



Systematic Literature Review Informing LIS Professionals on Embedding Librarianship Roles



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ABSTRACT

Purpose: Embedded librarianship currently receives renewed interest worldwide, seeks to bring the library and the librarian to users in their work environment. This paper identifies and documents embedding librarianship roles as reported in the Library and Information Science (LIS) literature.

Method: A systematic literature review was conducted using methods promulgated by the Center for Reviews and Disseminations but adapted to the particular needs of this review. Various online databases were used. The search phrases used were: *embedded librarianship, embedded librarians, blended librarian, integrated librarian, liaison librarian, information consultants, knowledge managers and subject librarians*. For inclusion, an article need to contain substantive description of the identified role and/or activity performed in embedding library practices. Papers that did not describe an actual (rather than proposed) embedding librarianship role were excluded. In total 102 articles were retrieved, 55 were found suitable for the review.

Findings: The roles of embedded librarians were identified, especially in the context of service delivery, all of which reported to be applied to academic libraries. Information literacy instruction, research and other scholarly activities, distance and online learning as well as embedding in classrooms, were described as ways of ensuring successful embedding librarianship.

Implications: The roles reported in the literature should inform practicing librarians contemplating embedding practices, guide formal embedded librarianship programs, and encourage other librarians to consider new skills in support of embedding roles.

Originality/value: The paper is the first to develop systematic literature review on embedding librarianship roles and offers the reference list of those selected papers and identifying further papers. This paper is recommended to those interested in a holistic and temporal view of the topic.

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INTRODUCTION

The developments of new digital information resources and related economic and administrative changes have made embedded librarianship (EL) critically important to library and information science (LIS) professionals, especially in the academia. Bell and Shank (2004) wrote that academic librarianship is at a critical professional juncture. There is a growing ambiguity about their professional role and they are “struggling with ways to harness and weave new technologies into their existing fabric of high quality information service delivery” (p.372). Meeting user needs and expectations is a priority within the library experience (Covone & Lamm, 2010). As the wants and needs of the library users transform, librarians have sought to redefine what the library building and their services mean to the users. They focus on the users and bring the library and the librarian to the users, wherever they are,

whether office, laboratory, home, or even on their mobile device (Kesselman & Watstein, 2009) through EL programmes.

The idea behind EL model is to demonstrate librarians' expertise as information specialists and to apply this expertise in ways that will have a direct and deep impact on the research, teaching or other works being done (Carlson & Kneale, 2011). Carlson and Kneale (2011) pointed out that as librarians seek to redefine themselves, the model of EL is generating interest as an effectual way of applying the knowledge and skills of librarians towards the information challenges of the digital age. Through EL, librarians move from a supporting role into partnership with their clientele, enabling librarians to develop stronger connections and relationship with those they serve. Talwal (2014) explained that there is a great shift in the role of librarian of mere custodian of information sources and services to EL, who is redefining the role of librarians by reactively answering a research request, developing a unique understanding of users need and delivering proactive results. EL involves better catering to the demands of the user groups through outreach programs and initiatives organized and hosted by them. For example, embedded librarians will undertake a leading

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role in developing and promoting users' information literacy and in adopting an active role in classroom teaching. In this context, the role of the embedded librarian morphs to include a hybrid of skills and duties, and the location of library service provision has to change to meet current user expectations. As information exponentially expands along with society's expectation for service, librarians must rise to the occasion and break out of the stereotypical librarian mould.

Considerable literature has been published on EL over the past ten years. This topic has been a prominent feature of the LIS research landscape over this period with the growing interest in EL in the research literature has been accompanied by an acknowledgement that it is "a strategic model for placing LIS professionals into partnerships with the individuals and working groups that depend upon their knowledge and expertise" (Shumaker, 2012). The phrase "embedded librarianship" takes root from "embedded journalists," a concept tied to wartime media coverage. In this situation journalist becomes part of the military unit giving war coverage; and using similar concept, EL places a reference librarian right in the midst of where the user is to teach research skill whenever and where ever instruction is needed. Similarly, Si, Xing, Zhou, and Liu (2012) who examined the concept of embedded service in the recent literature in China within the past 5 years synthesized that in EL services, librarians integrate actively into the user's environment, rather than remain in the library to await requests for service.

This paper presents a systematic literature review (SLR) undertaken to investigate the EL roles. Kitchenham (2004) describes several reasons for conducting systematic review, the most common are to identify any gaps in current research in order to suggest areas for further investigation; and to provide a framework/background in order to appropriately position new research activities. The terms *embedded librarian* or *embedded librarianship* can have multiple meanings which can be for a variety of reasons. As indicated in much of the current literature that addresses this subject; there is no one rule that defines how EL is implemented and what their roles are. Vassilakaki and Moniarou-Papaconstantinou (2015) who provided a systematic review of the specific roles information professionals have adopted in the past 14 years identified embedded librarian as a new and emerging role. With so many librarians "jumping on the embedded bandwagon" (Andrews, 2015), there has been much discussion on how we can develop ways to determine what would be considered the roles of an embedded librarian. One common technique that could be employed to determine this is through a review of literature. The absence of a systematic process that examines the characteristics and roles of embedded librarian is a matter of concern. The question is how the concept EL can be made more flexible in order to support change and evolution of this concept in the LIS profession. In order to address this gap, we synthesize current literature in a way that allows the reader to make decisions about EL choice with respect to the roles. A formal SLR provides a longitudinal study, depicting the element of EL as both a means of synthesis and contextual grounding. The following review question is addressed in this study: *What are the embedding roles that librarians play as reported in the literature?*

METHOD

The systematic literature review (SLR) was done using methods promulgated by the Center for Reviews and Disseminations (2009) but adapted to the particular needs of this review. A review protocol sets out the methods to be used in the review covering decisions about the review question, inclusion criteria, search strategy, study selection, data extraction, quality assessment, and data synthesis. The search process was conducted in January and February 2016 in two phases: (a) identification and selection of papers that contain the specific search terms; (b) scanning of references cited in the papers to identify further key literature. In the first phase, the search strategy undertaken is primarily based on identifying keywords and synonyms for terms used in

the research questions. This is carried out to minimize the differences in the terminologies. The following terms were used: *embedded librarianship*, *embedded librarians*, *blended librarian*, *integrated librarian*, *liaison librarian*, *information consultants*, *knowledge managers* and *subject librarian*. The following databases were used: *Web of Science*, *Scopus*, *Library and Information Science Abstracts (LISA)*, *Library Literature*, and extended to *Google Scholar*, *Springer Link*, *Science Direct*, *Wiley Online Library*, *Taylor and Francis Online*.

