Searching for sustainability - A blended course in how to search interdisciplinary

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Abstract:

Introduction
*This paper presents the information-seeking course Searching for sustainability. The course was
created to help students to become efficient users of information literacy skills needed within the
interdisciplinary field of sustainable development.*

Objectives
*Our primary objective was to create a blended learning course focused on how to search
interdisciplinary. The aim was to turn attention from the subject content to the more reflective
dimensions of information seeking, e.g. encouraging collaboration and discussions about the search
process.*

The course
*In spring 2013, teaching librarians at the Gothenburg University Library started developing a course
in sustainability with a new pedagogical approach. We were asked to teach a group of undergraduate
students, at The Gothenburg School of Business, Economics and Law how to search for
interdisciplinary material in general, and material on sustainable development in particular. The*

course is unique in a number of ways, not only in the way we teach information literacy but also the content of the course.
The course is flipped and the students are expected to complete a web-based part of the course before they meet us face-to-face. This approach enables us to focus our, perpetually scarce, time with the students on deeper knowledge and discussions rather than just transferring generic information seeking skills.

Results and conclusion
We have given this course at several occasions, and our experiences have so far been positive. It seems clear that the blended learning approach has a lot of positive consequences and can enable teachers to make better use of the face-to face time. We are now offering Searching for Sustainability to all faculties at the University of Gothenburg. The course is flexible and can be adapted to suit different programmes and students.

Keywords: information literacy, sustainability, sustainable development, blended learning, flipped classroom.

Introduction

The Swedish Higher Education Act (1992:1434) states that higher education institutions in Sweden shall promote sustainable development to assure a sound and healthy environment, economic and social welfare, and justice for present and future generations. The importance placed on fostering *sustainability literate* citizens can be seen by the increasing number of research publications and official documents and guidelines published in recent years (Stibbe, 2009; Winter & Cotton, 2012). UNESCOs Education for Sustainable Development Toolkit (2006) says that to advance sustainable societies "education must be reoriented to address sustainability and expanded to include critical-thinking skills, skills to organize and interpret data and information, skills to formulate questions, and the ability to analyse issues that confront communities".

Many of the competencies that are considered to be crucial for sustainable development, e.g. critical thinking and problem solving skills, are also expressed in standards and literature about information literacy (ALA, 2000; Webber & Johnson, 2000; Willer, 2014). The similarities between the concepts of sustainability literacy and information literacy constitute the frame within which Gothenburg University Library in 2013 started to move towards integrating issues of sustainable development into information literacy instructions. The result is presented in this paper; a blended learning course called Searching for Sustainability.

The collaborative effort of developing a new course

In spring 2013, a group of teaching librarians at the Social Sciences Libraries at the Gothenburg University Library began to develop a course in information literacy focusing on environmental issues. At this time the issue of sustainable development was already integrated in many of the programs and courses at Gothenburg University and we realized that by not just focusing on environmental issues but also on social and economic issues the new information literacy course would better blend in with the ordinary course activities across the university and be more relevant. The opportunity to develop a course focus on the concept of sustainable development gave us the chance to create a new type of information literacy course. Since sustainable development is often studied with interdisciplinary methods and theories, something not always associated with information literacy instruction, there was a need to broaden the scope of both the content and the

didactic strategy. Traditionally most of the information literacy training at Gothenburg University Library has been centred around the specific discipline of the participating students focusing on resources, relevance and retrieval within the subject field. When faced with students from different academic backgrounds and with a multidimensional concept like sustainable development closely linked with interdisciplinary research we felt a need of a different approach; the main difference being to shift focus from subject specific content to more reflective and collaborative dimensions of information seeking.

