Exploring Mobile Devices Adoption amongst Performing Arts Students

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ABSTRACT

Purpose: This research aims to study the information needs and online information-seeking behaviors on mobile platforms of performing arts students at the college level.

Design/methodology/approach: Survey instruments were used to collect data from performing arts students at the Hong Kong Academy of Performing Arts (HKAPA), the metropolitan's major performing arts tertiary institution. Data collected were analyzed through descriptive statistics and other statistical methods, and the music-related students were compared with the production-related students.

Findings: Our result reveals that performing arts students all owned their mobile devices and often used mobile apps for non-academic purposes, but they did not often use mobile library services or read online academic contents with their mobile devices. Our participants considered inadequate signal coverage, slow loading time, difficulty in reading on a mobile device, and the lack of specialized mobile apps were the more significant barriers affecting their usage. There are some significant differences between the music-related and production-related student groups in that music-related students watched lectures on the library websites and used electronic music scores more often than the production-related students.

Practical Implications: This study contributes to the input for enhancements and policies to future mobile services and facilities of performing arts libraries.

Originality/value: There have been scant studies on this topic, especially in Asia.

Keywords: Information needs; Mobile devices; Online information-seeking behavior; Performing arts libraries

INTRODUCTION

The use of smartphones and mobile technologies in academia has been well received and recorded (Krishnan, 2011). However, the information needs and behavior amongst performing arts students are likely to be different from students in conventional disciplines due to the differences in their curricula, i.e., arts and sciences vs. performing arts (Clark, 2013). Prior research (Thelwall *et al.*, 2003; Ho, 2014) has already pointed out that different academic disciplines would face a different level of impact in the online environment, and we can anticipate this situation to be more severe in the mobile learning environment. Thus, more studies have been conducted to investigate the information needs for non-conventional disciplines, such as Art and Design (Lo *et al.*, 2016; Chen *et al.*, 2018) and Nursing (Lu *et al.*, 2008). As far as we know, there are scant researches in the information need of performing arts students. Therefore, we explore this through a questionnaire survey at the Hong Kong Academy for Performing Arts (HKAPA), which fills up an important research gap in the mobile device adoption of performing arts students, especially in the Asian regions.

Founded in 1984, the HKAPA is a tertiary institute offering professional studies in performing arts in Hong Kong. It provides studio practice-based certifications, including professional diploma, advanced diploma, undergraduate, and postgraduate programs in various areas such as the Chinese opera, dance, drama, film and television, music, and theatre and entertainment arts (Choa, 2007). The HKAPA has a group of libraries, i.e., Academy Library, Film and Television Library, and Music Library (the HKAPA Libraries) offering collections of traditional academic libraries as well as numerous collections of performing scores, plays, motion pictures, audio recordings, and videos in both physical and electronic forms for supporting the teaching and learning in the HKAPA. As such, the operation of the APA Libraries is quite different from traditional academic libraries as they have most of their collections in digital media instead of printed materials.

Similar to other academic libraries, the APA Libraries are also moving on to provide library services through mobile devices as these customized services provide high availability and convenience for users. As virtually all instructors and students own their mobile devices and smartphones, which currently possess the computing power and the network bandwidth comparable to desktop computers, the use of mobile technologies is becoming an essential part of teaching and learning (Lam *et al.*, 2019; Ko *et al.*, 2015; Shin *et al.*, 2011). Adopting mobile technologies, library services are now deliverable via mobile devices, which also lead to new forms of usage of the library (Yip *et al.*, 2019; Krishnan, 2011).

As a result, this study aims to gain insights into the information needs and online information-seeking behaviors on mobile platforms of performing arts students in college. This contributes to the input for enhancements and policies to future mobile services and facilities of performing arts libraries, and address questions on how instructions, learning, resources, facilities, and research services to these performing arts students could evolve and be improved. In particular, we are interested in the following Research Questions (RQs):

RQ1: To what extent the performing arts students use mobile devices to access learning and other online

resources provided by their library?

RQ2: What are the differences in using mobile devices for learning between different majors of the performing arts students?

This paper is developed as follows. After this introduction, we present a literature review. Next, we discuss our methodology and present our data analysis. We then discuss our results before concluding our paper.

