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Motivating Factors for the Transfer of Information Literacy Skills among Undergraduates

ABSTRACT

Faculty and academic librarians who provide information literacy (IL) instruction frequently puzzle over students' inconsistent future use of IL skills. When they work with students who have received IL instruction in the past, some students demonstrate confident, mature, and practiced use of the skills. Others demonstrate skills that have either failed to develop further since the instruction session or skills that have atrophied. This study explores self-cited motivating factors for continued use of IL skills. It was conducted at an urban public research university in the United States, among 24 first-year undergraduates who participated in first-year seminars. The study connects the motivating factors with IL performance on a writing sample. It uses mixed methods involving a self-designed survey with Likert-style questions on eighteen motivating factors, plus a rubric adapted from the AAC&U VALUE rubrics.

KEYWORDS

information literacy, motivation, first-year undergraduate students, educational psychology

INTRODUCTION

Faculty and academic librarians (some of whom have faculty status themselves) who provide information literacy (IL) instruction frequently experience this scenario: A student who received IL instruction a few semesters ago requests one-on-one help. Upon discussing the student's current research-related need, it becomes evident that the student has been using IL skills consistently and well. Their skills and thought processes have become more sophisticated, and perhaps tailored to the student's area of study. At this point, they need guidance tailored to the task at hand. Weeks later, another student requests help. They mention a past "library day" a few semesters ago. However, after a short conversation, it becomes evident that they have not used IL skills since that session and have retained little of what they learned.

What lies behind these two scenarios? One student has apparently chosen to apply these skills to their work in the semesters since that past instruction session. The other seems to have had little practice. When students choose to continue to use IL skills, they support effective transfer of those skills when they need to use them in later situations.

This study explores self-reported motivating factors that encouraged 24 first-year undergraduate students to continue using IL skills learned in a first-year seminar. It also correlates them with IL performance on a writing sample. The impetus for exploring application in writing samples was seeing the skills applied in student work. Requesting that participants submit a brief writing sample incorporating information literacy skills, written for any course during the spring semester, provided an opportunity for students in all majors to consider participating since brief essays are a relatively universal type of assignment.

The original project explored motivating factors and performance for both IL and critical thinking (CT) skills. Please note that this article discusses only the IL-related findings and analysis.

The original project used mixed methods, combining a self-designed survey (appendix B) with 18 Likert-style items exploring specific motivating factors plus several free response items and a rubric (appendix A) condensed from the AAC&U VALUE rubrics for IL (Association of American Colleges & Universities 2013) and critical thinking (Association of American Colleges & Universities 2009). It finishes with a set of action-oriented recommendations for faculty and librarians who teach IL skills to undergraduates, based on the findings. Findings from this study related to students' transfer of critical thinking skills are discussed in a September 2021 *Teaching & Learning Inquiry* article (Sobel 2021). This is intended as a pilot in preparation for a larger-scale study.

LITERATURE REVIEW

The following literature review focuses on concepts within the studies of motivation and transfer of learning (sometimes simply called "transfer"). It connects them with research in higher education and adult education and highlights gaps in the literature relevant to this paper.

Motivation

Concepts of motivation taken from the field of educational psychology support the understanding of this study. Eccles and Wigfield (2002), major researchers on motivation in educational settings, divided theories of educational psychology into four categories: theories (a) focused on expectancy, (b) focused on reasons for engagement, (c) integrating expectancy and value constructs, and (d) integrating motivation and cognition (109). All four categories provide insights into this study. However, Eccles and Wigfield's work on modern expectancy-value theory provides concepts most meaningful for exploring this study. Modern expectancy-value theory outlines factors influencing students' choices about academic behaviors based on four concepts: (a) attainment value: "the personal importance of doing well on the task," (b) intrinsic value: enjoyment and interest related to the task, (c) utility value: perceived relevance to current and future goals, and (d) cost: "negative aspects of engaging in the task" (Eccles and Wigfield 2002, 120).

Deci and Ryan's (1985) concept of internalization helps explain the processes by which some students ingrain IL skills into their personal practice as they continue to use them after developing them in a first-year seminar. The authors' later work demonstrates that individuals who also exemplify self-determination often successfully internalize useful academic concepts (see Ryan and Deci 2000).