The School of Business, Economics and Law at Gothenburg University has since 2012 strongly emphasized the need of integrating sustainability all throughout the curriculum and have dedicated a great deal of resources in order to realize this strategic goal. One of the key points in their strategy is that the sustainability perspective always shall be present in teaching and research, rather than being something studied intensely for a brief period of time. Early in the process of developing the library course we identified that the School of Business, Economics and Law would be a suitable partner and we hoped that our course could give students more tools to transform an interest in sustainability into actually performing research containing, to some extent, a sustainability perspective. The teaching librarians participated in many seminars and lectures organized by the School of Business, Economic and Law, both as audience and participants. There were also several activities for faculty staff where we presented our work and the development of the new information literacy course. Overall the development of the course has been highly collaborative; teachers from the School of Business, Economics and Law were invited to discuss their and their students' needs in the area of sustainable development and information literacy. Another collaboration was initiated with GMV, The Centre for Environment and Sustainability, which is a network organization at Chalmers University of Technology and Gothenburg University. Staffs from GMV were also invited to discuss our course and how we could cooperate. GMV has produced several libguides concerning sustainable development for staff at the different faculties and the University Library has a libguide for students bringing together resources in sustainable development.

Talking to students and reading evaluations from information literacy sessions also helped us formulate ideas and focus on specific issues concerning content and delivery mode of that content. In order to explore more pedagogical tools and perspectives one of the teaching librarians signed up for a course in how to design for learning with digital tools to make a course which was flexible and innovatory.

For academic libraries the ability to collaborate with faculty in order to integrate information literacy into the class appears to be an important factor for success (McCue, 2014). The collaboration with The School of Business, Economics and Law and others was fruitful in that it helped embed the information literacy competencies and sustainability competencies in the regular university courses.

Library instruction at the Social Sciences Libraries

Approximately twelve teaching librarians are organized in a team at the Social Sciences Libraries at Gothenburg University. We have a progression model for the information literacy courses and we try to keep our courses focused on the subject for the current class. The idea behind using a progression model is two-fold. On one hand, it enables us to co-ordinate the information literacy training given to the students which makes us less vulnerable as a team and makes it easier to fill in for each other. On the other hand, we have found that the progression model is very useful when communicating with staff outside the library. It is sometimes hard to explain what we do, what we can help the students with and the progression model helps in communicating this to the rest of the university.

We use a progression model with four levels where the students are expected to complete each level, in the given order, before moving on to the next. As is often true with models this one doesn't always reflect how things look in reality. Some students are only given training on one or a couple of the levels and some of them we never see at all. The first level is an introduction aimed at students who

have just arrived at the university. The setting is often a large lecture hall with anywhere between twenty to three-hundred students. Subsequent levels are usually given in smaller groups, no more than twenty at a time, in a computer lab with workshop opportunities.

In level one, focus is on welcoming the students to the library and introduce them to the service offered by the library and a heads-up on what will be covered in the following levels of the progression model.

Level two is usually given in conjunction with a larger paper or assignment. On this level we cover basic information retrieval techniques, some subject databases, criteria for distinguishing between publication types, basic source criticism and how to properly use cites and quotations.

Level three is for when the students have just started writing their bachelor's thesis and are in need of skills that will enable them to search for information in a more systematic way. Here we go deeper into the areas covered in level two and have a more emphasized focus on embedding our teaching within the relevant subject area.

Finally, level four, whose target audience consists of master's students or PhD students starting on their thesis projects. New elements introduced at this level concern academic publishing, reference management software, bibliometric, citation searches and tracking, alerts and more.

This model has served us well, both when working internally, in the teaching librarian team, and externally when communicating with other members of faculty. However, working within a set framework can also be a hindrance. We soon realized that our goals and ambitions for the sustainability literacy course were incompatible with the progression model and our old way of doing things. One of our more long-term goals has always been to offer the course as widely as possible, which necessitated a shift from our previous method of embedding information literacy within the audience's subject area. Sustainable literacy's interdisciplinary nature instead became the important thing we wanted to transfer to the students, along with an understanding of information literacy as a reflective skill.

The course develops

Inspired by the course in how to design for learning with digital tools we reached the conclusion that this new course would suit as a blended course. We wanted all students at the university to be able to take the course regardless subject or faculty. Since the aim was to focus the time in the classroom on reflective and communicative aspects of information seeking we wanted to let the students do a web course with the basic knowledge about the information seeking process before we would meet for a more collaborative and reflective session face to face.

