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Motivating learners through information literacy

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Abstract. This paper introduces a model for creating information literacy learning activities that motivate students. The model draws from informed learning, an approach to information literacy that emphasizes the role that information plays in fostering learning about a subject. Self-determination theory, a motivational theory that focuses on enabling self-determined learners, is applied within the informed learning framework. The results of the investigation outline characteristics of motivating learning activities that enable learning subject content through engagement with information. The model is intended to be used by librarians when working with classroom teachers to foster greater student learning gains through creative and reflective engagement with information.

Keywords: Informed learning, self-determination theory, student motivation

1 Introduction

Information literacy is but one of many educational ideas that higher education teachers are asked to consider addressing in their courses. Student motivation is often considered important for enabling learners to succeed in higher education. This paper introduces a model for creating information literacy learning activities that motivate students. The model is intended to be used by librarians when working with classroom teachers to foster greater student learning gains through creative and reflective engagement with information. Informed learning, an approach to information literacy that emphasizes the role that information plays in fostering learning about a subject, provides the foundation for the model [1]. Self-determination theory, a motivational theory that focuses on enabling self-determined learners [2], is applied within the informed learning framework. The results of the investigation outline characteristics of motivating learning activities that enable learning subject content through engagement with information. To illustrate how these characteristics play out in higher education classrooms, examples are provided of motivating informed learning activities designed by two teachers in consultation with one of the authors.

2 Information Literacy and Motivation

Scholars have recognized that there is a relationship between student motivation and the attainment of information literacy skills. Motivation has been shown to be related to information literacy self-efficacy [3], and perceived competence, an aspect of motivation, has been associated with an internalized interest in research [4] and better performance on information literacy skills tests [5]. Select motivational concepts and models have been used to suggest ways of creating information literacy instruction that motivates students to learn information skills, such as search techniques, evaluation of sources, and so forth [6-8]. There is a key difference between earlier studies focused on the role of motivation in the attainment of information literacy skills, and our investigation. Our work examines the role of motivation in designing activities in which learning to use information is directed towards understanding subject content. Using an approach called informed learning [1] (described in the following section), our investigation is focused on identifying the characteristics of motivating activities that enable learning subject content through engagement with information.

3 Informed Learning

Informed learning is an approach to information literacy that emphasizes *learning* as an outcome of engaging with information [1]. Informed learning suggests that using information in the context of learning in the classroom is more likely to prepare students to successfully engage with information in other learning contexts, such as their future work, personal, and civic lives. It is grounded in the findings from several studies examining teachers and students' experiences of information literacy. These studies reveal that when learners engage with information to learn about a disciplinary subject, they tend to use information with more versatility and complexity [9-12]. For example, the findings from a study examining informed learning lessons in a undergraduate course suggest that content-focused learning outcomes are influenced by the way learners use information. Rather than students searching for evidence to support pre-existing or instructor-identified views of a topic, the teacher tasked students to learn about language and gender issues by tracing the evolution of their chosen topic [13]. This approached went beyond students only using information to justify a position, but instead allowed students to *learn* subject matter (language and gender issues), *through* intentional engagement with information.

There are several characteristics associated with informed learning [14]. One characteristic is that designing for informed learning is a shared responsibility amongst teachers with disciplinary knowledge and librarians, who have expertise regarding how students engage with information. Like other contemporary approaches for designing learning environments, informed learning tends to employ active learning techniques, such as independent learning, problem-solving, and evidence-based practice. Informed learning typically has students use information as they would in a real-life setting; thus students tend to be engaging in academic and professional information practices.

From an informed learning perspective, information could be anything considered to be informing [1]. For example, students in an environmental engineering course used the demographic data for various cities to determine the impact of environmental issues occurring in those cities. A introductory technology course had students conduct

in-person interviews with people on campus, to identify potential problems, such as traffic hazards, lack of recycling, and so forth, for which they then explored technological solutions. In an informed learning approach, the information needed is determined by what students are learning in the course. While students may use select databases provided by the campus library, they may also need to critically engage with information outside of the library, like blogs, interview data, and so forth.

Three principles guide informed learning: 1) learning should build on students' prior experiences, 2) students must learn new things about using information and subject content, and 3) they should learn about using information and subject content at the same time [14]. These principles may be used to design informed learning activities. Recognizing that the learning activities that take place in a class session need to contribute to the overarching learning goals for the course, teachers designing informed learning activies must determine:

1. what students should know or be able to do regarding subject content, and
2. how students need to use information to learn about the subject content (beyond what they already know how to do).