Motivation and interest

Students' interest in a subject, topic, process, or task also plays a significant role in how much effort the student puts into that initial learning and practice. Hidi's work on interest frequently connects with work on motivation (see, for example, Eccles and Wigfield 2002, 114–15). Through her research, Hidi (2006) identified and defined two major types of interest: situational and individual. Situational interest refers to strong interest that someone may briefly feel toward a topic during one particular learning experience (72). Students with individual interest, however, have ongoing interest in a topic. They may look for opportunities to incorporate these topics into course projects (Hidi 2006, 72–73). Hidi states that "learners' individual interests energize and motivate their thoughts and actions in a very goal-directed way" (72).

Transfer

Basic concepts associated transfer support understanding of this study. Bransford, Brown, and Cocking (1999), major authorities on transfer, define it as "the ability to extend what has been learned in one context to new contexts" (51). In Marton's (2015) complementary definition, transfer "refer[s] to the effect of learning to handle one task on our ability to handle another task" (72).

Key concepts of transfer

Bransford, Brown, and Cocking (1999) identified four "Key Concepts of Transfer" (53):

1. Students must first learn a skill or knowledge in order to transfer it. We know a great deal about how to best support this type of learning.
2. Embedding learning in too specific a context can decrease future transfer.
3. Transfer should be viewed as a process rather than a set of results or goals.
4. All new learning requires some transfer from previous learning. Teachers and researchers should keep this in mind when planning instruction.

Applying these relatively simple concepts in the classroom can help strongly support transfer.

Scholarship of teaching and learning, motivation, and transfer

A potent body of literature connects the scholarship of teaching and learning (SoTL) and transfer. Driscoll (2014) explored ways in which the current focus on career preparation in higher education makes students value general concepts less, and therefore feel less motivated to give them sufficient attention in their studies (21). While IL is not a concept explored in that study, it fits well among other general educational concepts that Driscoll discusses as being deemphasized and problematic. Reid, Rowley, and Bennett (2019) provide some positive counterpoints. They discuss ways in which students' ability to transfer knowledge and skills develops in parallel with their sense of self. Their context is a performing arts classroom where concerns about future employability are rife (Reid, Rowley, and Bennett 2019, 399). The authors' suggestions on helping their students' see themselves as performers rather than students provide interesting options for models that could be used in other fields of higher education.

McClurg, MacMillan, and Chick (2019) outline four strategies by which academic librarians and classroom faculty can partner to facilitate the transfer of IL skills. They emphasize the fact that providing "complementary perspectives" on information in the classroom can help students value the skills more highly, thus supporting more effective transfer (McClurg, MacMillan, and Chick 2019, 4). Research by Bankston, Moberly, and Waltz (2019) connects closely with this work. Their work demonstrates how teaching partnerships between STEM faculty and librarians can support students' abilities to read and judge scientific literature (Bankston, Moberly, and Waltz 2019, 133), crucial foundational skills for undergraduate students in many fields.

Catalano (2015) researched the effects of situated learning on evaluating information. Her study showed that situated learning has significant potential to facilitate the transfer of IL skills (Catalano 2015, 653). Her work provides an interesting counterpoint to the current project, since, in this study, students worked in a variety of learning environments at school, home, and elsewhere.

Transfer of IL skills in higher education

A small but powerful collection of recent studies explore transfer of learning of IL skills in higher education. Kuglitsch (2015) explores the potential of the Framework for Information Literacy in Higher Education (2016) to support transfer in the university IL classroom. Her work probes the relationship between the Framework's threshold concepts and transfer of IL skills within a specific discipline.

Testers, Gegenfurtner, and Brand-Gruwel (2015) analyzed factors that effectively supported transfer of IL skills between IL instruction, courses, and work environments for 234 university students in the Netherlands. Key factors for transfer were (a) relevant opportunities to apply the concepts directly to coursework, and (b) support from work supervisors in applying these skills (Testers, Genenfurtner, and Brand-Gruwel 2015, 473).

Assessment of transfer

Researchers and teachers are both interested in knowing when transfer has truly occurred. A large body of literature explores methods for doing so. Bransford, Brown, and Cocking (1999) discuss traditional tests of transfer (51–53). Basically, traditional transfer tests measure students' success in applying skills or information learned in one situation to another situation. Bransford, Brown, and Cocking (1999) note that studies of transfer typically monitor one particular type of transfer, such as near or far transfer (53).