LITERATURE REVIEW

Mobile Learning

With the advancement of information technology (IT), today's learning materials are delivered through electronic means, including videos, computers, televisions, and so forth, which enable e-learning services flourishing (Urdan & Weggen, 2000). Mobile technologies allow people to learn anywhere anytime. They improve the collaboration and interaction among instructors and students. The need for switching from traditional learning platforms like a classroom to mobile learning platforms for enhancing the learning experience is necessary (Lo *et al.*, 2017; Lam *et al.*, 2010). Quinn (2008) defines mobile learning as e-learning through mobile technologies, which pinpoints the significant change in technological media and implies that mobile learning is an advanced form of e-learning. The integration of mobile technologies and applications has become the critical success factor that enhances the teaching and learning environments (Lau *et al.*, 2017; Cochrane, 2010).

Users can select appropriate mobile devices and e-learning software to maximize the support of their mobile learning experience. E-learning software and applications on smartphones are becoming an essential topic in the future as the market shares of these applications increase continuously in the market (Boeder, 2013). Using smartphones for gathering information and learning will exceed similar activities on personal computers and laptops sooner or later. With contemporary design and development of mobile applications, these devices better support learning to benefit learners (Wai *et al.*, 2018; Subramanya & Farahani, 2012). The use of mobile devices and smartphones become a necessary powerful learning tool in higher education (Lo *et al.*, 2017; Yu, 2012). In particular, the implementation of mobile services in higher education is recommended because it improves usability, learning support, and tailored educational contents (Fung *et al.*, 2016). There are more and more universities developing mobile websites for their learners and started attracting researchers' attention (Al-Khalifa, 2014). Even though these new smartphones and applications are developed and updated rapidly due to the growing demand, there is still a lot of room for improving the learning experience by using these learning apps on mobile devices (Lo *et al.*, 2017; Shin *et al.*, 2011).

There are many examples of using mobile technologies and smartphones to support teaching and learning in different areas of higher education. Mobile devices and applications have been shown as an effective way of teaching and learning in computer science (Boticki *et al.*, 2013). Other studies explore the potential of using mobile devices in language teaching and learning. For example, Hung and Chao (2012) discover that university students accept mobile technologies as a language learning tool, and mobile

technologies help engage students in a self-directed learning process and improve their learning performance. Godwin-Jones (2011) also considers mobile technologies as a great way to achieve the goal of language learning because mobile technologies encourage and assist learners in enabling and providing a means for learners to combine formal and informal learning. Ho and Ho (2011) show that the use of mobile messages helps engage learning outside of the classroom, and the personality traits of the users have a significant influence on the adoption of e-learning (Dewan & Ho 2013). In particular, learning the language and culture of other countries on social networks using mobile devices without the restriction of time and place is even more effective (Zhang *et al.,* 2017). In general, recent evidence shows that social networks have a significant impact on students' educational quality (Jalali & Bouyer, 2019).

However, challenges posed by the mobile devices themselves may create hindrance to the adoption. The breaking of iPad screens has been identified as a particular issue (Wang, 2014). Likewise, the small screen size affects the reading experience of learners (Hayes, Joyce, & Pathak, 2004; Ko *et al.*, 2015), the small keypads of most mobile devices do not promote fluent and satisfying input, and some students regard the cost of applications and occasional unsatisfactory Internet connection as impediments to using mobile learning technology (Ko *et al*., 2015; Wai *et al*., 2018).

Mobile Library Services

Apart from using mobile technologies and smartphones to support teaching and learning, they can be used for library-related activities (Bomhold, 2015). The technological developments and increasing use of mobile devices provide an opportunity for libraries to extend their services (Lippincott, 2010; Ko *et al.*, 2015). Libraries offering mobile access to library databases and services are useful to library patrons (Dresselhaus & Shrode, 2012). Facilitating the accessibility of library information services with mobile applications allows users to access the library resources without the restriction of time and place (Lau et al., 2017). Kelley and Orr (2003) also discover that students prefer to access electronic resources and materials rather than printed versions even when they are inside the library.

Mobile library service is one of the earliest mobile applications providing online databases for users to access. Cutshall, Blade & Bandy (2001) reveal that developing successful library service involves five major elements, which concerns much on improving operations efficiency and usability such as minimizing the amount of typing and making it easier for users to quickly find what they want through basic intuitive navigation, while giving mobile users a choice between mobile and full-size webpage is also important. Therefore, many mobile library websites maintain direct links to their full-size library homepage and database pages.