Each full-text paper retrieved in phase one was reviewed based on the title, abstract, keywords and the paper that addressed "embedded librarianship" were identified as potentially relevant. The second phase is scanning the reference list of those selected papers and identifying further papers on embedded librarianship. For inclusion, an article needs to contain substantive description of the identified role and/or activity performed in embedding library practices. This means that the article has to include enough details to suggest a real role, rather than only a proposed role. Papers that did not describe an actual (rather than proposed) embedding librarianship role were excluded. General restrictions were that articles should be written in English, and should be on embedding librarianship role. In total 102 records were obtained and 78 remained after duplicates were removed. One again, the full-text of these 78 articles were accessed for eligibility. A total of 56 articles were found suitable for the review. Appendix 1 shows the flow of the information based on the different EL role types in the review.

The full text of these 56 papers was then read through independently by the authors to identify the roles of the librarians. Four main themes, all referring to embedding roles were identified. The themes are: "EL in information literacy instruction" (10 papers); "EL in distance and online learning" (33 papers); "EL in research" (5 papers); "EL in courses or classrooms" (8 papers). The resulting themes and the identified papers were further compared to resolve any discrepancies in the review process. A paper is assigned to only one and the nearest theme although it fits into multiple categories to avoid duplication of reporting. Appendix 1 lists the authors and title of papers retrieved categorized under the four embedding role themes.

Searches on the same data base were done for the second time, using a combination of search terms such as *embedded librarianship*, *embedded librarian*, *research roles*, *online learning roles*, *information literacy roles*, *teaching roles*, *classroom roles*. This was done to ensure that no important published literature was left out. The references of all the identified literatures were cross-checked in an attempt to identify any relevant research. Full texts of the papers were again analyzed to provide an insight into the methods these papers used to investigate the embedding librarianship roles in different contexts. However, only a small number of papers within the identified literature reported the use of specific methods whereas the majority reported the author's personal views and perceptions. The papers that adopted a method used mainly questionnaire, observations and content analyses; a few studies used a mixture of methods. A variety of different types of publications were identified (journal articles, conference papers, and books), but the majority of the identified papers were journal articles. It appears that academic librarians first started reporting their embedding experiences in 1998 (Stein & Lamb, 1998).

FINDINGS

The findings are organized under four role themes identified: (a) EL in information literacy instruction; (b) EL in research; (c) EL in distance and online learning; (d) EL in courses, classrooms and departments.

EL IN INFORMATION LITERACY

Promoting information literacy programme is a reason for the emergence of EL (Browler & Street, 2008; Edwards & Black, 2012; Ivey, 2003). In order to promote information literacy programs to students, librarians accepted a positive role in providing information resources to

courses, improving students' research skills and providing assistance at point of need. Although information literacy instruction is provided in five formats: reference, one-shot sessions, credit courses, library Web sites, and embedded librarians; [Tumbleson and Burke's \(2010\)](#) findings of Project Information Literacy hold clues which signal EL as the approach to pursue.

A significant proportion of the literature reported on embedded librarians' experiences in information literacy instruction ([Covone & Lamm, 2010](#); [Matava, Coffey, & Kushkowsky, 2010](#); [Hearn, 2005](#); [Muir & Heller-Ross, 2010](#); [Olivares, 2010](#); [Rudasill, 2010](#); [Shepley, 2009](#); [Tumbleson & Burke, 2010](#)). In particular, [Hall \(2008\)](#) gave his experience in working with the instructor of classes as an embedded librarian where he delivered two library instructional sessions in an effort to assist students with their information literacy skills. [Pritchard \(2010\)](#) pointed out that information literacy is essential for success in undergraduate science programs, however teaching faculty are generally ill-prepared or unwilling to provide intentional support in their courses. [Pritchard \(2010\)](#) wrote that librarians are uniquely qualified to help teach information literacy and presented one example of a faculty-librarian collaboration in which the science librarian is embedded in a first-year undergraduate course in nanoscience, both as a co-designer of the curriculum and a member of the teaching team. [Soules, Nielsen, Youn Lee, and Al Rifae \(2013\)](#) reported how postgraduate TESOL program coordinator and the librarian embedded information literacy through structured assignments, reflective essays, and librarian in-person classroom visits. Ongoing assessment of student survey results and reflective essays provide impetus for ongoing changes to the curriculum. Students' perceptions about and practice of information literacy enrich their program experiences and improve their preparation for further academic work or subsequent TESOL teaching.

The most common way embedded librarians have partnered with academic departments is to embed information literacy and research resources into class assignment. With regards to the answer to a need for a curriculum wide plan to teach research skills, embedded academic librarians formed partnership with departments to design research and writing assignments. According to [Brower \(2011\)](#) embedded librarians sensed it was essential to teach information literacy skills to students and uncover them to the library's resources early in their academic careers, designing assignments that require the use of library's resources early in their academic careers. Designing assignments that need the use of library resources helped students to know the value of the library's resources for their course assignments. Embedded information literacy components also assisted librarians to share their knowledge of the research process. Teaching information literacy courses would assist librarians to reach out to students who may not have received library instruction, attendance at the department/faculty meetings offered embedded librarians a chance to meet other faculty and learn about research initiatives or curriculum changes ([Brower, 2011](#)).

Faculty collaboration with the embedded librarian is the core of embedded information literacy instruction. Faculty-librarian relationship building is of great significance because the two must work closely together over an extended period of time, it is essential that librarians choose their partnership carefully. Several librarians stress the need to work only in partnerships where there is trust and mutual respect ([Carncross, 2013](#)). Librarians build these relationships in different ways, while collaborative relationship can be built in numerous ways, it is essential that both parties have common goals and know the importance of developing information literacy skills in their students. The most significant collaboration are from campuses in which librarian and university administrators have made information literacy a priority on campus, and have provided librarians and faculty with the time required to make the collaboration successful ([Cramer, 2013](#)).