The effectiveness of online and blended learning on student learning outcomes has been widely debated (Dziuban & Moskal, 2011). To reach successful results Moskal, Dziuban and Hartman conclude, referring to previous research, that focus must not primarily be put on e-learning tools and software but rather on issues such as institutional goals, organizational capacity, faculty development and student support (2013). They state that a "clear vision and strong support are necessities when moving to the blended environment. Only then can this modality not just succeed, but become a transformational force for the university" (2013). The collaborations with faculty staff and GMV made us believe that we had a good chance to succeed in creating and giving a relevant and motivating information literacy course. In this case, after identifying the similarities between the competencies and skills needed within both sustainability literacy and information literacy, it was easier than normal to reach a common goal and common understanding with the faculty staff.

Research published within this field of blended learning also provided some arguments for making the course blended. Susannah Diamond and Brian Irwin, for example, have looked at how sustainability

literacy can be embedded in the curriculum in higher education and in their article they explore the current practice in using e-learning tools to achieve this (2013). By reviewing different pedagogical approaches and e-learning tools they reach the conclusion that e-learning should be aimed at supporting student-centred modes of learning and that "these can be effective in developing difficult areas of student sustainability literacy". They further state that "these pedagogical shifts could create more powerful learning experiences for students, in both blended and distance learning modes, and foster graduates who are more confident in their ability to create more sustainable futures (2013).

We decided which part we wanted to include in the course and discussed in which forms they could be presented and delivered. Since we usually present the information in oral format with support of visuals (e.g. PowerPoint-presentations), we now had to think of other ways of presenting when it came to the information that would be communicated through the web-based part of the course. We didn't want this part to consist of texts based on our traditional classroom lectures so we started to write manuscripts for short films, screencasts and made Prezis and quizzes to include online. During the process of developing the course we asked for professional help regarding pedagogical issues from staff working at the Pedagogical Development and Interactive Learning (PIL) at Gothenburg University. We also got feedback about technical issues from staff who works with the learning management system (LMS) GUL. Simultaneously we read journal articles, reports, conference articles and other publications about blended learning, sustainable literacy etc. to be inspired when we created the course. Ryan & Stark (2014) gave us an idea about integrating a local issue in our course to make it more engaging for the students. They describe how the university library at University of Montana together translates national information literacy standards to local environmental issues. We decided to focus on a local issue and structure the course like a case study related to the concept of sustainable development. By letting the students work with a local issue, we hoped that they could relate to the problem and find it more interesting. Perin (2011) has suggested that contextualization of content can accelerate the progress of college students, so the first year the course was given the topic chosen was the Million Programme, a public housing programme in Sweden. It is a visible and, at that time, highly debated issue both locally and nationally. The second year we included several local and national issues.

Course description

We are aware of the great diversity of learning styles among students at Gothenburg University and when plan the structure of the course we tried to include different way the students would interact with the information/content of the course. The relational setting was also of importance, trying to facilitate for both self-study and interaction between students and librarian and peer to peer. The following model is meant to illustrate our thoughts and intentions with the course structure.

	Interaction with information	Goal	Setting
Phase 1	Receiving	Clarification	Librarian-Student
Phase 2	Interacting	Reflection	Self-study
Phase 3	Communicating	Elaboration	Peer-to-Peer

Since a part of the course is flipped the students are expected to complete a web-based part before they meet us face-to-face. This approach enables us to focus our, perpetually scarce, time with the students on deeper knowledge and discussions rather than just transferring generic information seeking skills. Still, we decided to have a short informative session with the students before giving them access to the web-based part of the course.

1st Phase: The lecture is centred on basic information about the University Library's services and the content and purpose of the course. It is held in a big auditorium for between 80-100 students where the librarians are doing most of the talking, delivering information and letting the students know of what the expectations are relating to the course. The goal for this session is to present the course and give the students the understanding and tools they need for the following sessions and to motivate them to be active and prioritize spending time doing the second phase of the course. Questions are answered and a demonstration is done to show the students how to access the material and interact with it.

2nd Phase: After the first phase the students have approximately one week to complete the web-based part of the course. Even though the web-based part contains many of the same elements we traditionally teach in a classroom setting the aim has been not to replicate the classroom session in an online environment but rather to develop a more multimodal, student-centred and flexible instructional design (Kirkwood & Price, 2014). To contextualize the content (Perin, 2011) the students "follow" a fictive student's journey from formulating a research question to when he searches and evaluates different publications. Along the way they are asked to answer convergent questions (McComas & Abraham, 2004) designed to function as a checklist to make sure they have understood the content. The web-based part also contains videos, Prezis and at the end the students get a short assignment having them contribute to the fictive student information seeking process. The assignment is designed as an open and more divergent question where the students are asked to supplement the fictive student's information need. When completed the answers are posted by the students on a PADLET-wall. These virtual "hand-ins" are later used as discussion material in the third phase.

