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Online information literacy instruction in Mexican university libraries: The librarians' point of view



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ABSTRACT

Online information literacy instruction is becoming increasingly popular among university libraries, although the level of its development varies from institution to institution. In this study, we seek to ascertain implementation levels for online information literacy instruction among university libraries in Mexico, as well as librarians' experiences, opinions, and attitudes with regard to this instruction modality. To this end, we analyzed data collected between November 2015 and January 2016 through a survey that was sent to 559 libraries at Mexican public universities and completed by 189 librarians. The results show a limited development of information literacy instruction in general and in online instruction in particular, despite the recognition of its importance and usefulness. The main barriers to implementation that were identified were a lack of technological resources and of personnel qualified to undertake these tasks. The main challenges that the libraries that do provide online instruction have had to face are related to a lack of institutional support, a lack of cooperation on the part of faculty members, students' motivation, and librarians' expertise.

Introduction

Information and communication technologies (ICT) and new education models have been changing students' role in higher education in recent decades. The traditional passive role of students has been replaced by an active one that is based on competencies and skills, and that implies that they have to be more autonomous and make wide-ranging use of information in their learning activities. Consequently, competencies in the proper use of information are becoming more and more important for students, and academic libraries are playing a key role in helping them to develop those competencies through information literacy programs and activities. In fact, currently, library and information literacy instruction is one of the most relevant and valued services in academic libraries (Extremeno, Amante, & Firmino da Costa, 2013; Long & Schonfeld, 2014; Wolff, Rod, & Schonfeld, 2016).

Because of the growing demand for instruction in information literacy, the capabilities of many university libraries to provide traditional face-to-face instruction are being overstretched, and online instruction is seen as an effective way to manage this situation (Dewald, 1999; Kraemer, Lombardo, & Lepkowski, 2007). Its advantages and disadvantages, as well as the resources of each library and the characteristics of its users, should be considered when determining the suitability of this modality of providing information literacy instruction for each library, since each library has its own context and

characteristics. In addition, choosing the most appropriate way of providing online instruction according to users' needs and the topic of focus may be challenging, since the production and dissemination of online instruction can occur in several ways (Watts, 2018). There are many types of materials, such as tutorials, games, podcasts and videos; there are many formats, such as html, PowerPoints and pdfs; and there exist different modalities of delivery, such as freely available materials or restricted-access courses contained in a learning management system. As a result, the adoption of online information literacy instruction has not been the same across libraries in different universities or countries, with respect not only to the number of libraries providing online instruction but also to the characteristics of the materials offered and the mode of delivery.

In the case of Mexican public universities, online information literacy is not very widespread, and there are few initiatives and materials provided by their libraries. According to a recent study (Fernández-Ramos, 2016c), the presence of training materials on their websites is quite low, especially in comparison to other countries such as the United States, Italy, and Spain, and the quality and characteristics of these materials could be improved. Although the libraries of Mexican public universities have experienced notable advances in the last two decades, doubling in number and considerably increasing their human and material resources, there are still significant shortfalls in terms of funding, services, and human resources training (Arellano Rodríguez &

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Mireles Cárdenas, 2018). According to the report produced by CONPAB-IES (2015) on the situation of Mexican higher-education institutions' libraries in the 1993–2013 period, more than half of these libraries do not have their own budgets but instead depend on allocations from other academic bodies; the majority of people who work in these libraries do not have specific training in Library Science; and the services offered are mainly of a basic nature (loans and reading rooms).

To a large extent, the situation of these libraries is determined by the characteristics of the universities that they are part of. Mexico's higher-education system has undergone a process of expansion and development since the 1990s, and that process has manifested itself in the form of a significant increase in the number of students, which has tripled between the 1990s and the present to reach 3.5 million. It has also taken the form of the creation of new universities: there were 307 universities 30 years ago, but there are now almost 3000. Although more than 65% of universities are private, over 70% of students are enrolled in public universities (Acosta Silva, 2014). This proliferation of both public and private universities was determined by the need to meet a growing volume of students and the need for universities to cover populations in rural areas. However, many of these new universities are small, in terms of both the number of students and the degrees offered, and their human and material resources are fairly limited (Mendoza-Rojas, 2015).

Taking into account this context, the objectives of this work are to ascertain how online information literacy instruction is implemented and provided in the libraries of Mexican public universities, to ascertain the opinions and attitudes of librarians regarding online information-literacy instruction, and to identify possible barriers to and limitations on the adoption of this instructional modality.

Literature review

Advantages and disadvantages of online information literacy instruction

Use of ICT in higher education is continually increasing, and it is changing the ways in which teachers educate, students learn, and students and teachers communicate and interact with one other. In addition to the use of ICT in face-to-face classes, which ranges from the use of PowerPoint presentations to the use of virtual platforms on which students can access teaching materials or submit their assignments, these technologies have a special relevance in distance education. The possibilities offered by the Internet and technological applications specifically designed for teaching—for example, MOOCs and Learning Management Systems—make online learning an increasingly attractive option for many students, especially those who have difficulties in attending classes in person owing to problems created by their schedules or physical location (Renes & Strange, 2011). The boom in online learning of recent years has been especially relevant in higher education, but it has also had an impact in many other areas, such as in industry, business and various public administrations and services (Davidson-Shivers, Rasmussen, & Lowenthal, 2018).