Bransford, Brown, and Cocking (1999)question the value of these traditional, "one-shot" tests of transfer (66). Rather, researchers and teachers need to remember to "view transfer as a dynamic process" (1999, 66). Transfer is not simply about applying learning once; it "requires learners to actively choose and evaluate strategies, consider resources, and receive feedback" (1999, 66). Their criticism of one-shot tests tied closely to Lave's criticisms of "two-problem" transfer situations. Lave provided extensive examples to demonstrate that in real life skill is developed over time. Skill is developed through successive applications, often with continued guidance available (Lave 1988, 40–44).

Alternatives for two-problem transfer situations exist. Roorda (2012) performed longitudinal research on the changes in students' mathematical performance after they learned complex concepts related to derivatives. His work explored Bransford, Brown, and Cocking's(1999) assertion that one-shot tests of transfer may seriously underestimate the amount of transfer that eventually will take place (66). Lobato has researched alternatives to two-problem transfer situations in STEM. For example, she collected protocols from several days of student learning and found that text acquired from those protocols demonstrated incremental learning (Lobato 2012).

Information literacy

The American Library Association (1989) defines 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.'" More recently, the Association of College and Research Libraries published the Framework for Information Literacy for Higher Education (2016). The Framework, as it is commonly called, explores IL in six frames: "(1) Authority is constructed and contextual, (2) Information creation is a process, (3) Information has value, (4) Research as inquiry, (5) Scholarship as conversation, and (6) Searching as strategic exploration" (ACRL 2016, 2).

Gaps in existing literature

Educational psychology literature connecting motivation and transfer of academic concepts is scant. A few pieces exist, such as Massenberg, Spurk, and Kauffield's (2015) work on factors that motivate employees to transfer training into practice at work. However, this theoretical piece, as well as most studies that employ concepts of both motivation and transfer, deal with job training rather than undergraduate education.

Scant brings all the major concepts in this paper—transfer, IL, and motivation—together. Beckford (2017) does touch on all three concepts in her doctoral work. She ultimately determined that, among the nontraditional college students whose IL transfer she studied, the ability to apply IL skills to academic tasks fell far below what librarians and college faculty expect (Beckford 2017, 110–11). Clearly, there is much work to be done in this field.

METHODOLOGY

This research explores two interconnected research questions. They are:

1. What motivational factors are likely to contribute to first-year undergraduate students' willingness to apply IL skills on their own?

2. Do certain motivational factors have a strong relationship with students' IL performance on a paper that they have written for a course of their choice one semester after learning the skills? (This question explores transfer of learning of IL skills across semesters. It also explores transfer between the contexts in which the IL skills were originally learned and the writing samples they submitted.)

This study's complex structure was designed to explore students' applications of IL "in the field." As is apparent in the study, applied IL appears in numerous ways throughout students' work. The researcher designed this study to explore real student applications of IL across the spectrum of work and personal life, to incorporate students' own perspectives on their motivations and to incorporate evaluations of students' IL applications from multiple expert perspectives (herself and a colleague).

Research sample and data sources

This research was conducted at the University of Colorado Denver (CU Denver), an urban public research university. In fall 2018, CU Denver reported enrollment of 11,010 undergraduate students, 2,328 of whom were first-year students (CU Denver Institutional Research 2019). Fifty-six percent of first-year students identified as either racial minorities or as international students (CU Denver Institutional Research 2019). All study participants had taken a three-credit first-year seminar (FYS), which embedded a set of college skills in a subject-specific course.

The researcher partnered with CU Denver's Director of First-Year Experiences to identify interested instructors of FYS courses. Nine faculty members invited the researcher to visit their courses during the fall 2018 semester. The researcher pitched and discussed the study for five minutes. In total, 152 students from the nine sections expressed interest in receiving study invitations. Students who registered as being interested received two email invitations to participate, with links to the study. The Director of First-Year Experiences also added a link to the study in a communication with students. Ultimately, 23 students provided a full submission, and one additional student completed the survey (due to a brief technological glitch). All 24 students were included in analysis for RQ1. The 23 students with full submissions were included in RQ2.

