Embedded librarianship and blended learning: an enhancing combination to increase effectiveness of information literacy training

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Abstract
The library of the Rotterdam University of Applied Sciences has wide experience in providing different kinds of training in information literacy. For a long time the formats for these trainings were mostly standalone library instructions and online training. However, slowly over the last few years a shift towards workshops that are integrated into courses of various study programs has taken place. The reason for this transition is in line with the philosophy of embedded librarianship. Embedded information literacy training should be more successful than standalone instructions, but what other factors influence its success and how to increase its effectiveness even further? The library of the Rotterdam University has examined this question by not only embedding a complete information literacy course into the curriculum, but also by selecting blended learning as an innovative educational model for it.

Keywords: Embedded librarianship, blended learning, information literacy, information research

Introduction

In a world of rapid technological change and a growing number of information resources, information is available to students everywhere. Not only are students facing abundant information choices in their personal and everyday lives, but most of all in their studies. Information is available through libraries, resources, organizations, media, and the Internet. In order to make appropriate information choices students are required to be information literate. Information literacy is a set of abilities to "recognize when information is needed and

have the ability to locate, evaluate, and use effectively the needed information" (American Library Association [ALA], 1989). These information literacy competencies have become more important than ever before to students, because the abundance of information itself will not create information literate students. Therefore, many libraries worldwide provide instructions, online tutorials and training to help students to develop their information literacy skills (Association of College & Research Libraries, 2015).

The library of the Rotterdam University of Applied Sciences is no exception by providing a wide range of instructions and training in information literacy. The extensive experience the Rotterdam University library has in this area has given them new insights on how to improve the effectiveness of these information literacy trainings. For a long time the formats for these trainings were mostly standalone library instructions and online training. However, over the last few years a shift towards workshops that are integrated into courses of various study programs, and the inclusion of information literacy skills in the curricula, has slowly taken place.

The reason for this transition is in line with the philosophy of embedded librarianship. According to Schumaker (2014), embedded librarians teach more effectively when the information literacy instructions are related to specific courses and assignments. This is supported by Brand-Gruwel (2014), who likewise states that training in information literacy is more effective when it is related to the context and content of specific courses. Therefore, embedded information literacy training should be more successful than standalone instructions. But what other factors influence its success and how can its effectiveness be increased even further?

The Rotterdam University library has examined this question by not only embedding a complete information literacy course into the curriculum, but also by selecting blended learning as an innovative educational model for it. This paper focuses on the teaching role of embedded librarians, and the experiences and results of this blended learning course, in order to discuss the factors that influence the effectiveness of information literacy training.

Theory

Embedded Librarianship
The term "embedded librarianship" is widely used in professional and academic literature (Dano & McNeely, 2010; Dene, 2011; Hall, 2008; Mastel, 2011; Matos, Matsuoka-Motley, & Mayer, 2010; Muir & Heller-Ross, 2010; Schumaker & Talley, 2009). The model of embedded librarianship takes the librarian out of the traditional context of the library and places him or her into a new setting. Jezmynne Dene (2011) describes her experiences with the embedded librarianship model at the Clarement Colleges as follows: "we chose to define an embedded librarian as 'an integral part of the whole,' based on the geological definition of an embedded element" (p.225). This description captures the essence of the concept namely to move librarians out of the libraries and develop stronger relationships and understanding of the groups they are engaging with. The idea behind the embedded librarianship model is that librarians move away from their supporting role into partnership. Through embedded librarianship, librarians become just as engaged in the work of a team as any other team member (Schumaker, 2014).

The model of embedded librarianship can be applied by libraries in several areas; information literacy training is one of them. Embedded librarians teach in a wide variety of disciplines and educational contexts, from face-to-face classrooms to digital learning environments, and can participate in curriculum development as well. As mentioned before, Schumaker (2014) emphasizes that information literacy training is most effective when it is related to specific courses or assignments, merely because then "Students are able to apply the concepts and methods from their information literacy instruction immediately to course assignments, and instructors are able to evaluate students' information literacy as a factor in their overall grading of the assignments" (p. 46). Hence, information literacy training should be embedded into the curriculum, aligned with course assignments and co-taught with lecturers.