Based on a large-scale survey on a sample of 10,491 students in the U.S. by using the Technology Acceptance Model (TAM) as a theoretical framework to examine the determinants of the students' behavioral intention to use of mobile learning and mobile library resources, Lee (2011) argues that factors such as performance expectancy, social influence, and perceived usefulness are significant determinants of behavioral intention to use mobile learning. The result concurs with the findings of Cutshall, Blade, and Bandy (2011)

where performance factors like efficiency and usability are crucial to the adoption of mobile library service. Besides, social influence representing the norm of acceptable behavior that an individual is expected to conform to in a particular group, community, or culture is a crucial factor in the adoption of library service besides performance factors.

Concerning usability, mobile library service, with the capability of providing information conveniently and providing advance searching functions for expert users and helpful error messages and guidance, are crucial to university students (Fung et al., 2016). Besides, a national survey on 39 major universities in China sponsored by "Project 985" (Wikipedia, 2020) reveals that 84.6 percent of these universities have opened up WeChat reference services, which is a new mode of mobile library service developed under the WeChat (social media platform). This demonstrates the tremendous benefits of developing mobile library services using social media, such as low development cost, automatic cross-platform service, adaptive screen, low acceptance cost, easier promotion, strong user viscosity, strong interactivity, and real-time consulting (Wei & Yang, 2017). Thus, Internet-enabled mobile technology offers a unique opportunity for libraries to provide electronic resources and information services to the users (Chandhok & Babbar, 2011; Fung et al., 2016). Libraries are indeed adopting mobile technologies for the library services to accommodate the changing needs of users' information needs (Li, 2013; Hyman *et al.*, 2014; Lo *et al.*, 2017).

In recent years, library users have a high demand for using library catalogs with mobile devices and smartphones (Cummings *et al.*, 2010). Users are also interested in accessing research databases as well as information and reference services on mobile devices (Seeholzer & Salem, 2011; Fung *et al.*, 2016). Besides, more researches have recently investigated how students from different disciplines have different needs for library services. For example, Wai *et al.* (2017) discover that the usage of mobile apps for a sample of 150 undergraduate students of the University of Hong Kong from the Business, Education, and Engineering faculties has no significant differences. Surprisingly, Lau et al. (2020) find that students of Library and Information Science (LIS) at Peking University are slightly more active in using mobile devices for some learning activities, but slightly less active in using library online services and resources than non-LIS students. On the other hand, Foung and Chen (2019) discover the online behaviors of design students and accounting students in a university English course are different in terms of starting days and completion rates. As the library services required for production-related and music-related are quite diversified (Lo, 2016), this motivates our comparison of these two groups of students on their use of mobile library services.

Research Gap

To sum up, using smartphones for learning and study can bring several major benefits to learners. First, mobile platforms can provide flexible learning environments for learners to gain access to information without any restrictions of physical space, and improve their learning experience (Zhang et al., 2017)`. Second, it can encourage interactions among learners in sharing contents and resources through social collaboration (Lo et al., 2017; Lam et al., 2010). Lastly, it can enhance the effectiveness and efficiency of learning, which allows users to access learning materials more conveniently (Cutshall, Blade, & Bandy, 2001).

Moreover, the performing arts studies are shifting from scarcity to abundance of digital data, while available funds to preserve culture is scarce (Borelli, 2013). Mobile library services play a critical role in helping the diffusion of culture and values and preservation of the history of performing arts through convenient access to digital archives. We intend to improve mobile library services, particularly information retrieval for performing arts through this research.

However, most researches on mobile library services were conducted using data collected from learners of traditional colleges and universities. Even though these studies show how the collection of traditional academic libraries, i.e., collections of books, periodicals, and databases, fulfills the information needs of teachers and students, there is a lack of research in studying the different behavior and needs of performing arts students (such as those in HKAPA) with those in traditional academic institutes. Therefore, we would like to look into such issues in this study.