Online information literacy instruction has become very popular in the last two decades, and many academic libraries provide their patrons with some kind of online course or training materials. The main advantages and strengths of online information-literacy are: it can reach more students than face-to-face instruction (Oud, 2009; Stiwinter, 2013); it allows students to learn at their own pace since online materials may be used anytime and anywhere (Palmer, Booth, & Friedman, 2012; Su & Kuo, 2010); it responds to the needs of students enrolled in distance education, whose numbers have grown over the years (Ganster & Walsh, 2008; Pastula, 2010; Webb, Logan, & Flaccavento, 2017); it provides the opportunity to address multiple learning styles at once (Gonzales, 2014; Mestre, 2006); and it saves time for librarians, who have experienced difficulties in teaching more and more students with fewer resources (Adebonojo, 2011; Kratochvil, 2014; Stiwinter, 2013). In addition, online information literacy instruction seems to be as

effective as face-to-face instruction in terms of learning outcomes and user preferences (Hess, 2014a; Matlin & Lantzy, 2017; Silk, Perrault, Ladenson, & Nazione, 2015; Zhang, Watson, & Banfield, 2007).

However, this modality of providing information-literacy instruction also presents some disadvantages, challenges, and difficulties, such as lower levels of interaction between students as well as between instructors and students (Dewan & Steeleworthy, 2013; Kraemer et al., 2007; Williams, 2010), the need for students to possess certain computer equipment and skills (Michel, 2001; Mutula, Kalusopa, Moahi, & Wamukoya, 2006; Silver & Nickel, 2005), the time and expense involved in the development of high-quality online materials (Allen, 2008; Behr, 2004; Bracke & Dickstein, 2002), the limited technological skills of some librarians (Anderson & Mitchell, 2012; Bowen, 2014; Dewan & Steeleworthy, 2013), the need to update these materials regularly (Blake, 2009; Hess, 2014b; Su & Kuo, 2010), the challenge of ensuring that students are aware of and motivated to use these materials (Harkins, Rodrigues, & Orlov, 2011; Hess, 2014b; Kraemer et al., 2007), and the difficulties sometimes encountered in collecting information about their usage and students' outcomes (Bottorff & Todd, 2012; Kelley, 2012).

Online information literacy instruction: a growing trend

A review of the literature suggests that in the last two decades there has been a remarkable increase in the scientific production on online information literacy instruction (Maddison, Doi, Lucky, & Kumaran, 2017). Most of this scientific and technical literature focuses on production of online materials of this kind (Koneru, 2010; Mestre, 2012; Nagra & Coiffe, 2010; Oud, 2009; Summey & Valenti, 2013; Turnbow & Roth, 2017), examples of particular initiatives (Clapp, Johnson, Schwieder, & Craig, 2013; Georgas, 2014; Holliday, Ericksen, Fagerheim, Morrison, & Shrode, 2006; Webb et al., 2017), reviews of best practices (Blummer & Kritskaya, 2009; Dewan & Steeleworthy, 2013; Fernández-Ramos, 2016b; Munn & Small, 2017; Somoza-Fernández & Rodríguez-Parada, 2011), analysis of their main characteristics (Fernández-Ramos, 2016c; Saunders, 2018; Somoza-Fernández & Abadal, 2009; Yang & Chou, 2014) or studies about their usefulness (Anderson & Wilson, 2009; Haber & Mitchell, 2017; Schweikhard, Hoberecht, Peterson, & Randall, 2018; Weightman, Farnell, Morris, Strange, & Hallam, 2017).

Despite this amount of literature, it is difficult to have a precise idea of the level of implementation of online information-literacy instruction among libraries in different countries or worldwide. There are several studies that use surveys to collect information about existing practices in libraries regarding information literacy instruction including specific questions about the modality employed. In these studies, it can be noted that traditional face-to-face instruction is more common than the online modality, though in many libraries both modalities coexist, and it is possible to observe an increase in the use of online materials and courses over time. Nevius, Ettien, Link, and Sobel (2018) carried out a survey among libraries affiliated with accredited US and Canadian medical schools in 2015 and found that 97% of them offered face-to-face instruction, while 85% used subject guides and 78% recorded tutorials. In 2016, Julien, Gross, and Latham (2018) sent an online survey to professional librarians in the United States who provide information literacy instruction in academic libraries. They found that for their instructional methods 87% of respondents used hands-on instruction in a computer lab, another 87% one-to-one instruction, 81% lectures or demonstrations in subject classrooms, and 73% used web-based materials. Moreover, 61% of the respondents believed that ICT has affected instructional delivery “quite a bit” or “a great deal” in the last few years. The prominence of face-to-face instruction has also been found in previous studies conducted by Julien in Canada using the same questionnaire. These articles (Julien, 2000, 2006; Julien & Leckie, 1997; Julien, Tan, & Merillat, 2013) note that the use of Web-based materials has increased over time, but the percentages are lower than those found

in the aforementioned study on the US libraries. In a survey sent to the members of the Information Literacy Instruction Listserv in 2010, results indicated that 78% of the libraries included in the study used face-to-face instruction, 6% online, and 12% both modalities (Luo, 2010).