The key challenge for teachers and librarians in creating informed learning activities is to first consider what students should learn about a subject and then determine in what ways students need to engage with information in order to learn as intended [13]. While still addressing the principles of informed learning, specific details of how students actively engage in gathering, analyzing and applying information to learn may vary in different instructional situations. As with any instruction, the choices a teacher makes in the design of activities can influence student motivation for informed learning.

4 Self-determination Theory

Thoughtfully crafted learning activities can produce little learning without students who are engaged and motivated. Learning activities are rarely done out of intrinsic motivation, so the key is to focus on making extrinsic motivation more self-directed, and thereby more motivating. Self-determination theory focuses on how extrinsic motivation can motivate students to learn [2]. In other words – how can students *internalize* extrinsic learning goals developed by the instructor and move further away from amotivation (lack of motivation) and closer to intrinsic motivation? This is particularly challenging because extrinsic motivation can yield both non-self-determined and self-determined behavior. Thus, it can enable or retard efforts to create a learning environment where students are motivated.

Similar to informed learning [1], self-determination theory emphasizes the agency of learners [2]. Accordingly, another way to ask our previous question about internalizing extrinsic learning goals is the following: how can students take ownership over their own learning? As outlined in Figure 1, to become more self-determined and motivated, learners need to avoid feeling as if their actions are controlled (external regulation) or performed to avoid feeling guilty or anxious (introjection). Rather, if learners can identify the personal importance of an action (identification) or internalize

the reasons for an action (integrated regulation), then learners will feel more volitional and motivated to learn.

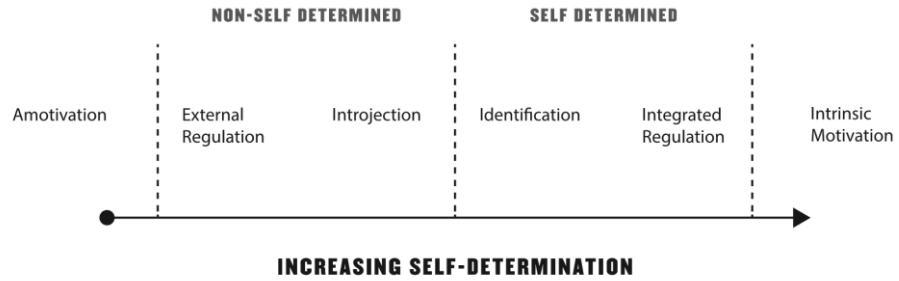

Fig. 1. Role of Motivation in Increasing Self-determination (Source: IMPACT Annual Report 2015, Part 1 & 2, p. 6 - http://docs.lib.purdue.edu/impactreps/6/)

Self-determination theory suggests that intrinsically motivated activities satisfy three basic and interrelated psychological needs: autonomy, competence, and relatedness. Learning environments which support these psychological needs have positive effects on student dedication, engagement [15], and achievement [16]. Crafting teaching and learning environments that facilitate students moving closer to self-determined behavior (and away from amotivation) requires focusing on these three psychological needs [2]. Autonomy is defined as feelings of volition and choice within a structure, where students "feel that actions emanate from themselves" [2, 17]. Relatedness is defined as a sense of belongingness and connection to others, such as fellow students and the instructor, as well as to the subject content. Competence is defined as feeling able to understand content and having the relevant skills to succeed. In short, students are more likely to adopt and internalize learning goals, and therefore become more self-directed and motivated, if they feel:

- autonomous (volitional over what they do),
- related (related to others and the subject content), and
- competent (able to succeed). [2]

5 Methods

The purpose of our work is to develop a model for designing motivating information literacy activities that simultaneously enable the learning of subject content. The questions guiding our exploration are: 1) what are the characteristics of motivating information literacy activities that enable the learning of subject content? and 2) what are considerations when designing motivating information literacy activities that enable the learning of subject content? After reviewing the literature, informed learning was selected as an approach to information literacy that emphasizes learning as an outcome of engaging with information [1]. Self-determination theory, which has been used to explain the role of autonomy, relatedness and competency in educational settings [2], was selected to define the characteristics of motivating learning environments. Although underpinned by different learning theories, the variation theory of learning for

informed learning and constructivism for self-determination theory, aspects of the two frameworks can be drawn together to inform the characteristics and design of motivating information literacy activities that enable learning subject content. For example, both theories give priority of learning agency to the learner, as opposed to the instructor. Described in the following section, the development of the new model involved determining how the concepts of autonomy, relatedness and competency would support an informed learning environment.

6 Designing Motivating Informed Learning Activities

In designing informed learning activities, teacher intentions concerning what students should learn about the subject, as well as how they will use information should be identified before considerations of student motivation. Creating motivating informed learning activities requires considering the psychological needs of autonomy, competence, and relatedness [2]. Students need to perceive that they have meaningful choices, feel connected, and are capable of successfully engaging with information to learn from the activities. When these needs are met, students will feel less coerced and more self-directed within the informed learning framework. In other words, it is more likely that students will be motivated to use information intentionally to learn.