The reviews do suggest that EL in information literacy instruction see librarians conducting the following specific tasks: help students to identify research problem ([Hoffman, 2011](#)); highlight key search concepts for students on their research ([Soules et al., 2013](#)); co-teach, insert

information fluency and research instruction into course projects, ensure that students have wide access to library materials and librarian expertise, teach how to use print resources, teach rudimentary internet searching, help teachers plan, implement, and evaluate online instruction, learning objects, digital resources and course design ([Bezetz, 2013](#)).

EL IN RESEARCH

A few papers identified that EL was a result of a model where academic librarians work directly with the faculty they serve as collaborators on research projects or as an integral part of a research team, which is described as "an emerging model" in [Carlson and Kneale \(2011, p. 170\)](#). As an embedded librarian in the research context, a librarian works with researchers more "upstream" in the research process rather than just with the products produced at the end of the research lifecycle: books and journal articles ([Carlson & Kneale, 2011](#)). Traditional subject librarians and reference librarians have much to offer in this new environment: as they involve themselves into the user's process of scientific research, and play a distinct role in this regards by assisting different disciplines, discuss with one another and by tracing, handling and, archiving information for interdisciplinary teams. The nature of these partnerships will be different according to the type of research being done and the needs of the researchers, but they will generally involve the application of the practices and principles of library science directly to the research being done.

There is increasing research collaboration in a more formal sense, where librarians are participating to the research outcome, requires a deeper level of embeddedness than casual contact. It needs a deeper knowledge about research of the faculty and an ability to find out how one specialized, both as a librarian and as subject professional can contribute. According to [Dewey \(2005\)](#), collaboration with research centers and institutes is another important aspect for successful partnerships. Librarians are in the business of research support but, on most campuses, have little direct contact with research centers. A strategic effort to make consistent contact with specialized research centers ensures that researchers have the most thorough and current information resources and accompanying expertise to support their work.

[Kesselman and Watstein \(2009\)](#) provide a clear overview of the various ways libraries and librarians are embedding themselves into research environment. Several roles are highlighted, including course-integrated instruction librarians as members of research teams, librarians collaborating with faculty in scholarly communication activities and librarians as partners in multidisciplinary, global, and virtual research collaborations.

The literature shows that EL in research will see librarians conducting the following tasks: evaluate and summarize the literature and support and contribute to writing grant proposals ([Shumaker & Talley, 2009](#)); generate bibliometric reports; provide advice regarding research and publication policies; manage drafts, preparing pre-prints and post-prints; communicate with journal editors, and dissemination of publication results through Open Access repositories ([Robinson-Garcia & Torres-Salinas, 2011](#)); provide ready reference, perform in-depth topical research, and work in resource development ([Drewes & Hoffman 2010a and 2010b](#)); and advise on data management, data curation and reference management ([Shumaker, 2009](#)).

EL IN DISTANCE AND ONLINE LEARNING

The proliferation of distance and online learning has led librarians to adapt their instructional techniques and follow teaching faculty and students into the online environment ([York & Vance, 2009](#)) and this has been outlined in many papers ([Daly, 2010](#); [Francis, 2012](#); [Figa, Bone, & Macpherson, 2009](#); [Herring, Burkhardt, & Wolfe, 2009](#); [Hoffman, 2011](#); [Love & Norwood, 2008](#); [Matthew & Schroeder, 2006](#); [Matos, Matsuoka-Motley, & Mayer, 2010](#); [Montgomery, 2010](#); [Tumbleson & Burke, 2010](#)). According to [Bezetz \(2013\)](#), an embedded librarian's

involvement in the distance and online learning environment deserves recognition as a transformative tradition in reference librarianship. A strong library support is essential for effective learning experiences and must be provided equally for on campus and distance learners. Nolan, Daugherty, and Russo (2013) stated that library support, through resources, services, and information literacy instruction, contributes greatly to the quality of distance learning. Distance learners need the same services as traditional students. Tipton (2001) stressed that if distance learning programs are to be credible and successful, the student of distance-learning must have the same access to embedded librarian's services as the students on campus. Nolan et al. (2013) viewed access to library as so significant that he questioned the appropriateness of offering the same academic award to those students without equivalent access to learning process.

Literature shows that academic libraries engage their distance learning communities through an embedded librarian model that facilitates direct interaction between students and librarians regardless of physical proximity. Becker (2010) discussed the benefits of integrating course management systems and social software such as Facebook with library services to meet patrons at their point of need. Cold and Urton (2013) described librarians' efforts at Kansas State University to become integrated in the online courses, classroom and more visible to students and teachers. At Athens State University, reference librarians were given the responsibilities for online courses and, thus, followed course materials and assignments to assist students (Herring et al., 2009). Davis and Smith (2009) described the experiences of librarians embedded in undergraduate English composition courses taught entirely in Second Life and presents the results of an empirical research study to assess the effectiveness of Second Life library instruction. Although information literacy competencies and confidence levels of students did not improve significantly with the introduction of course-embedded librarian instruction and support, there were unique challenges of "virtual embedding" and possible ways to improve librarian effectiveness in online learning. Hoffman and Ramin (2010) indicated that academic librarians interested in collaborating with faculty in online courses often express questions about their role, level of involvement, and potential activities as an embedded librarian.