Data collection

Each participant provided two types of data. During the second semester of the first year, the researcher emailed the 152 potential participants. The message included a link to a survey that asked them to (a) attach a copy of any paper written during their second semester in which they used IL and CT skills, and (b) complete a Likert survey regarding motivating factors that have shaped their use of IL and CT skills between their first and second semesters.

The rubric (appendix A) used to evaluate writing samples employed one criterion to evaluate IL: "Chooses a variety of information sources appropriate to the scope and discipline of the research question. Selects sources after considering the importance (to the researched topic) of the multiple criteria used (such as relevance to the research question, currency, authority, audience, and bias or point of view)."

The survey began with demographic items, plus two administrative items: the student's major and the course for which the submitted paper had been written. The body of the survey contained 18 brief Likert-scale items. Each item was rated on a four-point scale. Nine items related to motivational factors affecting use of IL skills; the other nine related to motivating factors affecting use of CT skills. Each of the nine IL items was paired with a CT item that had parallel wording; these pairs of items investigated a single motivating factor. The researcher created the survey items, incorporating feedback from educational psychology and education faculty colleagues. It was delivered using Formstack software, which allowed students to respond to the survey and upload their essay in a single interface.

Data analysis

Quantitative analysis for this study began with descriptive statistics for each survey item. Item analysis was performed on each question. Results supported the use of all items. The qualitative portion of this work involved rubric analysis of the writing samples. The researcher and one collaborator scored all samples, and averaged scores for each sample. Average scores are used in the correlations.

The mixed methods portion of the analysis sought to determine whether significant correlations between rubric scores and survey responses existed. After assigning each subject an IL score using the rubric, the researcher performed a series of correlations between IL performance on the rubric and each of nine motivating factors in IL. She searched for strong correlations over 0.7. The confidence level was set at 95%.

Variables

Since this study measured correlations between two sets of variables, there were no dependent or independent variables. All variables were considered equal. Performance scores in terms of IL served as one set of variables. Performance was measured using the IL portion of the rubric.

Nine motivating factors served as a second set of variables. On the original survey, each motivating factor appears as (a) one survey item relating to IL and (b) one survey item relating to CT (see appendix B).

Human subjects and confidentiality

The work was conducted as confidential rather than anonymous. All communications and methods were approved by and in compliance with the Colorado Multiple Institutional Review Board.

Incentive

Students who completed the survey and submitted an essay received a $5 Starbucks gift card. Because the researcher briefly saw participant email addresses while sending the gift cards, hence the confidential, rather than anonymous, status.

Limitations and delimitations

When designing the survey, the researcher worked to a succinct definition of IL using familiar language. Participants were provided with these definitions but may still have had incomplete understandings of IL.

One delimitation is the fact that CU Denver's First-Year Experience program is limited to students 26 years of age and under. Recommendations may not apply to older students.

Another delimitation is the decision to allow students to submit a paper from any course taken during their second semester, provided that they had used both CT and IL skills in producing the paper. While this option gave students freedom of choice, it reduced comparison of performance.

RESULTS

A total of 24 individuals completed the survey. Twenty-three of those also submitted a writing sample (a technological glitch allowed one participant to skip the writing sample). The survey was administered for five weeks in April and May 2019.

Sample population: Descriptive statistics

All study participants completed demographic questions. The following descriptive statistics are based on the 24 students who completed the survey, regardless of whether they also submitted the writing sample. Table 1 summarizes participants' demographics:

Table 1. Self-reported demographics of study participants

Demographic factor	Summary of responses
Age	Mean of 18.8 years; range of 17 to 20 years
Gender	16 (67%) females; 8 (33%) males; 0 transgender or "other: free response"
Self-identifies as a first-generation college student	13 (54%) identify as a first-generation college student; 11 (46%) do not
College major	21 (88%) listed a single major; 2 (8%) identified as undeclared; 1 (4%) listed two majors. Fifteen specific majors were listed.

Research question 1: Descriptive statistics

Research Question 1 (RQ 1) asked, "What motivational factors are likely to contribute to first-year undergraduate students' willingness to apply IL skills?" Table 2 shows selected statistics on

participants' responses related to motivating factors and IL. Factors are presented on the table from highest to lowest in terms of the average score students assigned them using a Likert-style scale.