Beyond North America, there are fewer studies about the methods used to deliver information literacy instruction, but similar results are to be found with regard to the prominence of face-to-face instruction, and in general lower levels of use of the online modality have been observed. For example, McGuinness (2009) carried out a survey of information-skills training practices at Irish higher education institutions in 2006–2007 and found that library tours, print-based guides, one-shot lectures and demonstrations, and hands-on laboratory sessions were used in at least 80% of the libraries included in the study, and only 43% of the respondents indicated the use of online tutorials. In Chile, Marzal and Saurina (2015) conducted a survey among 24 university libraries and observed that 82% of the libraries offered face-to-face instruction and that only 9% of them offered online instruction. In developing countries, this tendency is even more pronounced. Ullah and Ameen (2014) found that 86% of medical libraries in Pakistan offered face-to-face instruction, 4% web-based tutorials, and 9% a combination of both modalities. In a comparative study of information-literacy trends among six leading British, American, and Nigerian university libraries, it was found that the Nigerian libraries were the only ones that did not provide online literacy instruction (Baro, Seimode, & Godfrey, 2013).

Factors affecting the adoption of online information literacy instruction

Differences among university libraries regarding the provision or otherwise of online information-literacy instruction may be attributed to several factors, such as the estimation of the advantages and disadvantages of this modality of instruction mentioned above, or the specific characteristics of each library and its patrons. However, these factors have not been sufficiently addressed in studies that collect data from multiple libraries, and consequently it is difficult to have an overall view of the dimension or the impact of each factor. What is known about this topic comes from many particular cases of implementing or assessing online instruction in a library or from literature reviews, such as the study of Maddison et al. (2017), in which they analyze, among other topics, the challenges and limitations of online information-literacy instruction that are highlighted in the scientific literature published between 2010 and 2015. They found the following difficulties: assessment was not incorporated in the case studies, so it was difficult to determine the impact of the work; engaging with faculty and ensuring faculty buy-in presented challenges; content creators experienced a steep learning curve with the technology; there were issues regarding design, presentation, and accessibility; users experienced difficulties with technological aspects of the instruction; content creators experienced time constraints when developing or updating instructional contents; there were difficulties in keeping users engaged in the learning content; creating new online learning materials required additional and unanticipated funding; and organizational structures need to be kept updated.

Methods

The methodology used in order to achieve the objectives proposed in this research consists of the creation, distribution, and analysis of data from a survey designed to obtain first-hand knowledge of the views and experiences of librarians working at Mexican public universities in relation to online information literacy instruction; and the characteristics of the instruction that they deliver.

Study population

The study population consisted of librarians at Mexican public universities who are responsible for training users and, in the event that

the institution had no such librarian, the heads of the libraries. To be able to identify these universities, we consulted the Directory of Public Institutions of Higher Education in Mexico, available on the website of the Secretariat of Higher Education.¹ A total of 848 institutions grouped in 10 categories appear in the directory. We selected 7 of these categories, which comprised a total of 492 universities: federal-level public universities, state-level public universities, state-level public universities with solidarity support, polytechnic universities, technological universities, intercultural universities, and technological institutes. The other 3 categories not included in the study corresponded to research centers, whose main activity was research and not teaching, and to “normal schools”, whose size is very small because they only offer a single university qualification: teacher training.

Having identified these 492 universities, we consulted their websites to search for contact information for both their central libraries and their branch libraries—for example, faculty, departmental, and off-campus libraries, in the event that there were any. Only 39.8% (196) of those 492 universities offered contact information for at least 1 of their libraries. The sample of libraries that the survey was finally sent to comprised 559 libraries (196 central libraries and 363 branch libraries) for which at least 1 contact email address was available, either from the libraries' own Web pages or from the universities' directories (Table 1).

Survey design

We designed a questionnaire with open and closed questions that would collect information on how online information literacy instruction programs were being implemented, the characteristics of these programs, and the attitudes and opinions of librarians about this training modality. The questionnaire contained a total of 20 questions and was designed in such a way that it was not compulsory to answer them all. Rather, answers to particular questions determined which other questions needed to be answered. For example, Question 12 asked whether the library provided online information literacy instruction, and if the answer was yes, the participant moved on to questions about which competencies are addressed, which users the instruction is aimed at, and so forth, whereas if the answer was no, the participant was asked about the reasons why there was no such instruction and whether it was considered a possibility for the future.

The questions were organized into three main groups. The first contained 3 questions of a general nature, the objective of which was to identify the context within which the respondent librarian worked. These questions were answered by all respondents and made it possible to identify the type of university in which the participant worked, the type of library (central or branch), and the position of the survey respondent (head, librarian responsible for training, or other). The second group comprised 5 questions and focused on ascertaining the opinion of librarians regarding the importance of information literacy instruction, regardless of the modality used to deliver it; whether his or her library provided information literacy instruction; and, in the case such instruction was not delivered, the reasons why it was not and whether delivery of it in the future was under consideration. The third group was the largest and specifically focused on online information literacy instruction. It contained 12 questions that only needed to be answered by librarians whose libraries provided some type of information literacy instruction. The questions related to each librarian's opinion of the online modality in comparison to face-to-face instruction; whether or not the instruction was delivered online; where applicable the reasons for not using the online instruction modality, or in the case that instruction was offered online, how it was delivered and what difficulties had arisen when implementing it.

Once the questionnaire had been designed, it was piloted on a group of librarians from one of the universities included in the study to

¹ <http://www.ses.sep.gob.mx/instituciones.html>

Table 1
Population and sample of universities and libraries.