An analysis of the literature on EL in distance and online learning shows that librarians conduct the following specific tasks: offer support and access to resources and reference services equivalent to that provided for on-campus instruction (Francis, 2012); offer support to distance learners through virtual reference services, electronic access to and delivery of resources, conduct online information literacy instruction and be online co-instructors and technological applications such as instant messaging, e-mail, wikis (Nolan et al., 2013); employ variety of methods to teach information literacy, including posting to discussions boards, linking to course guides or other library web- pages, answering e-mail questions, providing library instruction through live webinars and chat sessions, and linking or embedding tutorials (Skaggs, 2013); give access to resources and guidance to searching and used marketing techniques (e.g. word-of-mouth and e-mails) to promote their role (Wright, Williams, & Wright, 2011); provide copyright clearance and content licensing role, promote open content; help to ensure that Massive Open Online Courses (MOOC) content is accessible to all users, provide online instruction in information literacy; and encourage the use of open licensing (Barnes, 2013); provide access and use of digital library resources to complete course requirements and help students in their online assignments (Edwards, Kumar, & Ochoa, 2010); gain electronic access to students through online course management tools which include automatically generated links within classroom management systems, online discussions, and chat functions (Drewes & Hoffman, 2010a and 2010b); create portals to library services (Farkas, 2008); deliver live resources training with the ability to record and post links inside courses for student reference (Hawes, 2011); upload content into a course or to monitor a discussion board where students may pose questions about research and utilizing library resources (Konieczny, 2010);

act as synchronous guest facilitators in course management software, create online learning tutorials, lead and participate in class discussion boards (Shepley, 2009).

The review reflects that there are more studies addressing EL roles in distance and online learning compared to the other "embedding" roles. A plausible explanation to this may be because "embedding" in an online course is easier, less intensive and less time consuming than "embedding" in a physical course. The convenience of online learning allows students, especially adult learners, to balance work, family, and education much more easily than many face-to-face programs (Farkas, 2008). Some of these students are in completely online programs, where they may never visit a campus during their education. Furthermore, with the rapid improvements in social technologies, the negatives associated with online learning such as lack of community and tacit learning are decreasing every day. According to Figa et al. (2009), some libraries and universities across the globe have implemented a number of features to enhance remote access to embedding services, in other words, many libraries have worked hard to develop a web presence and to translate traditional library services into the online medium in order to provide outreach services to online learners. It also appears that online learning is more convenient and much easier in providing outreach services to online learners.

EL IN COURSE, CLASSROOMS AND DEPARTMENTS

Libraries in general are known for their educational role (Bewick & Corral, 2010; Different terms were identified in the literature that articulated the librarians' instructional roles such as teaching librarian, instruction librarian, librarian as teacher and professor librarian. The embedded librarian is focused on course goals and learning objectives outside of the library and across the curriculum (Sinclair, 2009). In this regard, Kesselman and Watstein (2009) described embedded librarian as one who maintains a physical presence in an academic department, holding office hours and attending department meetings and is easily accessible to students and faculty.

In various effective embedded instruction programs, embedded librarians are seen as co teachers, research consultants, and members of the classroom community. For this type of role to develop, the librarian must put in a great amount of energy in establishing relationships with both faculty members and students, this usually includes multiple class sessions spent with students as well as consultation and discussion with students (Carncross, 2013). According to Carncross (2013), as students begin to admit the librarian as a member of the course community, they start asking questions and seeking out the librarian outside of class. This kind of negotiation is important if students are to see librarians as both members of a community and teachers. Several cases note that librarians' credibility and trustworthiness are enhanced as they become more and more active and visible in the course (Carncross, 2013). Increasing the prominence of librarians within the context of the academic process has the effect of raising the stature of the librarian as educator to the students.

The literature shows that librarians embedding in courses have an opportunity to engage with students and collaborate with departmental faculty across many disciplines in ways that can strengthen library programs already in place (Brower, 2011; Carncross, 2013; Covone & Lamm, 2010; Lillard et al., 2009). For example, Hall (2012) reported a successful service learning course at the Mississippi State University, aimed at improving retention rates, developing personal connections with freshmen, and helping them hone leadership skills and citizenship through service to their local community. Kansas State University's K-State Libraries adopted an organizational structure that allows librarians to better meet the needs of interdisciplinary fields of study, such as sustainability. The librarians are transitioning from a traditional model in which subject librarians were assigned to individual colleges/ departments based on subject knowledge to a more flexible approach that enables librarians to move freely across the disciplines. The

embedded librarians in the K-State libraries practice “embedded librarianship” as a growing concept that encourages librarians to proactively collaborate with faculty and instructors to advance teaching and research goals as well as campus and community initiatives (Cold & Urton, 2013). Jacobs (2010) described a case of a reference/instruction librarian who used targeted outreach to furnish library services to faculty and students while assigned to work in the College of Education during a library renovation project. Due to the success of this temporary assignment, the librarian has subsequently maintained regular office hours in the College to provide research consultations for faculty and students, collaborate on collection development, and continue outreach efforts resulting in increased requests for research assistance and course-integrated information literacy instruction.

Embedding librarians in academic departments and programmes is one way to expand library services within this new information landscape. Rudasill (2010) discussed the embedded librarian as an evolutionary product and speculates on the reasons driving the change from the library to the department or center for the delivery of information services. Matava et al. (2010) described the background and process for embedding librarians and provides case studies from three librarians who successfully embedded themselves in academic departments. However, definitions of successful embedding in courses, classrooms and departments will depend on the level of service accepted, and the librarian may become, if not fully embedded, sufficiently embedded. Olivares (2010) described the experience of a would-be embedded librarian and her attempts to embed herself in a department that is reluctant to accept reference, research or instruction services from the library. In such cases, the would-be embedded librarian may have to settle for “partial” embedding, offering some services where possible and tactfully abstaining from offering others that were not well-received.

The review designates that EL in courses, classrooms and departments see librarians conducting the following specific tasks: teach students how to be savvy searchers using computer and laptops (Boyer, 2015); collaborate where librarian and faculty member teach each other, exchanging favors, and the librarian selecting useful resources for the faculty (Ivey, 2003); take part in meetings to promote librarian’s presence and establish communication with the students, researchers and faculty (Jacobs, 2010); provide access to course-related library resources, in-class instruction sessions, library instructional handouts, information on referencing style, library Webinar information as well as teach note-taking (Bezot, 2013).

DISCUSSIONS AND CONCLUSION

The goal in conducting this review was to identify the roles of an embedded librarian. We searched published literature and found four themes associated with EL roles. The literature confirms that embedded librarians play an important role in providing support and support materials in online learning, teaching information literacy, managing and providing access to information resources in the classrooms, assisting in research and other scholarly communication activities. Indeed, these roles have also been highlighted in Schulte’s (2012) review on the development of EL and common activities in practice, and has been succinctly summarized in the following statement by Muir and Heller-Ross (2010): “Embedded librarians, connected with students and faculty inside the classroom, lab and studio, have new opportunities for preparing students for research and for collaborating with faculty on course-integrated information literacy, research assignment design, teaching, assignment interpretation, and timely student assistance”.