3rd Phase: The third phase of the course is a workshop where the class is divided into groups of twenty. By this time the students have submitted their hand-ins on the PADLET-wall and are encouraged to discuss the results in small groups before a general discussion takes place, curated by the teaching librarians. The discussions can deal with questions concerning scientific authority, the information seeking process or criteria for inclusion and exclusion. The students have now, by shadowing the fictive student in the previous phase, seen and participated in an information seeking process and it's time for them to transfer this knowledge to their own information needs. To make the library course as relevant as possible we collaborate with faculty staff so that the students have an assignment in their regular credit based university course that relates to the content of the library course. In small groups the student are now able to collaborate on solving a "real-life sustainability problem" by finding arguments in published research and based on these findings they are to write an opinion piece.

Evaluating the course

The first students to take the course were from the programme in Environmental Social Science (SMIL) and Environmental Natural science (NMIL). They were about 100 students and studied their first term at the programme. Since we were giving the course for the first time and wanted as much input from the students as possible, we constructed an evaluation consisting of 15 questions. The questions were divided into three parts; the web-based part, the classroom part and general questions about the whole course. 69 out of 100 students answered the questions.

Regarding the web-based part, many students mentioned technical issues as a problem. The LMS has limitations in the functionality and we are well aware of the technical issues mentioned by the students. There were also many comments about the quizzes in the web-based part and many thought that quizzes are a good way to test their knowledge but the functionality in the LMS made them difficult to work with. To make them function better in the LMS we decided to make a larger quiz at the end of the web-based part instead of several short quizzes.

In the evaluation, students mention the assignment that connects the web-based part with the classroom part. They wished that it would be more related to their course and even if this was a

question we tried hard to address when planning the content of the course we could agree, when we met the students face to face, that it could have been done better. We changed the assignment for the next year which turned out to work out better.

Regarding the classroom part, several students mention that they didn't know if this was necessary after the web-based part. We realized that we had to work more with the classroom part and figure out how to make this more meaningful for the students.

Regarding the whole course, the reflections from students about the blended model were many. Several asked if we could have both parts at the same time or maybe just keep one of them. We focused on the classroom part and discussed in the team how this part could be improved. Since several of the students mentioned that they wished our course to be better integrated with their ordinary assignments, we decided to try to make the classroom part even more related to their course.

As always we also got comments about the timing of the library instruction. This is a common problem for us at the library; in the eyes of the students we always have library instruction at the wrong time. Sometimes we come too early in their studies, sometimes too late. But we agree with the students, this was a bad timing. So we talked to the responsible teachers at SMIL and NMIL in order to be scheduled at a better time next year.

In December 2015 we did the same course again, with some improvements, for new students at SMIL and NMIL. There were approximately 80 students this time. We don't know exactly how many students who answered the evaluation since several of them answered together. We got 29 answers registered.

This time we only asked 7 questions after they fulfilled the course. We asked what they thought about the web-based course, the classroom part, the whole course in general, about blended learning and if there was something we could have done differently in the course.

The students were more positive this year. They thought the course was amusing, interesting, good and informative. One student commented about the web based course was: "Very good to have an introduction to the classroom part. It's easier to follow and you feel safer and not so stressed". This made us pleased since this was what we hoped for when we made the web part.

Another student said about the web- based part of the course: "Easy to understand, pedagogical and good variation with quizzes, videos and texts". This comment about the different parts in the web-based part was good for us in order to know how to develop the course further. It's important to know which parts that work and what doesn't work.

About the classroom part, one of the comments we got was: "The group work in the classroom made us active. It was good to be able to ask questions and get answers directly". This was satisfying since we had changed the format of the classroom part in order to make it more activating and meaningful for the students.