Table 2. Motivating factors related to IL

Motivating factor	Mean score	Standard deviation of scores
I believe in researching the reality behind what I read and hear.	3.79	0.08
I believe in searching for reliable information sources to learn about important topics.	3.79	0.41
I believe that strong IL skills will help me in my future career.	3.67	0.64
I believe that strong IL skills will help me to succeed in a future degree program (for example, a master's degree, law degree, medical degree, or Ph.D.).	3.63	0.56
My professors require IL as part of assignments and/or give points specifically for IL (such as finding articles in journals or going to the library).	3.46	0.51
I have learned to appreciate IL through experiences that I have outside of school (for example, in my social life, while writing or pursuing other creative hobbies, or while reading/watching media related to personal interests).	3.42	0.65
It is easy and/or natural for me to use IL skills now.	3.33	0.76
My classmates' performance in class or study sessions inspires me to use my IL skills.	2.79	0.72
Other students (classmates, friends, peer tutors, etc.) have recommended that I use IL skills on my assignments.	2.29	0.86
Note. Scores were presented to students as follows: (a) "very true for me" = 4 points, (b) "somewhat true for me" = 3 points, (c) "somewhat untrue for me" = 2 points, and (d) "Not at all true for me" = 1 point. *Note.* Mean scores and standard deviations have been rounded to two decimal points in order to make small differences in scores apparent.		

Free response: IL

A free response item on the IL section of the survey read, "Other: If something else inspires you to consider using your IL skills, please describe it here." Only two out of 24 participants (8%) responded to this question. Both wrote, "medical school."

Research question 2: Descriptive statistics

Research question 2 (RQ 2) explored the motivating factors most correlated with high performance on students' writing samples in IL.

IL performance and motivating factors for IL

Table 3 shows the correlations between each motivating factor for IL and IL performance on the writing sample, rated using the rubric. Only one of the p-values was less than 0.05. Thus, the only motivating factor having a significant correlation with performance was "I believe in searching for reliable information sources to learn about important topics."

Table 3. Correlations between IL performance and IL motivating factors

Motivating factor for IL	Pearson correlation with IL performance on writing sample	Significance (two-tailed)
My professors require IL as part of assignments and/or give points specifically for IL.	.170	.439
I believe that strong IL skills will help me to succeed in a future degree program (for example, a master's degree, law degree, medical degree, or Ph.D.).	-.085	.701
It is easy and/or natural for me to use IL skills now.	-.185	.398
I believe in searching for reliable information sources to learn about important topics.	-.476	.022
I believe that strong IL skills will help me in my future career.	.241	.269
I believe in researching the reality behind what I read and hear.	.043	.845
My classmates' performance in class or study sessions inspires me to use my IL skills.	.209	.339
Other students (classmates, friends, peer tutors, etc.) have recommended that I use IL skills on my assignments.	-.028	.898

I have learned to appreciate IL through experiences that I have outside of school (for example, in my social life, while writing or pursuing other creative hobbies, or while reading/watching media related to personal interests).	.023	.918

A brief discussion of correlations and significance may help readers in understanding these statistics. Pearson correlations above 0.7 represent strong correlations, those between 0.5 and 0.7 represent moderate correlations, and between 0.3 and 0.5 represent weak (but existing) correlations. When a Pearson correlation is negative, it represents a negative correlation. When examining significance, numbers less than 0.05 indicate statistical significance (meaning that there is a less than 5% chance that the results happened by coincidence). See the Discussion section for commentary on this study's results.

Rubric scores for IL and CT

The rubric used for this study (see appendix A) scored students' IL and CT performance separately, from 1 to 4 points. The researcher and a colleague scored students' performance independently. The two scores were averaged; the average was used to measure students' performance.

Participants' scores for IL performance had a mean of 2.24 points and a median of 2.00 points. Participants' scores for CT performance had a mean of 2.83 points and a median of 3.50 points. Both IL performance scores and CT performance scores had ranges of 1.0 to 4.0.

DISCUSSION

Findings revealed in this study connect with several bodies of existing research. They also offer some insights to areas that are sparse in terms of existing research, such as transfer in higher education, transfer of IL skills, and longitudinal studies exploring transfer over more than one semester.