This review found that embedding roles bring academic librarians out of the centralized libraries they have landed in and puts them back into the academic spaces in which they provide individual support and resources either through paper or electronic formats. The systematic literature review revealed that basic and necessary information literacy skills training for students and researchers is an important aspect of

the EL roles. The review pointed that it is a basic need for students to be taught information literacy skills and they should be made to know about the resources of the library and given work that demand the use of these resources at an early stage of their academic careers (Brower, 2011). EL role in information literacy enrich students’ learning experiences and improve their preparation for further academic activities. Li (2012) found that students developed their information literacy competencies through the financial and information literacy course.

In terms of classroom roles, the review indicates that academic departments associated with embedded librarians in terms of information literacy and research resources into class assignment in which a wide plan curriculum is required. This will answer calls for a good designed curriculum and writing assignment. In many effective instructional program of EL, embedded librarians are referred to as teachers, members of the classroom community, and as research consultant. Adequate staffing, training and re-training of the embedded librarians, availability of critical funding and policy on embedded librarianship as well as proper supervision could develop the role of embedded librarians. It will also minimize heavily time pressured and extremely time consuming, especially in physical classes, faced by the embedded librarians.

According to Shumaker (2009), to assess this classroom role, embedded service providers need to define criteria of “embeddedness” for library and information service programs, define indicators of success and identify successful (model) programmes, collect data about the practices followed by model programs in initiating, operating, and evaluating their services, develop recommendations for other librarians seeking to implement embedded services. Brady and Kraft (2012) maintained that creating an embedded librarianship program can be full of challenges for library administration already stressed with budget and staffing issues. Budgets, fear of change, work environment, and measuring usage are all challenges that library administration continually face with traditional library programs; embedded librarianship is no different. Shumaker and Talley (2009) stressed that many librarians complain about being underfunded. Often, the problem arises because it is the librarians who must persuade their managers to fund library services. The managers may not be direct beneficiaries of the library services, and may have little incentive or motivation to allocate more funds to libraries. The librarians’ justifications for increases may be seen as self-serving, and lacking credibility, especially when customers are in different organizational units whose support for library funding may have limited impact on the funding manager. A way out of this box is to have the customer management commit to fund embedded library services that directly benefit the customer organization. Here, management interests and customer interests are aligned, and customer value leads to support that can translate directly into funding for embedded library services.

With regards to faculty role of embedding librarianship role, four common elements in embedded librarian/faculty collaboration were enumerated. These are: like-mindedness, commitment, enthusiasm and innovation (Ivey, 2003). The collaboration often results in ongoing benefit such as the librarian and faculty member teaching each other, exchanging favors, and the librarian selecting useful resources for the faculty. Browler and Street (2008) and Dugan (2008) found that the students’ performance was getting better compared to when no librarian was embedded in the course.

Library support, through resources, services, and information literacy instruction, contributes greatly to the quality of distance learning. It has been pointed out that, for distance learning to be successful in their program, there is need for a strong support from the library. If distance learning programs are to be credible and successful, the student of distance-learning must have the same access to embedded librarian’s services as the students on campus (Tipton, 2001). Therefore, embedded librarians should offer support and resources equivalent to that provided for on-campus instruction to distance learners. They should make extensive efforts to ensure adequate support to distance learners through virtual reference services, electronic access to and delivery of resources.

The review shows that academic libraries that engage their distance learning communities through an embedded librarian as online co-instructors to deliver technological applications such as instant messaging, e-mail, and wikis. This EL model facilitates direct interaction between students and librarians regardless of physical proximity. Edwards and Black (2012) and Edwards et al. (2010) evaluated the program of embedded librarians in an online graduate educational technology course and found that students were helped with their online assignments.

The review shows that librarians in different institutions of learning particularly at research-based institutions are using the EL model in collaborating with the faculty they serve on research projects or as an integral part of a research team. Therefore library should not relent in making their institutes aware of their responsibility for the scholarly communication process. Library should involve in the complete information chain and start archiving and publishing knowledge created in the universities and provide knowledge access to users. In terms of embedding services in the form of publishing research, library publishing services are supposed to help scholars, authors, and editors. Libraries should provide expertise, timely notification, and advice on scholarly publishing in the rapidly changing scholarly communication paradigm. Libraries also provide the consultations regarding intellectual property rights, publications and the preservation of scholarly works. More embedded librarians are required to fulfill this role. In this, it could be inferred that this immediately puts the librarian on an equal footing with research partners. This calls for academic librarians whose jobs involve supporting or conducting research, or who have an interest in conducting research, to develop research competencies, and the academic libraries to source research training for their librarians.

However, the review revealed some issues confronting the embedded librarianship role. The teaching faculty are generally ill-prepared or unwilling to provide intentional support in their courses. Currently there is no cohesive guide to developing an embedded librarian service for online courses; embedded librarianship is still in its infancy and is still an emerging model in the research context, the pathways to engagement and the criteria for success are not yet fully defined. Courses regarding teaching methodologies should also be incorporated in embedded librarianship in order to address the new and evolving roles of information professionals. New courses should be introduced and existing ones should be updated to meet the challenges of social, technological, educational and economic changes. The best practices to guide those developing embedded librarian services are equivalent access, institutional relevancy, faculty interest, and the broad variance among the purposes, activities, and roles in embedded experiences. This also means a revised curriculum in LIS education that incorporates the education for embedded librarians.

The limitation of this review is that it covers only literature published in English. Ideally a review should aim to include all relevant studies, regardless of publication status, in order to avoid publication bias. However, there are practical issues that limit the inclusion of all studies regardless of publication type/status because unpublished studies are likely to be harder to source, and more difficult to obtain, than published studies. Most of the research focused on academic libraries and from United States and Europe. The literature review refers to the roles that embedded librarians practiced mainly in the university setting. Clearly there is need for future research to be conducted in other context. Further investigation need to be carried out on the advocacy of embedded librarianship in other types of educational organization. It does not only contribute in identifying the advanced and emerging embedding roles of LIS professionals, but it also discusses on the specific factors that led to the emergence of these advanced roles. It recommends future directions for its continuing developments in the field of LIS. This would be useful to LIS educators, to library planners and decision makers and to practicing librarians contemplating to conduct EL programmes.