Results and conclusion

During the years of developing this course we have been presenting our work at several conferences and seminars, both national and international. In October 2015, we presented the course at a conference in pedagogic in higher education for teachers working at Gothenburg University and Chalmers University of Technology. A teacher from Marine Sciences got interested and booked the course for his 40 students. Since Marine Sciences belongs to the Biomedical Library at the Gothenburg University, we saw an opportunity to collaborate with the teaching librarians at the Biomedical Library. We made a copy of the web-based part and then the librarians from the Biomedical Library made some changes in the course and the assignment. The classroom part was held together with librarians from both the Social Sciences Libraries and the Biomedical Library. For us, and also the students, this gave pedagogical benefits and made us better prepared when working with a multidimensional concept like sustainable development.
It has also been found that when we meet students from SMIL a few semesters after our course, when they are writing their thesis, they have a much better knowledge of information literacy and is more active in the classroom than students who just got a classroom session.

Outlook and plans for the future

We have given this course at several occasions, and our experiences so far have been positive. The course is constantly evolving but at this stage it seems clear to us that the blended learning approach has a lot of positive consequences and can enable teachers to make better use of the face-to face time. We are now offering *Searching for Sustainability* to all faculties at the University of Gothenburg. The course is flexible and can be adapted to suit different programmes and students. In the future, our plan is to make the web-based parts of the course freely available to all students through the university LMS, and offer departments the choice to provide only the web-based part or the web-part along with the librarian-led workshop.

Library instructions given at University of Gothenburg are billed to the departments, but there is a proposal before the board of the university, in an attempt to make all library instruction free of charge. We are hopeful that the proposal will be approved, and that it will mean an increase in requests for library instruction. This assumed increase in workload might necessitate a change in how we do things, since we are already stretched a bit thin. Many of the things learned while developing and giving *Searching for Sustainability* are sure to be of use, considering our time available with the students' looks like it will decrease. Though, it is worth pointing out that we did not develop the course in order to save time or money, it was rather an effort to experiment with a different type of pedagogy.

Colleagues at Gothenburg University Library gave the course to students from Marine sciences last fall, and the feedback from that experience has so far been very positive. Hopefully this venture can be expanded on, and the course can be taught at many more departments, regardless of what faculty they belong to. Chalmers, a technical university located in Gothenburg, has recently expressed interest in the course and a desire to cooperate around it and this is definitely a proposal worth exploring further. Our areas of focus now are to continue developing the course, making it available to interested parties, deepen partnerships already in place, and to explore possible new partnerships.

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Appendix: Progression model

PROGRESSION LEVEL	CONTEXT	COURSE CONTENT	LEARNING OBJECTIVES
LEVEL 1	New students	Introduction to information retrieval and the library · introduction to library services and resources · introduction to library website · demonstration of library catalogue and discovery tool (based on the reading list , which includes the document types and how to find these)	After completing the course, students will be able to: · use basic supply of services and resources the library offers · Search for and order books, renew loans · Navigate and find information on library website
LEVEL 2	In connection with a study assignment or project	Basic information retrieval · Basic search technique and search strategies · Subject searches in GUNDA/LIBRIS/Summon · databases within subject · basic source criticism · scientific communication · introduction to academic integrity · searches with tuition	After completing the course, students will be able to: · choose relevant search words and search services related to a search question · use search technique to perform a controlled search · review different types of sources · distinguish between different publication types · interpret references · describe the difference between quoting and citing · describe plagiarism

LEVEL 3	In connection with essay writing	In-depth information retrieval · in-depth information retrieval in relevant databases · scholarly and professional journals within the field · source criticism · academic integrity · reference management · searches with tuition	After completing the course, students will be able to: · search information in a systematic way · evaluate and critically review different source's scholarly value · interpret and write references · recognize and be able to avoid plagiarism, know when and how to cite or quote a source
LEVEL 4	In connection with publishing scientific work	Competitive intelligence and scholarly publications · in-depth information retrieval , including citation databases · monitoring of new research (alerts, tocs, rss) · orientation in bibliometrics, ranking systems for journals (Impact factor) · Publication channels (Sherpa Romeo, Juliet) · Open Access resources and GU:s publication databases GUP and GUPEA · Reference management including different styles and reference management software	After completing the course, students will be able to: · critically and independently reflect choice of search words, search strategies and search services · follow knowledge development in their field · have insight in of how scholarly information is organized and communicated · have insight in how bibliometrics is used to evaluate research · assess different publication channels · use reference management software