The effectiveness of embedded information literacy training is also underscored in an article by Wopereis, Brand-Gruwel, and Vermetten (2008). Based on instructional theories (Merrill, 2002; Reigeluth, 1999; Van Merriënboer, 1997, 2001, 2007; Van Merriënboer, Kirschner, & Kester, 2003; Van Merriënboer & Sweller, 2003; Van Merriënboer & Sweller, 2005) the authors emphasize that when it comes to learning complex cognitive skills the knowledge and skills required should not be taught separately, but integrated in a whole task. Information literacy skills such as locating, evaluating and presenting information should, therefore, not be taught in separate instructions, but be embedded in a professional task (Wopereis, Brand-Gruwel, & Vermetten, 2008).

Blended Learning
In literature, different views and various definitions can be found on the concept of blended learning. In his overview of definitions, Fransen (2006) focuses on the vision held by Oliver and Trigwell (2005), concluding it is not a mere combination of online learning and formal education, but also involves various didactical strategies, different kinds of learning environments and learning processes. Vandeput (2010) also mentions this variation and puts a strong emphasis on active learning in particular. In addition, Ugur, Akkoyunlu and Kurbanoglu (2009) state that a blended learning course should meet the different learning styles of students as defined by Kolb (1984).

Furthermore, blended learning is assumed to be more effective in learning outcome and more attractive to students. A meta-analysis prepared for the US department for education showed that "In recent experimental and quasi-experimental studies contrasting blends of online and face-to-face instruction with conventional face-to-face classes, blended instruction has been more effective, providing a rationale for the effort required to design and implement blended approaches" (Means, Toyama, Murphy, Bakia and Jones, 2009, p .XVII). Kraemer et al. (2007) experienced that students who had purely online instruction scored lower in a test on information literacy skills than students who had instruction in a face-to-face or blended instructional group. Additionally, The Hague University of Applied Sciences experienced higher scores in test results and student satisfaction after implementing the blended learning model in their information literacy course (Becker and Hiskes, 2014).

Combination of Embedded Librarianship and Blended Learning
The blended learning course of The Hague University was taught by lecturers of the Library and Information Studies department; no librarians were involved. For that reason, this course is not an example of embedded librarianship, but mostly an illustration of how information literacy can be embedded into the curriculum. Although the experience is that many lecturers think that information literacy skills should be part of the curriculum they often do not teach information literacy due to various reasons, one of them being that they are not sufficiently information literate themselves. This is where the library steps in; the knowledge and skills of librarians on information literacy make them the perfect partner to provide information literacy instructions to students, as well as lecturers.

Based on the positive outcome of the blended learning course of The Hague University, the demand for information literacy training in higher education and the belief that embedded librarians teach more effectively, the Rotterdam University library decided to embed a blended information literacy course into the curriculum. In literature, the effectiveness of blended learning and embedded librarianship in order to increase information literacy is underscored (Schumaker, 2014; Wopereis, Brand-Gruwel, & Vermetten, 2008; Becker and Hiskes, 2014). However, as far as is known, little research has been conducted about the combination of embedded librarianship and blended learning.

By embedding a blended learning information literacy course into the curriculum, the Rotterdam University library provides the opportunity to examine whether or not the combination of blended learning and embedded librarianship enhances the effectiveness of information literacy training. At the same time, this course provides opportunities to explore how to embed information literacy successfully into curricula, what the role of librarians is in this process and how to take embedded librarianship to the next level.

Embedded Blended Learning Course

Digital Platform of The Hague University
The digital platform with texts and assignments on information literacy was developed by the University of Applied Sciences in The Hague. Lecturers of The Hague University developed this platform based on the visions of Oliver and Trigwell (2005) and Vandeput (2010) by including active learning formats and meeting individual learning styles. In collaboration with an external commercial party they developed a digital platform, which offers students all the reading and teaching materials they need. Characteristics of this platform are:

- A limited amount of reading material; students will be presented with assignments instead (discovery learning).
- Controlling the students' progression: compulsory group assignments will only be made available on condition that the individual assignments of all group members have been completed.
- A game element: average assignment scores will be calculated and compared with each other.
- A contemporary design and easy to use interface for students and teaching staff.