METHODOLOGY

Research Context

In this study, we used a quantitative questionnaire to collect the responses from students of the HKAPA to explore how they use mobile technologies for information retrieval, access to library services, and daily communications. The questionnaire was prepared in English, and the survey questions were drawn from the prior literature (Dukic *et al.*, 2015; Ko *et al.* 2015; Lo *et al.*, 2016). The selection and modification of the survey items were based on the expected information needs of these students according to the literature (Lo, 2016; Mayer 2015; Medaille, 2010) and performed by a panel of researchers, and a pre-test were performed using student participants for finetuning the wordings used in the survey. The final survey contained three parts. Firstly, the participants were asked to provide their demographic and mobile usage information. Then, they were asked to respond to questions relating to their habit and preferences of using mobile devices in daily life and library-related activities. Lastly, our participants were asked to respond to a series of questions about their opinions on accessing online library services.

Data Collection

We recruited our participants at various libraries of APA during a two-week period. The participation of the survey was on a voluntary and anonymous basis. After screening out incomplete and irrelevant responses, we obtained 43 responses. These participants, on average, used ten to fifteen minutes to complete the survey. The data collected were analyzed using SPSS Version 23.

We divided the participants into two groups for comparison: music-related and production-related. We used descriptive statistics to analyze their demographic backgrounds and their usage pattern of mobile technologies in general. For the perceptions of mobile technologies and their frequency of usage of different academic and non-academic apps, we used quantitative survey items to collect their feedbacks. Their feedbacks were measured using 5-Likert Scale (1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Very often). The data collected were analyzed using the *t*-test and U-test as appropriate.

The demographic backgrounds of our participants are summarized in Table 1. The numbers of male and female respondents were about even. Their age ranged from 18 to 39, and most of them were full-time undergraduate students from the HKAPA. Most of them had an annual income of less than US$10,000 (about HK$78,000) and spent US$12-51 and an average of US$24 on their wireless services monthly subscription fees. Two-third of them were using 3G wireless services, and the rest of them were using 4G wireless services.

Table 1. Demographic background of respondents.

Demographics	n = 43
Gender	
Male	22 (51.2%)
Female	21 (48.8%)
Age	
Under 20	14 (32.6%)
20-29	28 (65.1%)
30-39	1 (2.3%)
Role	
A full-time Student	41 (95.3%)
A part-time Student	2 (4.7%)
Major of study:	
Production-related (N = 26, or 60.5%)	
Drama	9 (20.9%)
Film & TV	14 (32.6%)
Theatre & Entertainment Arts	3 (7.0%)
Music-related (N = 17, or 39.5%)	
Music	6 (14%)
Chinese Opera	4 (9.3%)
Dance	7 (16.3%)
Level of study	
Fast Track Vocational Certificate	1 (2.3%)
Associate Degree	2 (4.7%)
Bachelor	37 (86.0%)
Master	3 (7.0%)
Annual Income	
Below US$10,000	40 (93%)
US$10,0000-20,000	1 (2.3%)
US$20,001-50,000	1 (2.3%)
US$50,001-80,000	1 (2.3%)
Wireless service	
3G wireless services	28 (65.1%)
4G wireless services	15 (34.9%)

RESULTS

Attitude on using mobile devices

In Table 2, we report the general usage pattern on the mobile device usage of our participants. First, we note that about half of the participants used tablets as one of their devices for Internet connection, and almost all of them use their smartphones to access the Internet frequently. Plus, all of them used their mobile devices to access the Internet even when a computer with Internet access was readily available. Further, most of them accessed the Internet for at least 6 hours per week, with an average of 24 hours per week. Some of them even spent more than 40 hours online per week. Concerning their attitude towards their mobile devices, about a quarter of our participants would like to follow the trend and used the most updated models of smartphones, and another quarter was more reluctant to upgrade their phones.

Table 2. General mobile usage pattern.

Mobile Usage Pattern	n = 43
Mobile devices owned with Internet connect ability	
Smartphone only	18 (41.9%)
Smartphone and Tablet	15 (34.9%)
Smartphone and others (PDA, E-reader, Google Glass, etc.)	2 (4.6%)
Smartphone, Tablet, and others (PDA, E-reader, Google Glass, etc.)	6 (14.0%)
Text-based mobile phones with GPRS	1 (2.3%)
None of the above	1 (2.3%)
Most often used mobile devices	
Smartphone (e.g., iPhone, Blackberry, Android Phone)	40 (93.0%)
Others	3 (7.0%)
Would you use your mobile device to access to the Internet when a computer with Internet access is easily available?	
Never	0 (0%)
Rarely	3 (7.0%)
Sometimes	10 (23.3%)
Often	19 (44.2%)
Very often	11 (25.5%)
Access to the Internet (per week)	
0-1 hour	3 (7.0%)
1-5 hours	0 (0%)
6-10 hours	7 (16.2%)
11-20 hours	8 (18.6%)
21-30 hours	9 (20.9%)
31-40 hours	10 (23.3%)
> 40 hours	6 (14.0%)
Attitude towards mobile devices	
Early adaptor	11 (25.6%)
Follower	22 (51.1%)
Laggard	10 (23.3%)

