experience or expectations on the library service. You can draw places, technologies, applications or things in your study life that you regard as helpful to your study needs. You can also draw how you have been using the library system.

You can draw this map in different ways and there's no right or wrong way to draw up your mind. You can include words, texts, keywords, phrases, abbreviations, characters, rough scribbles, or diagrams in your drawing. You can also draw a concept map or mind map if that helps you with representing your thinking.

Semi-structured interview (around 40 mins)

First, can you explain your cognitive map (in the order of your drawing)? Can you try to label all the elements on your map?

Then, the semi-structured interview is conducted and three aspects of interview questions are asked:

(1) As an international learner: your learning experience in China and UK? Your cultural experience?

(2) As an information seeker: What information/where/how do you seek for to satisfy your study needs? What/how you find information on the library system? How you use technology to support your information seeking?

(3) As a library user: How do you use our library system? (habits/technology/functions) How do you evaluate it? (What you like/don't like) Your suggestions and expectations? Your perspective on the concept of 'smart library'?

Prompts for the interview

Those prompts shall be asked under each aspect if there is less responses being elicited from the participant by the above exploratory questions. The relevant prompts shall be asked according to the participant's response. The prompts are not set in order and there is no settled sequence of the questions.

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[5] This method comes from Priestner, A., & Borg, M. (2016). Uncovering complexity and detail. In In User experience in libraries-applying ethnography and human-centered design (pp. 1–8). Routledge.

(1) As an international learner:
-Based on your learning experience in China and UK, can you explain the difference you find?
-Have you done anything to prepare your learning in UK? Do you find it useful?
-When you were in China, what information did you usually search for meeting learning needs? And how did you search for them?
-When you are in UK, what information did you usually search for meeting learning needs? And how did you search for them?
-Do you find your learning habits changed because of the country?
-What the library system you used in China is like? In terms of the interface, way of structuring the resources and the user experience (UX)
-What do you prefer about the library system in China and the library system in UK?

As an information seeker:
-What activities do you usually do in your learning process? Can you think up of the scenarios or contexts of your different learning activities? (locations, tasks and information you need to find)
-How do you use different devices in your study? Can you explain in detail the different context/situation/environment/time you use different devices? (is there a preference)
-Do you use your mobile devices to learn? How?
-How long do you usually spend to seek information on the library system? What's your habit of using the library system?
-What information do you usually find on our library service page? (Can you show me how you do that on the library page?)
-Are there any difficulties you encounter when you are using the library system in UK? (UX) If so, why do you think you cannot find it? Can you think up an example/a time when you failed to seek for something?

As a library user:
-Have you used a digital library product before? How is it?
-What information do you usually find on the mobile library?
-How do you evaluate our library system? How do you evaluate it on different devices?
-What functions do you find most useful and satisfied? What functions you rarely use?
-From the perspective of international student, do you have any suggestions to help improve the library system?
-What's your understanding and expectations of the concept of 'smart library'?
-How do you think our library should leverage the technology or different devices to improve its services in the future in particular to support international students?

Appendix B: Themes and sample codes

Category	Code name	Code description	Examples from cognitive maps/interview transcriptions
Context 1: academic library experienced as a part of the learning experience within an educational system			
	Identity	Awareness of their identity as an international learner in a unfamiliar educational system	- *"there are former senior Chinese students who learned this major in UCL and I asked them related questions about the course. [...]recommended some helpful books[...] to help me get prepared."(participant 12)*
	Language	Language issues (including concerns, self-evaluations, and awareness) encountered in interacting with the library	-*"these are textbooks in the reading list and some are very theoretical an hard to understand. So I searched the Chinese versions and read them."(participant 10)* -*"sometimes probably because that I am not a native speaker, if I don't know how to express the keywords, I can't find the most relevant documents that I want[...] "(participant 5)*
	Meaning construction	The process they go through in building connections between two languages (Chinese and English) in order to construct meanings in the new system	-*"like the 'social network analysis'(SNS), [...] many articles would not put 'social network' in the title but actually used SNS as research method[...]which is not reflected in the title[...]but in references, so it needs deep excavation to get them." (participant 3)* - *"in the material science, we have a word which is* 气凝胶*(aerogel) in Chinese, if I use the [general] dictionary to translate, it's just the combination of the two words, air and glue. However, it has a special name aerogel" (participant 12)*

Context 2: academic library experienced within the digital world			
	Digital devices	The behaviors, experiences about the usage of digital devices (including desktop, laptop, and mobile devices) in interacting with the library and the digital world	*(Multi-task screen on digital devices by participant 4)*
	Digital literacy skills	The reflections on their own digital literacy skills in using the library system	- *"Sometimes I want to use these techniques to limit my search, but it turned out the limit is somehow too much and for some reason I can't find anything[...]Probably I am not quite familiar of it and don't know how to use it properly." (participant 4)* - *"Although the librarian taught us [retrieval techniques] before, I may not understand it at that time and not sure how to use it properly." (participant 5)*
	Digital library interface	The perspectives, behaviors and evaluations on the digital library interface	- *"If the interface can be very simple, straightforward and convenient that can let me search for the book I want quickly is probably the biggest demand for me." (participant 6)* - *"I don't like the design of the interface that every time when you log in, several pages will be open [...] anyway, I think it is complicated." (participant 4)*
Context 3: academic library experienced within the physical world			

	Affordance of library equipment	The way they use and feel about the characteristics and features (affordance) of the tool, equipment, facilities and services that provided by the library	- "*I use desktop as the main device in this library environment, because it has a larger screen and is connected to the UCL system[…] our university has the stable internet connection, so it is more stable, more convenient […]*" *(participant 4)*
	Library navigation	The way they perform and feel about the navigation in the library	- "*when I go into the library and (I hope) it can give me a map inside the library to lead me to exactly that bookshelf, that I can read it on my mobile phone.*" *(participant 9)*
	Feeling of "library environment"	The "library environment" is described as an environment that is conducive to study; this code represents how they describe, make use of, and duplicate this feeling in their learning activities	- "*I am more willing to go to the library to study, because the library in UK has more comfortable learning environment and better facilities.*" *(participant 3)*