Type of university	Total universities	Universities included	Central libraries	Branch libraries	Total
Public federal level	9	8 (88.9%)	8	117	125
Public state level	34	34 (100%)	34	239	273
Public state level with solidarity support	23	15 (65.2%)	15	6	21
Polytechnic	50	17 (34%)	17	1	18
Technological	102	28 (27.4%)	28	0	28
Intercultural	12	4 (33.3%)	4	0	4
Technological institutes	262	90 (34.3%)	90	0	90
Total	492	196 (39.8%)	196	363	559

confirm its validity. Based on the feedback that they provided, we changed the wording and content of some questions that could be confusing and prepared the final version of the questionnaire, which can be found in Appendix A. The survey was then transferred to SurveyMonkey so that it could be completed online.

Survey administration and data analysis

Once we had identified the 559 libraries that offered at least one email contact, we sent them an invitation to participate in the survey, which included a cover letter explaining the purpose of the survey, brief instructions on completing it, the link to the Web page that hosted the survey, and an undertaking to process the data anonymously. In the case of the libraries that had a single contact email address, we requested that the survey be completed by the individual responsible for training or, if no such person existed, by the head of the library or the librarian who was most involved in training activities. In the case of libraries that offered contact information for their employees, we operated along the same lines by sending the invitation to the individuals responsible for training or, if there was no such individual, to the head of the library. The initial email was sent during the last week of November 2015 to all the libraries included in the study to invite them to participate in the survey, and to increase the response rate, a reminder was sent in the second week of December. The deadline for completing the survey was January 2016.

The survey data were exported from SurveyMonkey to an Excel table and subsequently to SPSS 22.0. We conducted a descriptive statistical analysis of the data obtained from the closed questions, through which we obtained frequencies and percentages, and we studied the association between different variables using contingency tables and the Chi-Square test in the case of categorical variables. Open questions (Q10, Q11, and Q20) were analyzed via content analysis techniques to identify, normalize, and quantify the categories obtained from the responses.

Results

Response rate

Following first email containing the survey, 140 librarians responded (25% of the total), and 57 responded to the second, yielding a total of 197 survey responses and a response rate of 35.2%. The surveys received were collated to verify that they had been completed correctly, and from doing so we found that 189 (95.94%) were valid. Of these, 89 came from central libraries and 100 came from branch libraries. These 189 surveys were the ones included in the subsequent data analysis; the margin of error was 5.6% and the confidence interval 95%. The distribution of the completed surveys according to professional category and type of library is listed in Table 2, where it can be seen that more than 70% of respondents from the two types of libraries were the library heads. The frequency of responses from individuals in charge of training or from librarians whose duties included training users was much lower.

Table 2
Distribution of valid completed surveys.

	Central libraries	Branch libraries	Total
Head of library	63 (70.8%)	72 (72%)	135 (71.4%)
Individual responsible for training	11 (12.4%)	17 (17%)	28 (14.8%)
Other	15 (16.8%)	11 (11%)	26 (13.8%)
Total	89 (100%)	100 (100%)	189 (100%)

Information literacy instruction

The first question in this group (Q4) asked librarians about the importance that they attributed to information competencies instruction for their users. The results showed a significant awareness of the value and importance of this type of training for their users among librarians, regardless of their professional category or the type of library in which they worked. In total, 86.8% of respondents considered it very important, 12.7% important and 0.5% moderately important; none of them considered it to be of little or no importance. There were no significant differences in the scores based on the type of library or on the professional category.

With regard to the delivery of information literacy instruction (Q5), the results show that this takes place in only 73% (138) of the 189 libraries, despite the fact that 99.5% of the respondents consider it very important or important. Notable differences can be appreciated according to the type of library, and we observed that delivery of this sort of instruction is more frequent in central libraries (82%) than it is in branch libraries (65%). These differences between the two types of library were revealed to be significant when the Chi-Square test was applied ($\chi^2 = 6.925$; p -value = 0.008).

Libraries that do not impart information literacy instruction

With regard to the reasons for not providing information literacy instruction (Q6), the survey results indicate at a general level that the most frequently cited reason (more than one option could be chosen), which was selected in more than 60% of the cases, was a lack of specialist personnel in charge of training. The other reasons were identified much less frequently. A lack of technical or financial resources was identified in 30% of the libraries; a lack of time or the view that it was not a priority was selected in 25.5% of cases; and only 11.8% did not believe that such training fell within the library's competence. When we analyzed these results in a way that differentiated between central and branch libraries (Table 3), we noted that there were certain variations in reasons between the two types, although when the Chi-Square test was applied, significant differences were observed only in terms of whether the training was a priority at the respondent's library ($\chi^2 = 4.093$; p -value = 0.043), with this being the most frequently cited reason among central libraries.

Despite the reasons given, it seems that there is a desire in most of these 51 libraries to deliver information literacy instruction in the

Table 3
Reasons for not delivering information literacy instruction.

Reasons	Total (n = 51)	Central (n = 16)	Branch (n = 35)	p-Value
Lack of specialist personnel	31 (60.8%)	7 (43.8%)	24 (68.6%)	0.092
Lack of technical resources or infrastructure	16 (31.4%)	4 (25%)	12 (34.3%)	0.507
Lack of financial resources	15 (29.41%)	4 (25%)	11 (31.4%)	0.640
It is not a priority at my library	13 (25.5%)	7 (43.8%)	6 (17.1%)	0.043*
Lack of time	13 (25.5%)	4 (25%)	9 (25.7%)	0.957
It does not fall within the library's competence	6 (11.8%)	1 (6.3%)	5 (14.3%)	0.409

future (Q7). In 42 of them (82.3%) future delivery of this training was being considered, while 9 (17.7%) responded that it was not under consideration. These results are in line with the high level of importance attributed to this training in Question 4, and it is possible to interpret them as a commitment to overcome the barriers identified in Question 6 in the future. With regards to the delivery modality (Q8), of the 42 libraries that did plan to provide information literacy instruction in the future, 9 (21.4%) were considering delivering it online, 8 (19.1%) in face-to-face form, and 29 (69.1%) via a blended modality that incorporates online elements and classroom training.