As prior research has shown that the adoption of information systems would be affected by gender (Venkatesh *et al.*, 2003), we analyze the overall frequency in using non-academic apps. Our results are reported in Table 3. We note that the usage of non-academic by music-related students and production-related students were very similar. The exceptions were on the usage of productivity tools, online shopping, casual reading, and watching videos in which music-related students had a higher usage level (with $p < 0.10$).

Table 3. Non-academic mobile apps usage

Mobile Applications	Overall	Major		
		Production-related	Music-related	*p*-value
Accessing email	3.56 ***	3.54	3.59	0.96
Text messaging	3.70 ***	3.77	3.59	0.35
Engaging in online finance and banking transaction	3.42 ***	3.23	3.71	0.17
Social networking	3.88 ***	3.81	4.00	0.41
Using productivity tools	3.67 ***	3.42	4.06	**0.02**
Engaging in online shopping	3.35 **	3.07	3.76	**0.02**
Engaging in casual reading	3.33 **	3.00	3.82	**0.01**
Playing games or engaging in other entertainment	3.44 **	3.23	3.76	0.19
Listening to music	3.44 ***	3.46	3.41	0.88
Downloading music	3.35 ***	3.19	3.59	0.16
Watching videos	3.44 ***	3.27	3.71	**0.10**
Accessing health/fitness information	2.86 ***	2.69	3.12	0.29
Accessing to reference or libraries	2.23 ***	2.12	2.41	0.62
Accessing to search engines	2.47 ***	2.62	2.24	0.30

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$
U-Test were used to compute the *p*-values between groups, and values in **bold** are having *p*-value < 0.1.
5-point Likert scale was used in the survey (1 = never used; 5 = very often used).

Table 4 shows the adoption of mobile library services of our participants. As shown in our results, our participants did not often use mobile library services and had their scores all statistically significant below the mid-point of the scale (i.e., 3). This indicated that they were unsatisfied with these mobile services. Concerning the usage level, the two groups of students had a similar usage level, except that music-related students watched lectures on the library websites and used electronic music scores more often than the production-related students (with $p < 0.10$).

Table 4. Mobile library service usage

Mobile Applications	Overall	Major		
		Production-related	Music-related	*p*-value
Search mobile electronic resources	2.40 ***	2.42	2.35	0.91
Read academic papers	2.26 ***	2.27	2.24	0.81
Read e-books	2.30 ***	2.35	2.24	0.65
Search for library collections	2.26 ***	2.39	2.06	0.18
Renew of library materials	2.33 ***	2.54	2.00	0.12
Access my library account	2.37 ***	2.54	2.12	0.27
Request for library collections	2.28 ***	2.27	2.29	0.84
Contact librarian	1.88 ***	1.77	2.06	0.27
Watch lectures posted on the library website	1.93 ***	1.73	2.24	**0.03**
Read electronic plays	2.05 ***	2.00	2.12	0.52
Read electronic music scores	2.05 ***	1.89	2.29	**0.08**
Access to images database	2.05 ***	1.92	2.24	0.22
Accessing to online music libraries	1.98 ***	1.92	2.06	0.57

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$
U-Test were used to compute the *p*-values between groups, and values in **bold** are having *p*-value < 0.1.
5-point Likert scale was used in the survey (1 = never used; 5 = very often used).

We also explore the usage preference of computing devices by our participants (see Table 5). We note that our participants had a negative perception of using electronic-reader for academic purposes. Plus, we note that our participants generally did not prefer using the text messaging functions provided by the library for services (see Table 6). In general, we also observed that our participants had a negative perception of using their mobile devices for reading various kinds of online academic contents (see Table 7).