During the selection process of the course's content, the lecturers of The Hague University used a set of competencies for information skills as described in the scoring rubric of Jos van

Helvoort (2010). These competencies not only refer to the searching and finding of data and scholarly information, but concern the evaluation, interpretation and processing of information found on the Internet as well. They are in line with the description of information literacy by The American Library Association's Presidential Committee, which describes information literacy as a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (ALA, 1989).

In the course, the following competencies receive ample treatment:

- Orientation on the subject
- Creating and executing search strategies
- Evaluating the quality of primary resources
- Using secondary resources effectively
- Using APA style correctly
- Analyzing and comparing articles
- Processing found information correctly in an essay

On the blended learning platform, the students submit the assignments that focus on the above mentioned competencies. Upon submitting, the students would receive either automatic feedback, which informed them whether or not they had given the right answers, or feedback that was tailored specifically to the students' answers.

Embedded Blended Learning Course of Rotterdam University
The digital platform of the University of Applied Sciences in The Hague, was altered for the Rotterdam University library. This altered digital platform in combination with face-to-face meetings, in which active didactic methods are included, form the structure of the Rotterdam University course. In 2013-2014, the course was organized twice as a pilot for the elective course that started in February 2015. These pilots were an integral part of a minor, which means that the students had to conduct research for their minor using the skills taught in the information literacy part. The lecturers and the librarians taught their parts of the minor separately. However, during the second pilot two out of the four lecturers attended the information literacy classes and evaluated the students' information literacy as a factor in the overall grading of the research assignments. Based on the evaluations and experiences of the pilots, the following alterations were made to the course:
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- Face-to-face meetings scheduled on a weekly basis instead of a few meetings.
- Embedding more active didactic methods in the face-to-face meetings.
- A stronger coherence between the information literacy training face-to-face and online.
- Giving feedback on the assignments online as well as in face-to-face meetings.
- More opportunity for the students to choose subjects for the assignments that are relevant to their own study programs.
- Providing the opportunity to students of all kinds of study programs to enroll, by embedding this course as an elective course into the curriculum.

Experiences and Results
The Pilots
In the evaluations of the pilots the students emphasized that they liked the blended learning concept, but would have preferred to have had more face-to-face meetings instead of just a few meetings. Also, it was indicated that the coherence between the subject discussed in class and the content of the digital platform could be improved, as well as the relevance of the subjects of the assignments to their study programs. Even though information literacy skill can be applied to any subject involving information, they preferred to have had assignments that align with the course assignments of their own study program. Nevertheless, they also affirmed that they increased their proficiency in locating, evaluating and processing information.

The experiences of the librarians confirm the increasing information literacy of the students during the pilots. However, the information literacy skills were less demonstrated in the other assignments of the minor than expected. Even though, for the research part of the minor they had to search for relevant and reliable information and use this information for the assignment, one student handed in the assignment without a reference list. Furthermore, the librarians experienced that the digital feedback on the assignments was hardly read by the students. In order to stimulate "learning by doing" more active didactic methods had to be included in the face-to-face meetings.

The Elective Course
The elective course started with 12 students, 10 of whom completed the course successfully. Right from the beginning the students of the elective course were enthusiastic about the course's content and the blended learning concept. Many of them had chosen this course as preparation for writing their thesis. They emphasized the fact that they were missing a similar course in the curriculum of their own study program.

At the beginning of the course, a test (test 1A) was held to assess the students' theoretical knowledge without taking this information literacy course. In the test, the students had to answer 18 multiple-choice questions and 2 open questions. For example, students had to answer the question whether or not all the information found in Google Scholar is freely available. In another question a diagram was shown and the students had to determine whether or not an AND operator was used in the search engine. In one of the open questions, students were asked to provide keywords for a given research task. This test was repeated (test 1B) at the end of the course to assess the knowledge they had gained by taking this course. The test results have been compared with each other (table 1).

Table 1. Comparison of number of correct answers of both tests

Student	1	2	3	4	5	6	7	8	9
Results Test 1A	09/20	07/20	09/20	12/20	11/20	13/20	14/20	09/20	13/20
Results Test 1B	11/20	17/20	14/20	19/20	14/20	16/20	16/20	13/20	19/20

Clearly, the students' scores in the test taken at the end of the course exceed the ones from the test at the beginning.