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APPENDIX 1. DISTRIBUTION OF PRIMARY LITERATURE ON EMBEDDED LIBRARIANSHIP BASED ON ROLE TYPES.

Author	Title	Year	No. of references
Role: Embedded librarian in research (5 papers)			
Carlson, J., & Kneale, R.	Embedded librarianship in the research context navigating new waters	2011	3
Dewey, B. I.	The embedded librarian: Strategic campus collaborations.	2005	6
Kesselman, M. A., & Watstein, S. B.	Creating opportunities: Embedded librarians	2009	5
Robinson-Garcia, N., & Torres-Salinas	Librarians embedded in research	2011	4
Stein, L. L., & Lamb, J. M.	Not just another BI: Faculty-librarian collaboration to guide students through the research process	1998	4
Role: Embedded librarian in information literacy instruction (10 papers)			
Hall, R.	The embedded librarian in a freshman speech class information literacy instruction	2008	-
Hall, S.L.	Embedded library programs within a first year service learning course: opportunity for library outreach and instruction	2012	4
Hearn, M.L.	Embedding a librarian in the classroom: an intensive information literacy	2005	8
Ivey, R.	Information literacy: how do librarians and academics work in partnership to deliver effective learning programs?	2003	4
Jacob, B.W.N.	Embedded librarianship is a winning proposition	2010	11
Muir, G. & Heller-Ross, H.	Is embedded librarianship right for your institution?	2010	6
Pritchard, P.A.	The embedded science librarian: partner in curriculum design and delivery	2010	5
Rudasil, L.M.	Beyond subject specialization: the creation of embedded librarians	2010	4
Soules, A. et al.	Embedding information literacy in an MATESOL program	2013	8
Tumbleson, B.E. and Burke, J.J.	When life hands you lemons: overcoming obstacles to expand services in an embedded librarian program	2010	3
Role: Embedded librarian in distance and online learning (33 papers)			
Allen, E. and J. Seaman	Making the Grade: Online Education in the United States.	2006	-
Allen, I. E., & Seaman, J.	Class Differences: Online Education in the United States	2010	-
Barnes, C.	MOOCs: the challenges for academic librarians	2013	5
Becker, B.W.	Embedded librarianship, a point of need service- EdiTLib digital library.	2010	6
Bell, S. & Shank, J.	The blended librarian: a blueprint for redefining the teaching and learning role of academic librarians	2004	3
Boyer, B.	Designer librarian: Embedded in K12 Online Learning	2015	4
Brower, B.	Designer librarian: Embedded in K12 online learning	2011	13
Carncross, M.	Faculty and librarian collaboration in the first year: A literature review. Embedded librarianship	2013	8
Cold, S. and Urton, E.	Embedded librarianship: a model for promoting sustainability on campus	2013	4
Covone, N & Lamm, M.	Just be there: campus, department, classroom and kitchen?	2010	3

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Author	Title	Year	No. of references
Daly, E.	Embedding library resources into learning management systems A way to reach Duke undergrads at their points of need	2010	2
Davis, M.G. & Smith, C.E.	Virtually embedded library instruction within second life	2009	9
Edwards, M., Kumar, S., & Ochoa, M.	Assessing the value of embedded librarians in an online graduate educational technology course	2010	13
Farkas, M.G.	Embedded library, embedded librarian: online courseware, <i>The Desk and Beyond: Next generation Reference Services</i>	2008	4
Figa, E., et al.	Faculty-Librarian collaboration for library services in the online classroom: Student evaluation results and recommended practices for implementation	2009	13
Francis, M.	Making embedded librarians a part of an online community of learners	2012	15
Harloe, B. and Williams, H.	The college library in the 21st century	2009	3
Hawes, S.L.	Playing to win: embedded librarians in online classrooms	2011	6
Herring, S.D. et al.	Reaching remote students	2009	5
Hoffman, S.	Embedded academic librarian experiences in online courses: roles, faculty collaboration, and opinion	2011	8
Hoffman, S. & Ramin, L.	Best practices for librarians embedded in online courses	2010	6
Kathy Drewes & Nadine Hoffman	Academic embedded librarianship: An introduction	2010	9
Lillard, L. et al.	Embedded librarians: MLS students as apprentice librarians in online	2009	4
Love, M. & Norwood, S.	Finding our way as embedded librarians	2008	2
Matos, M.A et al	The embedded librarian online or face-to-face: American university's experiences	2010	11
Matthew, V., & Schroeder, A.	The embedded librarian program	2009	1
Montgomery, S.E.	Online webinars! interactive learning where our users are: the future of embedded librarianship	2010	4
Nolan, D.	Embedded librarianship in context.	2013	14
Daugherty, A., & Russo, M.	<i>Embedded librarianship: What every academic librarian should know</i>		
Shank, J & Bell, S.	Blended librarianship: (re)envisioning the role of librarians as educators in the digital information age	2011	10
Shepley, S.E.	Building a virtual campus: librarians as collaborators in online course development and learning	2009	2
Si, L., et al.	Embedded services in Chinese academic Libraries	2012	18
Sinclair, B.	The blended librarian in the learning commons: new skills for the blended library	2009	3
Sullo, E. et al.	Rethinking library service to distance education students: Analyzing the Embedded Librarian Model	2012	3
Tipton, C.J.	Graduate students' perceptions of library support services for distance learners	2001	8
York, A.C. & Vance J.M.	Taking library instruction into the online classroom: best practices for embedded librarians	2009	8
Role: Embedded librarian in courses, classrooms and departments			
Bezeta, A.	Free price inside! Embedded librarianship and faculty collaboration at a small- sized private University	2013	31
Carncross, M.	Faculty and librarian collaboration in the first year: a literature review: embedded librarianship	2013	8
Cold, S. & Urton, E.	Embedded librarianship: a model for promoting sustainability on campus	2013	4
Covone, N. & Lamm, M.	Just be there: campus, department, classroom and kitchen?	2010	3