Self-determination theory emphasizes the importance of instructors crafting learning activities which allow students to internalize learning goals and feel volitional about their own learning [2]. In many university courses, students are given little guidance concerning how to use information when completing college-level assignments [18]. Students' perception that they have too many (or too few) choices, may be detrimental to their engaging with information to learn. For example, if students in a writing and rhetoric course with no background knowledge in the subject are told they may select any discourse community to research for their final paper, they may not know how to make a relevant selection [19]. In this case, too many choices may also impact their perceptions of how competent they are to complete the task.

Students must also perceive their relatedness to the materials and teacher and students involved in their experience of using information to complete coursework. If a student is not interested in a topic, or sees no reason that they need to know about the topic, they will be less motivated to learn. This is equally true of students' learning to use information in new ways, who may feel that their current information practices learned in high school or previous university courses will suffice. Additionally, students need to feel competent that they will be able to complete the learning activities required of them that involve engaging with information. While locating information on a given topic is typically not a problem for students, using it in ways necessary for completing college-level work has been shown to be challenging [19]. This highlights the need to scaffold learning experiences for students involving new types or novel engagement with information – supporting student perceptions of confidence and competence.

Designing informed learning activities that are motivating involves determining how to address the three basic psychological needs of autonomy, relatedness and competency as they relate to 1) learning subject content 2) through engagement with information. The specific information sources and the ways information may be used to

learn about the topic can vary within a given learning situation. Using the framework outlined in Table 1, librarians and teachers can work together to identify specific ways of using information to foster the learning of subject content. Then, they can design activities for enabling this type of learning that are supportive of learners' perceptions of the three basic psychological needs within the learning environment.

Table 1: Relating self-determination theory to informed learning

Informed learning	**Self-determination theory**		
	Autonomy	Relatedness	Competency
Subject content learning	Student perceives choices in what they learn	Student feels connected to the subject content and/or peers/instructor	Student feels capable of learning subject content
Engagement with information, e.g., academic, disciplinary, or professional information practices	Student perceives options in how they use information to learn	Student feels connected to students, instructor, and/or subject material through intentional engagement with information	Student feels capable of using information in the way needed to learn

Adopting an informed learning approach, the teacher of the first-year writing and rhetoric course in which students lacked motivation to write a paper would start by determining specifically what the students were intended to learn about course content, such as being able to identify the "characteristics" of a specific discourse community. The librarian and teacher could then determine how the students needed to engage with information to learn about the characteristics of a discourse community, as well as strategies for investigating one. The teacher might have students reflect on what discourse communities they are aware of on campus, elements of discourse communities they have discussed in class, and then work with them to identify questions they have about a specific discourse community on campus. This set of activities, or something similar, may provide the students with enough structure, yet also offer them the ability to make meaningful choices about what they want to learn.

Informed learning suggests that students learn information practices that may be relevant to their lives outside college [14]. Doing so may foster student perception of a stronger connection to course content and fellow students. For example, the instructor of an environmental studies course could have students compose blog posts or podcasts to share issues about which the students feel passionate. Working together in groups to gather and explore information on an issue, such as global warming or electronic waste, may further build feelings of relatedness as the course content moves beyond something one must memorize to something that could affect change in the world. Students must also feel competent to use information in the ways required of them in college. Minimally, the teacher could provide more guidance about the types of sources and how to use them to complete an assignment. However, it is important that students get practice and feedback about using information to learn in the way intended in the class.

An example can be drawn from the teacher of the course mentioned previously, that aimed to have her students understand a language and gender topic by tracing its evolution through scholarly discourse [13]. This teacher dedicated one class session to a "thesis workshop," in which the students peer-critiqued one another's thesis statements to determine if the statements reflected an insight based on the student's analysis of research articles revealing how the topic evolved over time.

There is a great deal of variability in constructing activities where students feel volitional about how and what they learn, related to others and the subject content, and competent to complete the learning tasks. Determining the right informed learning activities may often require trying new class activities, gathering feedback from students, and revising the activities until the desired result is achieved. The following sub-sections provide examples describing how two teachers developed motivating informed learning activities. Although very different from each other, the activities address specific motivational needs within the learning context of each course.