In addition, another test was held at the beginning (test 2A) and at the end (test 2B) of the course. In this test students were asked to classify information literacy terms, such as plagiarism, secondary resources, APA rules, etc. into three categories:

1. I know what this term means and can give the right definition
2. I might have heard of it, but am not exactly sure what it means
3. I have never heard of it

Table 2. Comparison of categorized number of definitions of both tests

	Results Test 2A	Result Test 2B
Category 1	14 *	21
Category 2	5	2
Category 3	5	1

(* 5 out of the 14 definitions given were incorrect)

Evidently, at the end of the course the students could describe significantly more terms correctly than at the beginning of the course.

In the group assignments, in which they had to demonstrate the ability to search, evaluate and use information correctly, a progression was also made during the course. The average grades of the group assignments at the beginning and end of the course increased 0.9 grade points.

Of all the respondents (N=10) in the written evaluation at the end of the course 100% confirmed the students' positive attitude towards the concept of blended learning: 90% indicated the concept suited their learning styles. The coherence between the information literacy training face-to-face and the content of the online platform was positively judged: 70% of the respondents qualified it as "good", 30% as "very good". By following this course, 100% of the respondents indicated that they increased their proficiency in searching information, 100% in evaluating the information and 100% in using the information correctly. 100% of the respondents think they are able to apply the concepts and methods from this information literacy course to course assignments of their own study program. Finally, 90% of the respondents confirmed they are missing a similar course in the curriculum of their own study program.

Conclusion

Based on the results of The Hague University blended learning course (Becker and Hiskes, 2014) and the evaluations of the pilots held at the Rotterdam University of Applied Sciences, the conclusion can be drawn that blended learning is a successful and effective tool to train information literacy. However, to have students apply these skills in other parts of their study programs appeared to be more difficult. The information literacy skills were less demonstrated in other research assignments of the minor than expected.

According to several scholars (Schumaker, 2014; Wopereis, Brand-Gruwel, & Vermetten, 2008), the effectiveness of information literacy training could be increased by embedding a course like this further into the curriculum. Therefore, the elective course of the Rotterdam University library provided new opportunities to explore how to embed information literacy more successfully into the curriculum. Furthermore, the elective course enabled the Rotterdam University library to examine the role of librarians in this process of embedding information literacy into the curriculum and helped to develop ideas on how to take embedded librarianship to the next level.

The elective course was further "embedded" by providing students more opportunity to choose subjects for the assignments that are relevant to their own study programs. In addition, more feedback and face-to-face meetings with active didactical methods were offered to the students. By including more didactical strategies and learning processes the course became even further "blended". Making the course more "embedded" and "blended" had a positive outcome. The evaluations and results of the elective course reaffirm that the blended learning concept as offered is a highly effective tool for information literacy training. By further embedding this course the students emphasized that the information literacy skills became easier to apply to course assignments of their own study program. Another factor that influenced the effectiveness was that of embedding this course as an elective course in the curriculum primarily prompting highly motivated students, who recognized the benefits of taking an information literacy course, to enroll. The overall conclusion is that the concepts of embedded librarianship and blended learning together in a course can work as an enhancing combination to increase the effectiveness of information literacy training provided by libraries.

Discussion

Despite all the efforts, it seems to require more to take embedded librarianship to the next level. The consequence of embedding information literacy as an elective course into the curriculum was that not all the assignments could be aligned with the subjects of a specific study program. Nor in most cases is information literacy a factor in the overall grading of other research assignments across different study programs. The elective course missed the cooperation with other lecturers, which basically created an embedded "separate" unit in the curriculum. A solution to this problem could be embedding an information literacy course like this into the curriculum of a study program and co-teach this course with a lecturer. Debatable in this case is the role of the embedded librarian; should the librarian co-teach or might another option be to focus on training lecturers to teach information literacy, even though this would be a less "embedded" approach?

Finally, there is still much to explore regarding the effectiveness of embedded information literacy training. Embedding an elective information literacy course into a curriculum is a good start in the right direction; it creates new opportunities to further examine how to do so in the future and it will expectantly open new doors to take embedded librarianship to the next level.