Opinions about online versus face-to-face instruction

This group of questions only had to be completed by librarians whose libraries delivered information literacy instruction. The first of these (Q9) asked if online instruction was considered to be more or less effective than face-to-face instruction. As can be seen in Table 4, the results show that there is no trend in the opinions in favor of one kind of delivery modality or another. In most cases, the view was taken that the effectiveness of online and face-to-face instruction was similar, or that it depended on the type of user or on the competence being taught. The percentage of respondents who considered online modality more effective than face-to-face was about the same as the percentage who considered face-to-face more effective than online. Although there was some variation in the responses depending on the type of library and on the professional category, this was not significant.

Regarding the advantages (Q10) and disadvantages (Q11) of online instruction relative to a face-to-face modality, respondents were asked to list in their own words all those which they deemed worthy of note. In conducting an analysis and synthesis of responses, we extracted a series of categories with an associated frequency of occurrence for them, as can be seen in Table 5. It can be seen that the main advantages identified in relation to online instruction are associated with the possibility of consulting the materials at any time (50.8%) and in any place (21.1%), as well as with its facility to allow students to follow the course at their own learning pace (25%). In general, fewer disadvantages were identified, and they were identified less frequently. The most commonly mentioned disadvantage was the difficulties encountered to resolve uncertainties (31.3%), the impersonality or lack of human contact of this type of instruction (26.6%), the need for students

Table 4
Views on effectiveness of online versus face-to-face instruction.

	Online instruction more effective	The two modalities are similarly effective	Online instruction is less effective	It depends on the type of competence/user	DK/NA	Total
Total	19 (13.8%)	55 (39.9%)	19 (13.8%)	30 (21.7%)	15 (10.9%)	138 (100%)
According to type of library						
Central	7 (9.6%)	36 (49.3%)	6 (8.2%)	16 (21.9%)	8 (11.0%)	73 (100%)
Branch	12 (18.5%)	19 (29.2%)	13 (20.0%)	14 (21.5%)	7 (10.8%)	65 (100%)
According to professional category						
Head of library	13 (13.1%)	41 (41.4%)	14 (14.1%)	23 (23.2%)	8 (8.1%)	99 (100%)
Individual responsible for training	4 (18.2%)	8 (36.4%)	3 (13.6%)	4 (18.2%)	3 (13.6%)	22 (100%)
Other	2 (11.8%)	6 (35.3%)	2 (11.8%)	3 (17.6%)	4 (23.5%)	17 (100%)

Table 5
Advantages and disadvantages of online versus face-to-face instruction.

Advantages	Disadvantages		
Access at any time	50.8%	Difficulty of resolving uncertainties	31.3%
Self-paced learning	25%	Impersonal	26.6%
Access from anywhere	21.1%	Requires technological equipment	18%
Advantages of hypertext	15.6%	Difficulty in evaluation	13.3%
Reach more students	14.8%	Difficulty to elicit the student's interest	9.4%
More interaction	10.2%	Requires digital skills	9.4%
More attractive for young people	7.8%	None	4.7%
Autonomous learning	7%	Ineffective	4.7%
Repeatable	7%	Instructors' lack of pedagogical knowledge	2.3%
Customization	3.1%	Difficulty of developing materials	2.3%
Cheaper	2.3%	Not widely used	2.3%
Allows the student to select aspects that interest him or her	2.3%	Difficulty of teaching certain competencies	2.3%

to possess the appropriate technologies (18%), and difficulties in being able to assess their learning (13.3%).

Online information literacy instruction

Of the 138 libraries that offered information literacy instruction, 128 gave responses about whether or not they offered their users some sort of online instruction (Q12). The results show that 56.3% of these libraries do not offer any type of online instruction to their students (58.2% in the case of central libraries and 54.1% in the case of branch libraries), and that only 43.7% did offer it (41.8% of central libraries and 45.9% of branch libraries). Surprisingly, we did not find a statistically significant correlation between this variable and assessment of the effectiveness of online instruction relative to face-to-face instruction (Q9). That is, the delivery of online training did not suppose a better or worse assessment of the effectiveness of this training modality.

Table 6
Reasons why online information literacy instruction was not provided.

Reasons	Total (n = 66)	Central libraries (n = 36)	Branch libraries (n = 30)
We do not have the required resources	46 (69.7%)	25 (69.4%)	21 (70%)
It is not necessary. Classroom training is sufficient	5 (7.6%)	4 (11.1%)	1 (3.3%)
It is not suitable for the library's users	4 (6.1%)	2 (5.6%)	2 (6.7%)
Other reasons	16 (24.2%)	9 (25%)	7 (23.3%)

Libraries that do not provide online instruction

The 72 librarians from the libraries where there was no online instruction were asked a question about the reasons why none was offered (Q13). A total of 66 of them responded, and of these 36 worked in a central library and 30 in a branch library (Table 6). Despite the fact that participants could select multiple response options, more than 90% only chose 1, and the most commonly selected response for either type of library was a lack of the resources required to implement online instruction. This response was chosen in nearly 70% of cases. The other reasons were identified much less frequently, with none of them appearing in more than 10% of cases. These reasons included the positions that classroom training is sufficient, that online training is not suitable for their libraries' users, that there was not enough time to develop the materials, that there was a lack of institutional support, or simply that the idea had never been suggested.