Research question 1

RQ 1 asked, "What motivational factors are likely to contribute to first-year undergraduate students' willingness to apply IL skills on their own?" In practice, it asked all student participants in the study, regardless of their level of performance on the writing sample, what factors motivate them to use IL skills in their schoolwork and personal lives.

Motivating factors

Table 1 shows the order in which students identified motivating factors for use of IL skills, from most to least popular. This order of preference represents all study participants. The relative emphasis that students gave these factors highlights factors that participants viewed as most personally relevant.

Motivating factors: Top-tier responses

The motivating factors listed in first and second place in the list above were tied in their mean Likert scores. The items have several interesting similarities. Both could refer to topics that interest students for academic or personal reasons. Both suggest that students are interested in finding quality information on topics that matter to them for various reasons. Both imply that students are aware that

multiple information sources are available, with a range of levels of quality or reliability. Finally, students' response to the wording of both implies personal belief, which goes beyond seeking out quality information simply to fulfill academic requirements. They are both intrinsic (stemming from the students' personal motivations, rather than from outside pressures).

While the two motivating factors that tied for first place have similarities in terms of skills and techniques, the topics they relate to play different roles in students' minds. The motivating factor "I believe in researching the reality behind what I see and hear" relates to Hidi's (2006) concept of situational interest (72). The other motivating factor that tied for first place, "I believe in searching for reliable information sources to learn about important topics," ties with Hidi's contrasting concept of individual interest. In this study, it appears that topics of both situational and individual interest supported use of IL skills. When students see a topic as important but do not express ongoing interest, the topic falls within Hidi's (2006) definition of situational interest (72).

The third- and fourth-place motivating factors for continued use of IL skills related to IL skills supporting future career plans and future degree programs. With its focus on preparing students for future success at CU Denver, instructors and librarians can easily incorporate brief discussion of IL's roles in future careers and degrees.

Motivating factors: Bottom-tier responses

The two weakest responses, "My classmates' performance in class or study sessions inspires me to use my IL skills" and "Other students (classmates, friends, peer tutors, etc.) have recommended that I use IL skills on my assignments," relate to peer influence. The former relates to classmates' passive influence on each other by example, and the latter relates to students actively influencing each other. There was a gap between the seventh-rated motivating factor and the bottom two motivating factors in terms of IL. This connection suggests a few things. As new undergraduates, students may benefit from prompting to use IL skills. They may struggle to learn directly from examples that their classmates provide without guidance. Alternatively, they may be unready to provide each other with substantial suggestions regarding improvement of academic performance.

Motivating factors: Middle-tier responses

The remaining three factors were "My professors require IL as part of assignments…" (fifth place), "I have learned to appreciate IL through experiences that I have had outside of school…" (sixth place), and "It is easy and/or natural for me to use IL skills now" (seventh place). Perhaps requiring IL is so normal to students that they do not think about it. Regarding the sixth-place item, students in the pilot study provided thoughtful, enthusiastic commentary on this topic. The researcher believes that students may make stronger connections with this item if an instructor purposefully introduces it with more context and gives students structured opportunities to work with it. The seventh-place item ("It is easy and/or natural for me to use IL skills now") makes sense: students may not have practiced IL skills, particularly at the college level, enough for them to feel comfortable in use.

Several topics connected with this study merit future work. One is the concept of incremental learning. Lave (1988) discussed students' gradual, measurable development of skills over successive applications (40–44). Future work could investigate how students' use of IL skills matured throughout successive assignments.

During the pilot study, participants shared powerful examples of research related to personal interests. (They had been asked to elaborate upon survey responses.) This informally suggests a potential for incorporating discussions of students' personal hobbies and interests into IL activities during FYS and other courses.

The pilot study also hinted at insights that could be gained by interviewing students and asking them to use the "think-aloud" methodology described by researchers who study transfer in secondary STEM education (e.g., Lobato 2006; Lockwood 2011; Patchen and Smithenry 2013). The researcher would be interested in using this on a small scale with individual students to identify unanticipated motivating factors. She would be equally interested in performing another study very similar to this one with a much larger sample group. This would provide stronger statistical insights and cover a broader range of student minds and viewpoints.