Table 5. Usage of computing devices for academic work

Devices		Major		
	Overall	Production-related	Music-related	*p*-value
Desktop computer	3.28	3.50	3.00	0.17
Laptop computer	3.14	3.13	3.16	0.94
Tablet	2.98	2.92	3.05	0.62
Smartphone	3.05	3.13	2.95	0.62
Electronic-reader	2.63 ***	2.50	2.79	0.20

Note: *** p < 0.01; ** p < 0.05; * p < 0.1
U-Tests were used to compute the *p*-values between groups, and values in **bold** are having *p*-value < 0.1.
5-point Likert scale was used in the survey (1 = never used; 5 = very often used).

Table 6. TEXT/SMS library service users already use with their mobile devices

Services		Major		
	Overall	Production-related	Music-related	*p*-value
Receive renewal or overdue notices	2.70**	2.85	2.59	0.55
Receive recall notifications	2.35***	2.58	2.35	0.56
Receive a call number from the catalog	2.44***	2.54	2.29	0.40
Receive change of the opening hours details	2.40***	2.58	2.29	0.31
Receive library news	2.40***	2.23	2.18	0.89

Note: *** p < 0.01; ** p < 0.05; * p < 0.1
U-Tests were used to compute the *p*-values between groups, and values in **bold** are having *p*-value < 0.1.
5-point Likert scale was used in the survey (1 = never used; 5 = very often used).

Table 7. Use of mobile devices in reading academic content

Academic content		Major		
	Overall	Production-related	Music-related	*p*-value
Online database	2.42 ***	2.48	2.35	0.35
Materials provided by class instructor	2.51 ***	2.52	2.50	0.41
Forwarded by colleague(s)/classmate(s)	2.51 ***	2.43	2.60	0.96
Google Scholar	2.33 ***	2.39	2.25	0.25
Google Book/Books on Google Play	2.42 ***	2.43	2.40	0.49
Amazon	2.26 ***	2.17	2.35	0.71
Library catalog	2.47 ***	2.48	2.45	0.54
Safari Online	2.23 ***	2.13	2.35	0.40
Internet Archive	2.26 ***	2.17	2.35	0.43
Web search	2.65 **	2.65	2.65	0.96
Mobile application (e.g., Kindle, Stanza)	2.44 ***	2.48	2.40	0.97

Note: *** p < 0.01; ** p < 0.05; * p < 0.1
U-Tests were used to compute the *p*-values between groups, and values in **bold** are having *p*-value < 0.1.
5-point Likert scale was used in the survey (1 = never used; 5 = very often used).

In Table 8, we also present the factors affecting our participants to engage in the online library by mobile devices. Our participants considered inadequate Wi-Fi and 3G/4G cell phone coverage, the slow loading time of Webpages, difficulty in reading the content format in a mobile device, and the lack of specialized mobile apps were the more significant negative factors affecting their usage. Besides, our participants had a neutral view on the importance of mobile technologies for libraries, with a perception of importance score of 3.14 out of 5, and is statisticially indifference with the midpoint of the scale (i.e., 3.0) with $p > 0.10$.

Table 8. Factors affecting user to engage in the online library services with their mobile device

Services		Major		
	Overall	Production-related	Music-related	*p*-value
Small screen size	3.05	3.15	2.88	0.31
Web page formatting	3.09	3.19	2.94	0.29
Difficulty with text entry	3.00	3.08	2.88	0.41
Difficulty with university authentication	3.12	3.23	2.94	0.37
No Wi-Fi or Wireless signal coverage	3.51 ***	3.69	3.24	0.21
No cellular signal coverage	3.37 **	3.62	3.00	**0.07**
Difficulty reading content format	3.30 **	3.35	3.24	0.65
Lack of specialized mobile apps	3.26 *	3.27	3.24	0.77
Slow loading time	3.49 **	3.58	3.35	0.51
Short battery life on a single charge	3.19	3.23	3.12	0.70

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$
U-Test were used to compute the *p*-values between groups, and values in **bold** are having *p*-value < 0.1.
5-point Likert scale was used in the survey (1 = never used; 5 = very often used).

DISCUSSION

This study aimed to gain insights into the different information needs of performing arts college students using HKAPA students as samples and their relations to the use of mobile devices. We would also like to investigate whether the online services and resources provided by the HKAPA Library could adequately address those needs. We discuss the results according to our research questions and give some suggestions.