6.1 Statistical Literacy on Social Media (Example 1)

The first example of motivating informed learning activities is drawn from a large, introductory-level statistical literacy course with over 400 students. Each semester, three sections of the course are offered: traditional (lecture) (over 300 students), online (approximately 80 students), and flipped (approximately 60 students). The goal of the course is to teach the students to become informed consumers of statistics and to understand how statistics are used in their daily lives. Aligned with the learning goal of being able to understand statistical concepts, each student shares a popular news source in a Facebook-like social media platform and makes a post evaluating the veracity of research studies described in the news item. The teacher and other students in the class post comments with feedback for the original poster to consider. Examples may include suggesting lurking variables that have not been considered, or the appropriateness of the sample population for answering the research question. This is an example of informed learning, because the students are learning about statistical concepts (subject content) by applying them in a practical way (engagement with information) that may be applicable in their personal lives.

As outlined in Table 2, the teacher's design for the activities supports students' feelings of volition by allowing them to investigate any topic, so long as they could locate a news article or video on that topic which described a research study. Within these parameters students were able to explore a wide range of topics, such as breast cancer or the health effects of eating chocolate. While providing a structure for the students to give one another constructive feedback, the familiarity of communicating through a social media platform may support the students' perceptions of competency. Perhaps more importantly in a large class, where it may be difficult for students to feel connected to the teacher and their fellow students, the social media platform provides a space for students to relate to one another and their common struggle to grasp the concepts being introduced in class. A survey of the students in the class conducted in 2013 (response rate of 96.2 percent, n = 405) suggests that although the learning activities provide a positive experience for the students, their search strategies tended to

focus on finding news sources that report on a research study [20]. That is to say, the students search news resources for terms like, "research studies" or "experiment," (53.2 percent), rather than exploring an interesting topic. After learning this, the teacher decided to place more emphasis on students being able to find a topic of interest, which may increase students' perceptions of autonomy and relatedness to the content when engaged in this learning activity.

Table 2: Motivational elements of informed learning activities in a statistics course

Informed learning	**Self-determination theory**		
	Autonomy	Relatedness	Competency
Subject content learning	Students have choices in demonstrating proficiency of statistical concepts	Teacher and students discuss statistical concepts Students learn about self-selected topics of interest	Statistical concepts learned previously in class Teacher and students provide feedback to one another regarding statistical concepts
Engagement with information, e.g., academic, disciplinary, or professional information practices	Students select news article on any topic that reports on statistics from a research study Students have choices in how they apply statistical concepts	Students provide feedback to one another about application of statistical concepts Teacher provides feedback to students about application of statistical concepts	Students apply statistical concepts learned previously in class Students are familiar with information sources, e.g., news blogs, videos etc. Students are familiar with social media platforms

2.2 Biology that Matters (Example 2)

The second example is from a introductory biology course with 50 students, which uses a peer-led team learning approach in which students complete homework tasks individually, then discuss problematic aspects of the homework in small groups of four students that then share their consensus answers in class. In this course, the teacher had previously assigned homework tasks that included students learning to find biological information, and analyze research articles to understand how biologists answer questions relevant to the field. However, the teacher felt that the students were not motivated to complete these exercises. Drawing from the six frames of information literacy model [21] that is part of the informed learning framework [1], the teacher decided to adopt an approach that enabled the students to perceive personal relevance in relation to what they learned. While still having the students complete the

information-related homework tasks, the teacher first had them identify a topic that was meaningful to them personally. When completing homework assignments that involve gathering and analyzing biological information, the students focused their efforts so that they were simultaneously learning about their topic. Outlined in Table 3, the team interactions that are part of peer-led team learning encourage perceptions of relatedness. However, allowing students to choose a topic with personal meaning fosters volition through relatedness to the subject content, as well as through perceptions of autonomy that result from being able to make purposeful choices related to learning. The topics students chose were wide ranging, with one student investigating alcoholism to better understand a relative with that disease, and another exploring herbal medicine, saying that he had always wanted to know more about it. After modifying the activity to have the students select a personal topic, the teacher was satisfied with the level of student engagement in the information literacy-focused homework assignments.

Table 3: Motivational elements of informed learning activities in a biology course

Informed learning	**Self-determination theory**		
	Autonomy	Relatedness	Competency
Subject content learning	Students have choices in applying subject content learning to inform a personal interest	Students relate subject content to personal interests Small groups of students discuss biological concepts and theories	Course builds on the content learned during the 1st course in the sequence
Engagement with information, e.g., academic, disciplinary, or professional information practices	Students have choices in selecting a topic that can be explored from a biological perspective	Students provide feedback to one another about using biological information Teacher provides feedback about using biological information	Homework tasks are scaffolded across the semester Team members and teacher provide feedback

7 Conclusion

Considerations of autonomy, competence, and relatedness have a role to play in designing informed learning activities. The proposed model demonstrates how librarians can collaborate with instructors to craft motivating learning experiences for students that enable the learning of subject content through intentional engagement with information. The next phase of this work will involve conducting classroom research to study informed learning activities that have been designed to support student self-determination in various educational contexts.

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