However, in spite of all these reasons, we noted a high level of interest in delivering this type of instruction in the future, because 98.5% of the libraries that did not provide online instruction were thinking about offering it in the future (Q14). Regarding the modalities considered for delivering online instruction in the future (Q15), 39% of the 69 participants who responded to this question indicated two or more options, while 61% indicated one only. The three modalities proposed in the questionnaire—video tutorials, tutorials based on texts and images, and training integrated into the virtual learning environment—were identified to similar degrees, with percentages close to 50%. However, we did observe slight differences between central and branch libraries (see Table 7), although these proved to not be statistically significant when the Chi-Square test was applied. Among the branch libraries, there was a preference for tutorials based on texts and images, with this option being chosen in 59.4% of cases. In contrast, among central libraries this modality was chosen in 45.9% of cases, the lowest response percentage for the three modalities proposed in the survey. The other modalities indicated, though to a much lesser degree, were social networks and videoconferencing. These latter modalities were suggested by participants who selected “Other” from the list of options.

Libraries that did provide online instruction

With the objective of examining the characteristics of the delivery of online instruction in more depth, the 56 libraries that did offer online information literacy instruction answered questions about what specific competencies their online instruction addressed (Q16), which instructional modalities were used (Q17), which users the instruction was aimed at (Q18), who was involved in preparing the teaching materials (Q19), and what the main difficulties encountered in providing online

Table 7
Modalities under consideration for the delivery of online instruction in the future

Modality	Total (n = 69)	Central libraries (n = 37)	Branch libraries (n = 32)
Video tutorials	31 (44.9%)	18 (48.6%)	13 (40.6%)
Tutorials based on text and images	36 (52.2%)	17 (45.9%)	19 (59.4%)
Virtual learning environment	32 (46.4%)	19 (51.4%)	13 (40.6%)
Other	5 (7.2%)	2 (5.4%)	3 (9.4%)

Table 8
Information competencies taught online.

Competence	Total (n = 51)	Central libraries (n = 27)	Branch libraries (n = 24)
Information-needs awareness	29 (56.9%)	18 (66.7%)	11 (45.8%)
Information seeking	49 (96.1%)	27 (100%)	22 (91.7%)
Information evaluation	19 (37.3%)	12 (44.4%)	7 (29.2%)
Information management	27 (52.9%)	16 (59.3%)	11 (45.8%)
Ethical information use	22 (43.1%)	14 (51.9%)	8 (33.3%)

instruction had been (Q20).

At the majority of the libraries offering online instruction included in the study, this instruction encompassed the development of several information competencies. An average of 2.9 competencies was taught at each library. It can be observed that in the case of central libraries the average is higher than it is for branch libraries; the former taught 3.2 on average, and the latter 2.5. As can be seen in Table 8, in both library types, the most commonly addressed competence in online instruction was information seeking, which was taught at almost all the libraries. Following at some distance behind information seeking were information management and information-needs awareness and, further behind still, ethical information use and information evaluation. We did not find significant differences between the competencies taught by central libraries and branch libraries.

With regard to the formats used in training materials, there were some differences between central libraries and branch libraries. While the former made similar use of the three formats listed in the survey—around 60%—in the case of branch libraries, the most commonly used format was tutorials based on text and images (72.7%). This format was used much more than were video tutorials (45.5%) or a virtual learning environment (31.8%). Branch libraries' preference for tutorials based on text and images is consistent with the results of Question 15, in which branch libraries that did not provide online training indicated a preference for this format in the context of their intention to deliver online instruction in the future.

In terms of the target audience for online instruction, 64% of libraries provide instruction of this type of in a way that distinguishes between users at particular academic status levels (master's-level students, doctoral students, undergraduates, and faculty); 42% produced materials aimed at all types of users; and only 12% provided instruction intended for users from a scientific discipline. In the case of branch libraries, this latter percentage is greater than it is at central libraries (21.7% versus 3.7%). This variation could be explained by the subject specialization of branch libraries, which in many cases serve users from a particular faculty, whereas users of central libraries may be much more heterogeneous in terms of the disciplines that they study or within

Table 9
Professional categories involved in the production of instructional materials.

Professional category	Total (n = 52)	Central libraries (n = 27)	Branch libraries (n = 25)
Librarians	47 (90.4%)	26 (96.4%)	21 (84%)
ICT personnel	24 (46.2%)	11 (40.7%)	13 (52%)
Faculty members	16 (30.8%)	5 (18.5%)	11 (44%)
Other	4 (7.7%)	2 (7.4%)	2 (8%)

which they conduct research.

With regard to the different professionals involved in the production of instructional materials (Table 9), librarians clearly predominated and were involved in this work in the majority of the libraries. Surprisingly, however, there were libraries in which librarians were not involved in this area, especially in the case of the branch libraries, where librarians only participated in 84% of cases. The second most-involved group in terms of the creation of instructional materials was ICT personnel, who took part in this work in 40.7% of central libraries and in 52% of branch libraries. Faculty members' involvement was generally lower, but it was considerably higher in branch libraries than it was in central libraries. In a few cases, the involvement of other people such as Web designers or educational specialists was reported, but only marginally so.