(continued)

Author	Title	Year	No. of references
Hall, S.L. and Marshall, D.H.	Embedded librarianship in branch settings: Customizing liaison services.	2014	9
Matava, T. et al.	Beyond library walls: embedding librarians in academic departments	2010	11
Olivares, O.	The sufficiently embedded librarian: defining and establishing productive librarian-faculty partnerships in academic libraries	2010	8
Shumaker, D.	Who let the librarians out? Embedded librarianship and the library manager	2009	5

REFERENCES

- Andrews, C. R. (2015). Embedded librarianship: Best practices explored and redefined. *The International Journal of Educational Organization and Leadership*, 22(2), 1–14.
- Barnes, C. (2013). MOOCs: The challenges for academic librarians. *Australian Academic and Research Libraries*, 44(3), 163–175.
- Becker, B. W. (2010). Embedded librarianship a point-of-need service-EdTLlib digital library. *Behavioral and Social Sciences Librarian* 237, 29(3), 237–240.
- Bell, S., & Shank, J. (2004). The blended librarian: A blueprint for redefining the teaching and learning role of academic librarians. *College and Research Libraries News*, 65(August), 372–375.
- Bewick, & Corral, S. (2010). Educating the academic librarian as a blended professional: A review and case study. *Library Management*, 31(8/9), 567–593.
- Bezeta, A. (2013). Free prize inside! Embedded librarianship and faculty collaboration at a small-sized private university. *The Reference Librarian*, 54(3), 181–219.
- Boyer, B. (2015). Designer librarian: Embedded in K12 online learning. *TechTrends*, 59(3), 71–76.
- Brady, K., & Kraft, M. (2012). Embedded & clinical librarianship: Administrative support for Vital new roles. *Journal of Library Administration*, 52, 716–730. <http://dx.doi.org/10.1080/01930826.2012.748403> (Taylor & Francis Group, LLC ISSN: 0193-0826 print/1540-3564 online).
- Brower, M. (2011). A recent history of embedded librarianship: Collaboration and partnership building with academics in learning and research environments. In C. Kvenild, & K. Calkins (Eds.), *Embedded librarians: Moving beyond one-shot instruction* (pp. 3–16). Chicago: Association of College and Research Libraries.
- Browler, M., & Street, K. (2008). Investigating the efficacy of embedment: Experiments in information literacy integration. *Reference Services Review*, 36(4), 438–449.
- Carlson, J., & Kneale, R. (2011). Embedded librarianship in the research context navigating new waters. *College & Research Libraries News*, 72(3), 167–170.
- Carncross, M. (2013). Faculty and librarian collaboration in the first year: A literature review. *Embedded Librarianship: What every academic should know*. 21–40, .
- Center for Reviews and Dissemination (2009). *Systematic reviews CRD's guidance for undertaking reviews in health care*. York: Center for Reviews and Dissemination.
- Cold, S., & Urton, E. (2013). Embedded librarianship: A model for promoting sustainability on campus. *International Journal of Sustainability Education*, 8(1), 13–22.
- Covone, N., & Lamm, M. (2010). Just be there: Campus, department, classroom and kitchen? *Public Services Quarterly*, Vol. 6(2/3), 198–207.
- Cramer, S. (2013). Relationships and ethics of coteaching research-intensive classes. *Embedded librarianship: What every academic librarian should know* (pp. 41).
- Daly, E. (2010). Embedding library resources into learning management systems a way to reach Duke undergrads at their points of need. *College & Research Libraries News*, 71(4), 208–212.
- Davis, M. G., & Smith, C. E. (2009). Virtually embedded: Library instruction within second life. *Journal of Library and Information Services in Distance Learning*, 3(3/4), 120–137.
- Dewey, B. I. (2005). The embedded librarian: Strategic campus collaborations. *Resource Sharing & Information Networks*, 17(1–2), 5–17.
- Drewes, K., & Hoffman, N. (2010a). Academic embedded librarianship: An introduction. *Public Services Quarterly*, 6(2–3), 75–82.
- Drewes, K., & Hoffman, N. (2010b). Academic embedded librarianship: An introduction. *Public Services Quarterly*, 6(2–3), 75–82.
- Dugan, M. (2008). Embedded librarians in an Ag econ class: Transcending the traditional. *Journal of Agricultural and Food Information*, 9(4), 301–309.
- Edwards, M. E., & Black, E. W. (2012). Contemporary instructor librarian collaboration: A case study of an online embedded librarian implementation. *Journal of Library and Information Services in Distance Learning*, 6(3/4), 284–311.
- Edwards, M., Kumar, S., & Ochoa, M. (2010). Assessing the value of embedded librarians in an online graduate educational technology course. *Public Services Quarterly*, 6(2/3), 271–291.
- Farkas, M. G. (2008). Embedded library, embedded librarian: Online courseware. *The desk and beyond: Next generation reference services*. Chicago: Association of College and Research Libraries.
- Figa, E., Bone, T., & Macpherson, J. R. (2009). Faculty-librarian collaboration for library services in the online classroom: Student evaluation results and recommended practices for implementation. *Journal of Library & Information Services in Distance Learning*, 3(2), 67–102.
- Francis, M. (2012). Making embedded librarians a part of an online community of learners. *Journal of Library and Information Services in Distance Learning*, 6(1), 19–27.
- Hall, R. (2008). The 'embedded' librarian in a freshman speech class information literacy instruction in action. *College and Research Libraries News*, 61(1), 28–30.