The researcher hopes that this work will inspire a great deal of additional research in the future. She will conduct some, and perhaps others in the overlapping fields in which she works will pick up some of the themes as well. As various portions of this paper mention, this research sits at the intersection of a number of gaps in existing literature.

Research question 2

RQ 2 asked, "Do certain motivational factors have a strong relationship with students' IL performance on a paper that they have written for a course of their choice one semester after learning the skills?" The objective in asking this question was to identify factors that motivated the students who gave the strongest performances on the writing sample, in terms of their usage of IL skills.

RECOMMENDATIONS

Data gathered throughout this study suggests four practical recommendations for higher education:

Recommendation 1: Students of all performance levels share motivating factors.

Rather than looking to the "most successful students" for a model as faculty and librarians in higher education often do, instead consider emphasizing factors that consistently motivated the most students regardless of their performance levels.

Recommendation 2: Students engage with career-related applications of IL.

Thoughts of future careers and, to a lesser extent, degree programs, motivate students. The thought of a career is more tangible and familiar to undergraduate students, which may be why students rated careers as a more powerful motivating factor in terms of IL use. Faculty and librarians can connect their discussions of IL with careers, as well as plans for future degree programs and other career preparation.

Recommendation 3: Students engage with fact checking and examining "the truth behind" media stories and big ideas.

Students expressed motivation to use IL skills to investigate major topics of interest, and to check the reality behind ideas that they come across through media. Instructors and librarians can work together to craft activities and plan discussions that make use of these strategies.

Recommendation 4: Students may benefit from coaching on use of IL.

Students may not know how best to coach each other or to comment on their use of IL. At CU Denver, one popular practice is to ask a writing center tutor to teach students to give effective feedback on writing. In addition to coaching them on giving feedback on writing, faculty can help students to comment on classmates' IL skills by giving each other language and techniques with which to do so.

FUTURE WORK

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The researcher hopes that this work will inspire a great deal of additional research in the future. She will conduct some, and perhaps others in the overlapping fields in which she works will pick up some of the themes as well. As various portions of this paper mention, this research sits at the intersection of a number of gaps in existing research. Insights in any of these areas will benefit student learning and performance.

AUTHOR BIOGRAPHY

Karen Sobel directs the Center for Faculty Development & Advancement at the University of Colorado Denver (CU Denver). She also serves as a Teaching & Learning Librarian at CU Denver's Auraria Library. She holds a Doctor of Education from CU Denver, as well as an MSLS in Library Science and an MA in English from the University of North Carolina at Chapel Hill.

ETHICS

Research methods and instruments were examined and accepted by the Colorado Multiple Institutional Review Board (COMIRB), which governs research at the University of Colorado Denver.

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APPENDIX A: RUBRIC USED IN THIS STUDY

IL section

The rubric item and rating levels that I used for assessing the IL content of students' papers were as follows:

Criterion: "Evaluate information and its sources critically."

4 points ("capstone")	3 points ("milestone")	2 points ("milestone")	1 point ("benchmark")
Chooses a variety of information sources appropriate to the scope and discipline of the research question. Selects sources after considering the importance (to the researched topic) of the multiple criteria used (such as relevance to the research question, currency, authority, audience, and bias or point of view).	Chooses a variety of information sources appropriate to the scope and discipline of the research question. Selects sources using multiple criteria (such as relevance to the research question, currency, and authority).	Chooses a variety of information sources. Selects sources using basic criteria (such as relevance to the research question and currency).	Chooses a few information sources. Selects sources using limited criteria (such as relevance to the research question).

(Modified from Association of American Colleges & Universities, 2013).

CT section

The rubric item and rating levels that I used for assessing the CT content of students' papers were as follows:

Criterion: "Conclusions and related outcomes (implications and consequences)"

4 points ("capstone")	3 points ("milestone")	2 points ("milestone")	1 point ("benchmark")
Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

(Modified from Association of American Colleges & Universities, 2009)

APPENDIX B: SURVEY USED IN THIS STUDY

Dear Student,

Please upload a paper that you have written for any course this semester. In addition, please make sure that it is a paper where you were required to refer to outside sources (such as articles, books, websites, etc.). Choose one where you are proud of the work you have done with (a) CT and (b) IL. Definitions:

- *CT*: "evaluating the accuracy, credibility, and worth of information and lines of reasoning" (Ormrod, 2012, p. 421). In other words, have you analyzed others' reasoning and arguments, or created strong reasoning or arguments of your own?
    - o Some actions that you might have taken related to CT are:
        - ▪ Spending time analyzing or researching whether something you have heard could be true
        - ▪ Looking for alternative opinions on a subject
        - ▪ Debating different sides of a topic with someone else, or choosing to listen to a debate
        - ▪ Thinking about the assumptions behind what a person or group has said or written
- *IL*: "recognizing when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association, 1989).
    - o Some actions that you might have taken related to IL are:
        - ▪ Thinking about whether a website you visited is reliable
        - ▪ Thinking about what facts, statistics, or ideas would best support an idea that you have
        - ▪ Visiting a library or a library's website
        - ▪ Asking a librarian, professor, or friend for advice on your research

Note that if you have questions or technical difficulties, you may contact me, Karen Sobel, at karen.sobel@ucdenver.edu.

Please remove your name from your paper before submitting.

{{UPLOAD BOX}}

Title of your paper: [free response] (Note: This helps ensure that I can connect your paper and your survey responses.)

Demographics

1. What is your age? [Enter years.]
2. What is your gender? [female, male, transgender, other: [free response]]
3. What is your major? [menu]
4. What department did you write this paper for? [menu]
5. Do you identify as a first-generation college student (first in your family to attend college)? [yes, no]

Questions

What are some reasons that you continue to use the CT skills that you learned during your First-Year Seminar course (and perhaps other courses) last semester?

- My professors require CT as part of assignments and/or give points specifically for CT.

4 (very true for me)   3   2   1 (not at all true for me)

- I believe that strong CT skills will help me to succeed in a future degree program (for example, a master's degree, law degree, medical degree, or Ph.D.).

4 (very true for me)   3   2   1 (not at all true for me)

- It is easy and/or natural for me to use CT skills now.

4 (very true for me)   3   2   1 (not at all true for me)

- I believe in thinking critically about important topics.

4 (very true for me)   3   2   1 (not at all true for me)

- I believe that strong CT skills will help me in my future career.

4 (very true for me)   3   2   1 (not at all true for me)

- I believe in thinking critically about what I read and hear.

4 (very true for me)   3   2   1 (not at all true for me)

- My classmates' performance in class or study sessions inspires me to use my CT skills.

4 (very true for me)   3   2   1 (not at all true for me)

- Other students (classmates, friends, peer tutors, etc.) have recommended that I use CT skills on my assignments.

4 (very true for me)   3   2   1 (not at all true for me)

- I have learned to appreciate CT through experiences that I have outside of school (such as in my social life, or while reading/watching media related to personal interests).

4 (very true for me)   3   2   1 (not at all true for me)

Other: [Short free response]

What are some reasons that you continue to use the IL skills that you learned during your First-Year Seminar course (and perhaps other courses) last semester?

- My professors require IL as part of assignments and/or give points specifically for IL (such as finding articles in journals or going to the library).

4 (very true for me)   3   2   1 (not at all true for me)

- I believe that strong IL skills will help me to succeed in a future degree program (for example, a master's degree, law degree, medical degree, or Ph.D.).

4 (very true for me)   3   2   1 (not at all true for me)

- It is easy and/or natural for me to use IL skills now.

4 (very true for me)   3   2   1 (not at all true for me)

- I believe in searching for reliable information sources to learn about important topics.

4 (very true for me)   3   2   1 (not at all true for me)

- I believe that strong IL skills will help me in my future career.

4 (very true for me)   3   2   1 (not at all true for me)

- I believe in researching the reality behind what I read and hear.

4 (very true for me)   3   2   1 (not at all true for me)

- My classmates' performance in class or study sessions inspires me to use my IL skills.

4 (very true for me)   3   2   1 (not at all true for me)

- Other students (classmates, friends, peer tutors, etc.) have recommended that I use IL skills on my assignments.

4 (very true for me)   3   2   1 (not at all true for me)

- I have learned to appreciate IL through experiences that I have outside of school (such as in my social life, or while reading/watching media related to personal interests).

4 (very true for me)   3   2   1 (not at all true for me)

Other: [Short free response]

Is there anything else that you'd like to tell me? [short free response]