Most libraries have had to face different problems or difficulties in setting up and maintaining online information literacy instruction; only 13 of the 56 librarians responded that they had not had any noteworthy difficulties. The main problems identified by the 43 other libraries were a lack of motivation among students (31.8%), a lack of adequate technological equipment (22.7%), a lack of training and interest among librarians (20.5%), and a lack of interest among faculty members (11.4%). Other problems identified, though to a lesser extent, were librarians' lack of time, organizational problems within the library, the difficulty of adjusting materials to the needs of students, and difficulties in monitoring the use of materials. It should be noted that many librarians commented that over time many of these difficulties had been overcome and that they felt satisfied about having set up this type of instruction.

Discussion

The results of this study make it possible to obtain an overview of the development and characteristics of information literacy instruction at university libraries in Mexico from librarians' point of view, both generally and specifically with regard to online training, as well as their perceptions of this training modality and the barriers and difficulties that they have experienced in the implementation of such training. However, these results should be interpreted with due consideration given to the study's limitations in terms of the sample selected, the fact that data was collected via a survey, and the fact that this survey was completed by 35.2% of the libraries that it was sent to. In general, we observed that most of the university libraries in Mexico provide information literacy instruction, but that there has been little in the way of development of online training, something that may be linked to these libraries' limited Web presence, in terms of both the level of information provided about their physical libraries and their offerings of online library services. In this regard, it is illuminating to note that only 40% of universities included in the study offer contact information for their libraries on the Internet and that in a recent analysis of online library services at Mexican universities revealed that only 44% of these libraries had their own Web page (Fernández-Ramos, 2016a).

Information literacy instruction

A noteworthy result of the study is that, despite the fact that the libraries analyzed displayed a very high perception of the importance of information literacy instruction, something common in university

libraries (Long & Schonfeld, 2014; McGuinness, 2009; Ullah & Ameen, 2015), there are still many university libraries in Mexico that still do not provide this training. This situation had previously been observed by Uribe Tirado (2012), who in a study on information literacy instruction programs offered at university libraries in Mexico found that most of them did not offer this training. In this regard, the results of our study offer an encouraging picture, since the percentage of libraries that offer information literacy instruction has increased markedly over the 6 years that have gone by between the two studies. In addition, as the results show, the vast majority of the libraries that do not offer information literacy instruction would like to offer it and are considering providing it in the future, but at present they do not do so primarily because they lack personnel who specialize in training activities, and because the financial and technological resources available do not allow them to offer such training. An improvement in the currently fairly scarce appreciation of information competencies on the part of universities and the agencies responsible for accrediting academic programs in Mexico² could create greater levels of institutional support, which in turn would lead to a greater allocation of resources.

It should be noted that in studies carried out in other, more developed countries, a lack of personnel who specifically focus on training and a lack of institutional support have been identified as fundamental problems when it comes to providing information literacy instruction (Julien et al., 2018), while in developing countries, in addition to these issues, additional problems have been found regarding a lack of computer equipment and connectivity (Baro, 2011; Baro & Zuokemefa, 2011; Dadzie, 2007; Ullah & Ameen, 2016), as is the case in our study.

Online information literacy instruction

With regard to online instruction, the results of this study corroborate the limited development of this training modality in Mexican university libraries that is observed in Fernández-Ramos's (2016c) study. Face-to-face training, just as is the case in other countries (Julien et al., 2018; Marzal & Saurina, 2015; McGuinness, 2009; Nevius et al., 2018), is the commonest form in which information competencies are imparted in Mexican university libraries, in spite of the fact that the two modalities are considered equally effective and the fact that librarians are aware that although online training presents certain disadvantages, it also offers many advantages, such as access to educational resources at any time and from any place, the possibility of reaching more students, and its capacity to allow students to learn at their own pace. In fact, almost all libraries that do not provide online information literacy instruction are willing to do so in the future, albeit in a way that combines it with face-to-face training, but they have not yet done so primarily because of a lack of resources. This lack of resources at a general level has been noted in other studies conducted in less-developed countries as an impediment to the development of online training (Baro et al., 2013), whereas in the most advanced countries, barriers take the form of a lack of time and library personnel's lack of training (Blevins, Deberg, & Childs, 2014; Georgas, 2014; Hess, 2014b).

The online training offered at university libraries in Mexico deals mainly with information seeking (in more than 96% of cases), at the expense of other skills such as information-needs awareness, information evaluation, and ethical use of information, which may be considered more cognitively demanding. This circumstance has already been observed in other studies on online information literacy instruction in Mexico (Fernández-Ramos, 2016c) and in other countries (Saunders, 2018; Somoza-Fernández, 2015; Yang & Chou, 2014), and it could be considered a shortcoming, since information literacy instruction is supposed to pay special attention not only to technical issues but

²The official list of organizations able to accredit academic programs in Mexico can be found at: https://www.copaes.org/organismos_acreditadores.php

also to critical thinking and other high-order skills. A possible explanation for it could be that there is a preference for delivering more cognitively demanding competencies face to face, with online training being used for simpler matters. However, it would be necessary to carry out specific studies on this issue in order to confidently make such an assertion.