- Hall, S. L. (2012). Embedded literacy programs within a first-year service learning course: Opportunities for library outreach and instruction. *Codex: the Journal of the Louisiana Chapter of the ACRL*, 1(4).
- Hawes, S. L. (2011). Playing to win: Embedded librarians in online classrooms. *Journal of Library and Information Services in Distance Learning*, 5(1/2), 56–66.
- Hearn, M. R. (2005). Embedding a librarian in the classroom: An intensive information literacy model. *Reference Services Review*, 33(2), 219–227.
- Herring, S. D., Burkhardt, R. R., & Wolfe, J. L. (2009). Reaching remote students. *College and Research Libraries News*, 70(11), 630–633.
- Hoffman, S. (2011). Embedded academic librarian experiences in online courses: Roles, faculty collaboration, and opinion. *Library Management*, 32(6/7), 444–456.
- Hoffman, S., & Ramin, L. (2010). Best practices for librarians embedded in online courses. *Public Services Quarterly*, 6(2/3), 292–305.
- Ivey, R. (2003). Information literacy: How do librarians and academics work in partnership to deliver effective learning programs? *Australian Academic and Research Libraries*, 34(2), 100–113.
- Jacobs, B. W. N. (2010). Embedded librarianship is a winning proposition. *Education Libraries*, 33(2), 3–10.
- Kesselman, M. A., & Watstein, S. B. (2009). Creating opportunities: Embedded librarians. *Journal of Library Administration*, 49(4), 383–400.
- Kitchenham (2004). Procedures for Performing Systematic Reviews. *Joint Technical Report Software Engineering Group*. Keele: Department of Computer Science Keele University (Staffs ST5 5BG, UK Keele University Technical Report TR/SE-0401 ISSN:1353-7776 and Empirical Software Engineering National ICT Australia Ltd. Bay 15 Locomotive Workshop Australian Technology Park Garden Street, Eversleigh NSW 1430, Australia NICTA Technical Report).
- Konieczny, A. (2010). Experiences as an embedded librarian in online courses. *Medical Reference Services Quarterly*, 29(1), 47–57.
- Li, J. (2012). Librarianship serving as an educator: A southern case in embedded. *Journal of Business and Finance Librarianship*, 17(2), 133–152.
- Lillard, L. L., et al. (2009). Embedded librarians: MLS students as apprentice librarians in online courses. *Journal of Library Administration*, 49(1–2), 11–22.
- Love, M., & Norwood, S. (2008). Finding our way as embedded librarians. *College and Undergraduate Libraries*, 14(4), 87–93.
- Matava, T., Coffey, D., & Kushkowski, J. (2010). Beyond library walls: Embedding librarians in academic departments. *Public Services Quarterly*, 6(2/3), 165–173.
- Matos, M. A., Matsuoka-Motley, N., & Mayer, W. (2010). The embedded librarian online or face-to-face: American university's experiences. *Public Services Quarterly*, 6(2/3), 130–139.
- Matthew, V., & Schroeder, A. (2006). The embedded librarian program. *Educause Quarterly*, 29(4), 61.
- Montgomery, S. E. (2010). Online webinars! Interactive learning where our users are: The future of embedded librarianship. *Public Services Quarterly*, 6(2/3), 306–311.
- Muir, G., & Heller-Ross, H. (2010). Is embedded librarianship right for your institution? *Public Services Quarterly*, 6(2/3), 92–109.
- Nolan, D. A., Daugherty, A., & Russo, M. (2013). Embedded librarianship in context. *Embedded librarianship: What every academic librarian should know*. 13–19.
- Olivares, O. (2010). The sufficiently embedded librarian: Defining and establishing productive librarian-faculty partnerships in academic libraries. *Public Services Quarterly*, 6(2/3), 140–149.
- Pritchard, P. A. (2010). The embedded science librarian: Partner in curriculum design and delivery. *Journal of Library Administration*, 50(4), 373–396.
- Robinson-Garcia, N., & Torres-Salinas, D. (2011). Librarians 'embedded' in research. *CLIP Update Gazette*, 44–46.
- Rudasill, L. M. (2010). Beyond subject specialization: The creation of embedded librarians. *Public Services Quarterly*, 6(2/3), 83–91.
- Schulte, S. J. (2012). Embedded academic librarianship: A review of the literature. *Evidence-based Library and Information Practice*, 7(4) Available at <https://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/17466/14528>
- Shepley, S. E. (2009). Building a virtual campus: Librarians as collaborators in online course development and learning. *Journal of Library Administration*, 49(1), 89–95.
- Shumaker, D. (2012). *The embedded librarian: Innovative strategies for taking knowledge where it's needed*. Information Today, Inc.
- Shumaker, D. (2009). Who let the librarians out? Embedded librarianship and the library manager. *Reference and User Services Quarterly*, 48(3), 239–257.
- Shumaker, D., & Talley, M. (2009). *Models of embedded librarianship: Final report*. Special Libraries Association, 9.
- Si, L., Xing, W., Zhou, L., & Liu, S. (2012). Embedded services in Chinese academic libraries. *The Journal of Academic Librarianship*, 38(3), 175–182.
- Sinclair, B. (2009). The blended librarian in the learning commons: New skills for the blended library. *College and Research Library News*, 70(9), 504–516.
- Skaggs, D. (2013). Using a digital learning object repository to provide library support for online learning. *Embedded librarianship: What every academic librarian should know* (pp. 85).
- Soules, A., Nielsen, S., Youn Lee, H., & Al Rifae, K. (2013). Embedding information literacy in an MA TESOL program. *New Library World*, 114(1/2), 32–43.
- Stein, L. L., & Lamb, J. M. (1998). Not just another BI: Faculty-librarian collaboration to guide students through the research process. *Research Strategies*, 16(1), 29–39.
- Talwal, M. (2014). Embedded librarianship – New horizon of librarianship. *DESIDOC Journal of Library & Information Technology*, 34(6), 461–466.
- Tipton, C. J. (2001). Graduate students' perceptions of library support services for distance learners: A university system-wide study. *Journal of Library Administration*, 32(1–2), 393–408.
- Tumbleson, B. E., & Burke, J. J. (2010). When life hands you lemons: Overcoming obstacles to expand services in an embedded librarian program. *Journal of Library Administration*, 50(7/8), 972–988.
- Vassilakaki, E., & Moniarou-Papaconstantinou, V. (2015). A systematic literature review informing library and information professionals' emerging roles. *New Library World*, 116(1/2), 37–66.
- Wright, L., Williams, G. H., & Wright, L. B. (2011). A history of the embedded librarian program at Odum library. *Georgia Library Quarterly*, 48(4), 7.
- York, A. C., & Vance, J. M. (2009). Taking library instruction into the online classroom: Best practices for embedded librarians. *Off-Campus Library Services Conference*. 49. (pp. 1–11) (Cleveland, OH).