Use of mobile devices by the performing arts students for learning purposes and library services

The smartphone is a replacement for the legacy mobile phone. Smartphones have much more useful features comparing to legacy mobile phones, and the price of smartphones is becoming affordable. Almost all our participants currently own smartphones with Internet connection ability (Table 2) because mobile service providers offer plans with wireless services at a price close to those without wireless services. About half of the participants also own tablets with Internet connection ability because they may use them as smartphones with bigger screens or use them as lighter and smaller laptops. We found that our participants strongly preferred to use their mobile devices to access the Internet even when a computer with Internet access is readily available (see Table 2) by testing their preferences with a *U*-test for comparing the mean value (3.88, $p < 0.01$) with the mid-point of the scale. This is because the hardware and capabilities of mobile devices are as powerful as computers (Ko *et al.*, 2015), and they perceive using mobile devices more convenient due to their mobility.

According to Table 4, the overall respondents' opinions about accessing online library services were negative, though they generally are indifferent in using mobile technologies for libraries (overall 3.14, as mentioned above). They have a relatively low usage need of mobile technologies for library-related services and activities. Still, they often use mobile devices as communication tools such as text messaging, accessing email, and uploading content, as well as for social networking and entertainment. Our respondents also had a low usage of mobile service for receiving renewal or overdue notices with their mobile devices, among other library services. Although the library had conducted a big promotion banner about the AirPAC (mobile catalog designed for handheld devices and smartphones) shown in the HKAPA library webpage, our participants were still having a low perception of these services. Such low perception would be fueled by the difficulties in managing the circulation records in the desktop version catalog when the users were using mobile devices.

Moreover, the overall frequency of usage for academic purposes was relatively low. This is because there were fewer applications for academic uses specially designed for performing arts students comparing to communication tools, social networking, and entertainment. Plus, applications for academic purposes often lack promotion (Ko et al., 2015). During our follow-up interviews of five HKAPA students, we noted that they did not know that they could use their mobile devices to access some applications for their academic use or library-related services. They also lacked instructions on where and what they could find academic content to read on their mobile devices.

Although our participants reflected that smartphones were almost as important as desktop and laptop computers for academic work (Table 5), they also agreed there are general barriers to engaging in online activities while using mobile devices (Table 8). Those barriers can be eliminated if the capabilities of mobile devices can be further advanced, wireless signals are improved, and more innovative apps developed (Wai *et al.*, 2018).

Differences in using mobile devices for learning between different majors of performing arts students

In general, our results revealed that there are were not many differences in mobile technology adoption for learning between music-related and production-related students.

However, there are indeed different information needs and information-seeking behavior of the two groups of students. For music-related students, they had higher usage of productivity tools, engaging more in online shopping and casual reading, and watch more online videos than the performance-based students. Watching online videos (such as on YouTube) is undoubtedly one of the most influential and convenient online one-stop media discovery tools for these music-related students (Table 3). Further, their faculty members would provide much information to students in the form of DVD, audio sound files, digital video streaming, instead of in textual formats. For such reasons, these music-related students were not always motivated to conduct conventional library-related research or did not often need to use the resources provided by the library to complete their assignments (see Table 4). However, resources such as Naxos Video Library and Naxos Music Library could provide more systematic access and meta-data for library users.

According to a qualitative interview study conducted by Mayer (2015), music classes and assignments also require students to perform research via information gathering. Such research work carried out by music students would often include music history, vocal pedagogy, and world music. Some music students would describe the research process as searching for music pieces, preparing the score, experimenting instrumentation, performance practice, scholarly definitions lookup, and so on. Furthermore, when it came to researching musical works, music students would generally start on the Internet and go to the library later in the research process. In another interview study by Clark (2013), findings indicated that music students would frequently obtain items for their studies through sources other than the library (iTunes, IMSLP, etc.). As the HKAPA curricula focus more on performance than composition or theory, research information need from library services, no doubt, is minimal. This may account for the current low usage of the mobile library services by the music-related students.