Challenges

The main challenges faced by libraries that offer online training to their users vary, and they can be classified into three categories. First, there are problems related to motivation or interest on the part of students and teachers alike. This is a habitual difficulty when it comes to setting up a new service in a library, as innovations can be a little uncomfortable for certain users, information about how new services work does not reach users, and the usefulness of those services is not appreciated by them. As a result, it is essential to carry out major work in disseminating and promoting innovations among students (Befus & Byrne, 2011; Extreño et al., 2013; Su & Kuo, 2010), as well as to improve communication with faculty members so that collaborative efforts in the design of training are possible. It is also essential for the training to be adapted to the needs of the library's students and for its use to be promoted (Brasley, 2008; Thacker & Laut, 2018). In addition, there are problems related to a lack of financial and technological resources and a scarcity of time and training on librarians' part. This is a difficult problem to solve, since libraries often do not have the resources they would like to have and find it difficult to increase their budgets and to hire more staff. However, the scientific literature has proposed solutions for ways of trying to alleviate this handicap, such as resource sharing and efforts undertaken alongside other libraries (Qun & Xiaocheng, 2012), taking advantage of instructional materials that are available on the Web (Russell, Ryder, Kerins, & Phelan, 2013), or attempting to secure funds from outside the institutions themselves (Behr, 2004). Third, comments have been made within the literature on the characteristics of online training, such as matching training materials to users' needs and characteristics, and the difficulty of monitoring use of and benefits derived from the training. It is of course difficult to create excellent resources on the first attempt and to establish procedures to conduct the same monitoring that is conducted in face-to-face training, but it is possible to improve these aspects on the basis of the experience gained, evaluation and updating of the materials, and consultation of specialist literature on similar experiences at other libraries (Befus & Byrne, 2011).

Central vs. branch libraries

Finally, in terms of the differences found between central libraries and branch libraries, it should be noted that more information literacy instruction is delivered at central libraries than at branch ones, regardless of the instruction modality. Curiously there are more central libraries than there are branch libraries that stated that they did not provide information literacy instruction because doing so was not one of their priority functions. We assume that this paradox is due to the differences between the library systems of different universities or to the possibility that at smaller universities with fewer resources and no branch libraries, the central libraries must meet other, more urgent priorities. At both types of libraries, the percentages for delivery of online training were similar. However, there were some completely logical differences in terms of the target audiences for the training—at branch libraries there was more training aimed at discipline-based users—and of the greater involvement of faculty members in the production of training materials at branch libraries, which could be explained by greater links between faculty members and the librarians at this type library.

Conclusions

We live in an educational context that is profoundly shaped by technology, in which the Internet is widely used by students and faculty members in their various academic activities, from information seeking to collaborative work conducted via digital platforms. Libraries have not remained on the sidelines in this context and, to the extent that they have been able to do so, they have made a significant effort to provide more services, not just on a face-to-face basis, but also via the Web in order to meet the needs of their users through a medium that is being used more and more. Information literacy instruction is an essential service in university libraries, and the online modality is increasingly being used, since it is very well suited to the needs of certain increasingly autonomous users who in many cases cannot attend face-to-face training courses, and also because, in many cases, libraries do not have the capacity to provide all the training that they would like to offer. However, this training modality also has its limitations relative to face-to-face instruction, and it requires considerable effort, proper planning and design, and the availability of sufficient time, knowledge, and human and technological resources. Taking into account that each library has its own characteristics, resources, and users, it is easy to appreciate why the development of information literacy instruction delivered via an online modality is not uniform across all university libraries.

In Mexico's case, we observed that in general there has not been a great deal of development of online training in the country's libraries and that there are even libraries that do not provide information literacy instruction via any modality. However, in order to assess the results of this work, we must also take into account that in Mexico there are many universities and that they are very different from one other: while the National Autonomous University of Mexico (UNAM) has about 350,000 students as well as more than 130 libraries and 1000 employees, there are other, much smaller universities that only have a single library and few employees and that do not even have a Web page. This situation might explain why although at a large majority of libraries information literacy instruction is considered very important and an online modality is regarded as a good choice, it has not yet been possible to implement such training at all institutions due to a lack of resources and of specialist staff.

Once the decision to provide online information literacy instruction has been taken, libraries will likely face certain difficulties. Those detected in this work in the case of Mexico do not differ substantially from those that have been identified in other countries—for example, obtaining institutional support, being able to collaborate with faculty members, motivating students so that they use the training, monitoring learning, and needing librarians to be appropriately trained. Some of these difficulties will be more conspicuous in some libraries than in others, but it is clear that it is not easy to implement any new service and have it work perfectly from day one. We believe that cooperation between libraries and consultation of the abundant scientific literature that describes cases of implementation, evaluation, and improvement of online training programs in information competencies may be very useful in dealing with these difficulties.

The results of this study offer a diagnosis of the situation of online information literacy instruction in Mexico and may be a good starting point for similar future investigations to be conducted, which would make it possible to observe any developments that take place over time and ascertain to what extent the barriers and difficulties identified in this work are being overcome. In addition, we take the view that, to better understand the problem, it would be necessary to undertake other types of study that analyze the relationship between the delivery within university libraries of training in information competencies in general—and in particular via an online modality—with other factors, such as: the number of students who are served by the library and their characteristics; the number of librarians and their backgrounds; the budget available to the libraries; the degrees offered at each university;

and reference to competencies in information use in curricula or in degree standards. In addition, it would be advisable for Mexican university libraries to make an effort to share and disseminate their experiences, at the levels of both successful cases and difficulties encountered and overcome, when it comes to online information literacy instruction, in order to help other libraries to set up and improve their own online information literacy instruction programs.

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Appendix A. Supplementary data

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