References
Association of College & Research Libraries (2015), Framework for information literacy for higher education. Retrieved March 11, 2015, from http://www.ala.org/acrl/standards/ilframework

American Library Association (1989). Presidential committee on information literacy: Final report. Chicago: American Library Association.

Becker, P. & Hiskes, A. (2014). Blended learning: A new approach for teaching information literacy. Paper for the 5th international Symposium on Information Management in a Changing world. November 25-27, 2014, Antalya.

Brand-Gruwel, S. (2014). Sla als docent en media-en bibliothecaris de handen ineen. IP: vakblad voor informatieprofessionals, 18(9), 30-32.

Dano, R. & McNeely, G. (2010). Embedded librarianship in the field. New Orleans, LA: Special Libraries Association.

Dene, J. (2011). Embedded librarianship at the Claremont Colleges. Embedded librarians: Moving beyond one-shot instructions, 219-228

Fransen, J. (2006). Een nieuwe werkdefinitie van blended learning. OnderwijsInnovatie (Open Universiteit Nederland), 8(2), 26-29.

Hall, R. A. (2008). The "embedded" librarian in a freshman speech class Information literacy instruction in action. College & Research Libraries News,69(1), 28-30.

Kraemer, E. W., Lombardo, S. V., & Lepkowski, F. J. (2007). The librarian, the machine, or a little of both: A comparative study of three information literacy pedagogies at Oakland University. College & Research Libraries, 68(4), 330-342.

Mastel, K. (2011). Extending Our Reach: Embedding Library Resources and Services within Extension. Embedded Librarians: Moving Beyond One-shot Instruction, 211-218.

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.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. U.S. Department of Education, Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service. Retrieved January 12, 2015, from http://files.eric.ed.gov/fulltext/ED505824.pdf

Merrill, M. D. (2002). First principles of instructional design. Educational technology research and development, 50(3), 43-59.

Muir, G., & Heller-Ross, H. (2010). Is embedded librarianship right for your institution?. Public Services Quarterly, 6(2-3), 92-109.

Oliver, M., & Trigwell, K. (2005). Can 'blended learning' be redeemed. E-learning, 2(1), 17-26.

Reigeluth, C. M. (1999). What is instructional-design theory and how is it changing. Instructional-design theories and models: A new paradigm of instructional theory, 2, 5-29.

Shumaker, D. (2014). The embedded librarian: Innovative strategies for taking knowledge where it's needed. Medford: Information Today.

Shumaker, D., & Talley, M. (2009). Models of embedded librarianship: Final report. Alexandria, VA: Special Libraries Association.

Uğur, B., Akkoyunlu, B., & Kurbanoğlu, S. (2011). Students' opinions on blended learning and its implementation in terms of their learning styles.Education and Information Technologies, 16(1), 5-23.

Vandeput, L. (2010). Van e-learning naar geïntegreerd blended learning: Kernproject ENW-School of Education. Retrieved January 5, 2014, from tinyurl.com/pzrmvhe

Van Helvoort, J. (2010). A scoring rubric for performance assessment of information literacy in Dutch Higher Education. Journal of Information Literacy,4(1), 22-39.

Van Merriënboer, J. J. G. (1997). Training complex cognitive skills: A four-component instructional design model for technical training. Englewood Cliffs, NJ: Educational Technology.

Van Merriënboer, J. J. G. (2001). ID for Competency− based Learning: New Directions for Design, Delivery and Diagnosis. Interactive educational multimedia, (3), 12-26.

Van Merriënboer, J. J. G. (2007). Alternate models of instructional design: Holistic design approaches and complex learning. In R. A. Reiser & J. V. Dempsey (Eds.), Trends and issues in instructional design and technology (2nd ed.) (pp. 72-81.) Upper Saddle River, NJ: Merrill.

Van Merriënboer, J. J. G., Kirschner, P. A., & Kester, L. (2003). Taking the load off a learner's mind: Instructional design for complex learning. Educational psychologist, 38(1), 5-13.

Van Merriënboer, J. J., & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and future directions. Educational psychology review, 17(2), 147-177.

Wopereis, I., Brand-Gruwel, S., & Vermetten, Y. (2008). The effect of embedded instruction on solving information problems. Computers in Human Behavior, 24(3), 738-752.

Biographical Notes

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