On the other hand, the interdisciplinary information needs of those creating production (drama, TV, and film) are extremely varied. According to Medaille (2010), in preparing for productions, extensive research using a variety of sources is integral to their preparation, and the amount of Internet usage among theatre artists varies. For example, the prop artisan/set painter is more comfortable using the Internet than using the library. Even when they use the library, they would often skip the catalog. For directors, their research includes studies of culture, history, performance style, criticism, and foreign languages. For set designers, they may research knowledge in history, culture, art, images, fashion, and building materials and procedures, among numerous other topics. For actors, the preparation may or may not include historical and cultural research (depending upon the work being performed). Still, it consistently involves a process of both internal and external examination and observation that results in a rich palette of character choices for exploration in rehearsals. Theatre artists appreciate libraries' extensive art and media collections, but they also use library collections of historical materials, language materials, cultural and critical studies, and periodicals, among others. At the same time, theatre artists take great advantage of the different types of resources provided by the Internet. They find online collections of texts, images, and audio and video files to be useful. It seems that the production-related students would prefer to use the library in person but not through mobile networks.

Suggestions

The findings have implications on how library instructions and research services should evolve to serve this student population with different needs from conventional academic disciplines. As performing arts students have diversified multimedia and interdisciplinary needs for research and learning (according to the discussion in the above subsection), like general college students (Wai *et al.*, 2018), the library catalog and scholarly journals are not always the first source for these performing arts students to consult for carrying out their research. Instead, they would prefer convenient, quick access to a variety of information and its sources, i.e., ease of use seemed more important to them. To further increase their information literacy skill in search of various interdisciplinary resources, the library is suggested to work more closely with faculties to provide customized library user education (LUE) to different majors (Liu et al., 2019). This enables both the library and the users understanding the cost and benefit of contemporary technologies and utilize them to their fullest advantage (Aharony, 2014).

On the other hand, the students generally perceived mobile library technologies indifference – not positive nor negative, and they were frequent users of non-academic mobile apps (Table 3), but not for academic or library use (see Tables 4, 5 and 7). Therefore, another possible reason for their low usage of library services is that these current services could not satisfy their learning needs. Suitable online services and electronic resources development would probably attract them to use mobile library services. For example, digitization of printed scores and play scripts could help them improve professional practice because these documents could be retrieved online with relative ease anytime, anywhere. Further, as we understand that many of these students have other part-time jobs such as music/art tutors, performers, and production team members, they have higher demands for mobile services (Du, Yang, Shelton, & Hung, 2019).

With the rapid advancement in technologies, libraries need to keep up with technology to serve their patrons well. For example, mobile catalog interface or mobile apps that support not only traditional information searching but also for multimedia resources should be developed to facilitate the general needs of performing arts students. Adequate bandwidth should also be implemented on campus with Wi-fi and 4th or even 5th Generation networks (Ko *et al.*, 2015; Wai *et al*., 2018), which is essential for enabling quality access to multimedia resources.

The findings of this study also revealed that more marketing of mobile library services might be needed. Some performing arts students might just equate the library with print books and audio-video shop, and did not always make the connection that libraries could offer many of the online sources that they would find useful. For this reason, the continual need for services marketing of the library is indeed necessary. According to Liu *et al.* (2019), close collaboration between librarians and faculties also contributes to the effective promotion of library services to the student communities. Besides, mobile services in libraries can increase the number of users, as they can access the library anywhere, anytime (Aharony, 2014).

CONCLUSION

This study provides valuable insights into the use of mobile devices amongst a group of students majoring in music-related and production-related at the HKAPA. This study is unique due to the disciplinary orientation of the population, as few studies have been conducted to examine the information-seeking behavior of performing artists and students, and in particular, in the East. Our research demonstrates that low-level usage in mobile library services is most probably because the services cannot meet the diversified learning needs of students from different disciplines. Understanding the role of the change of information-seeking in the creative processes of students practicing or studying in the field of performing arts is crucial in this mobile computing era. The findings of this study may also help library and information science (LIS) professionals gain a better understanding of the unique and changing nature of performing arts students' information needs and their information-seeking behaviors. Undoubtedly, the input gathered could have implications for other library services worthy of further research. Furthermore, the findings of this study could facilitate building connections with HKAPA students. Such insights are useful for developing new approaches and helping strengthen arguments for changes and improvements to services (Lo *et al.*, 2017).

Similar to other studies, this study also has its limitations. The data for this study were collected through an online questionnaire survey from one single performing arts academy located in Hong Kong. While it would be better if we can collect data from more than one institution for comparison, there is only one performing arts academy in Hong Kong, and we are unable to further research this issue by comparing the findings from other institutions from Hong Kong. As a follow-up study, we plan to conduct similar studies in other countries in Asia to investigate this issue further.

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